

COLECCIÓN **DIVULGACIÓN**

Celebrating glass, achieving sustainability, inspiring transformation

ALICIA DURÁN AND JOHN M. PARKER
EDITORS

CSIC


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A report on the activities undertaken for the
United Nations International Year of Glass 2022

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A report on the activities undertaken for the *United Nations International Year of Glass 2022*

Alicia Durán and John M. Parker (eds.)

CSIC

Madrid, 2024

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Glass will stay in our memory

WHEN in the future the United Nations historians study the tragic years of the early 2020s, they will look with curiosity at the International Year of Glass 2022. Amid the lingering effects of the pandemic's medical, economic and social crisis of COVID, with increasingly threatening geopolitical tensions and the bloody wars in Ukraine or Ethiopia, among many other conflicts, the division of the world into blocs and the paralyzed Security Council, the United Nations General Assembly was able to concentrate on the task of building a better future, to implement concretely the 2030 Agenda and unanimously adopt a resolution proclaiming 2022 the International Year of Glass.

In July 2018, Professor Alicia Durán, president of the International Commission on Glass, contacted me, the recently appointed Spanish ambassador to the United Nations. We were old friends and with her explanations I understood the magnitude of the challenge, but also its transversal importance: glass is not only one of the basic materials of civilization, but it is essential to achieve almost all the objectives of the 2030 Agenda. Upon arrival in New York, the Spanish Mission to the United Nations endorsed the objective of placing the International Year of Glass on the agenda of the General Assembly. And the person in charge of starting the negotiations to promote the resolution with the support of all member states was counselor Ana Alonso Giganto.

Little did we suspect then the difficulties that awaited us. The COVID epidemic was a practical example of the extent to which we depended on glass for the vaccination campaign that the UN tried to extend to the entire planet. It was not

glass that limited this effort. But other priorities forced diplomatic negotiations to be postponed until early 2021 to gain support of all UN Member States in the General Assembly.

The campaign was an example of what civil society, scientific organizations, artists, museums and companies in the glass sector could do. The program of scientific conferences, meetings and artistic exhibitions was accompanied by pedagogical extension and exchanges of technology and know-how about the glass sector in all its aspects. The effort was self-financed and a fund was created with the generous help of industrial sponsors and national societies, so that all interested parties could participate on equal terms in the programmed activities. The events were distributed throughout the planet to make the effort truly international: an example of establishing effective alliances in the public, public-private and civil society spheres.

As dissemination of information about the program increased, interest and pressure from scientific, museum and business organizations on their governments to join the campaign and the negotiation process at the United Nations also grew. The Spanish Mission was no longer alone in promoting the resolution and the number of co-facilitators expanded, since this resolution allowed many of the UN Member States to show their commitment to the Sustainable Development Goals.

It could not be otherwise. When it was most necessary to relaunch the objectives of the 2030 Agenda, the world was plunged into geopolitical crises. But the International Year of Glass made it possible to advance Goal 3 (Health and Wellbeing) as had been made evident during the epidemic; Goal 4 (Education), organizing hundreds of seminars and workshops to disseminate technology and scientific and artistic knowledge about glass; Goal 5 (Gender Equality), taking the fight against discrimination of women and girls within the sector and making organizations and companies aware of the importance of achieving gender parity and equality, especially in promoting the empowerment, participation and contributions of women and girls through education, in science, technology and innovation; Goal 6 (Drinking water and sanitation) developing glass filters for wastewater treatment; Goal 7 (Clean and accessible energy for all) because glass is an essential component of solar and eolic (wind) energy and green hydrogen transport; Goal 9 (Innovation, industry and infrastructure), since without optical glass fibers the maintenance of our knowledge society and the digital revolution would not be possible; Goal 11 (Sustainable cities and communities), glasses are perhaps the most historically present basic construction material and on whose evolution we depend to maintain and develop the infrastructure of our life together, while we recycle them over and over

again, contributing to achieving a circular and sustainable economy ; Goal 12 (Responsible consumption and production), glass is not only endlessly recycled, its production is one of the industrial sectors where continuous efficiency has allowed us to reduce the carbon footprint; Goal 13 (Climate action) the massive application of glass has allowed not only the growth of solar energy, but also energy savings; Goal 14 (Marine life), allowing not only oceanographic exploration, but also the replacement of plastic, which is one of the greatest threats to maritime life; Goal 17 (cooperation and associations), the International Year of Glass itself is an example of how commitment to the common good is capable of structuring diverse interests and promoting the 2030 Agenda.

The International Year of Glass 2022, under the coverage of the resolution of the United Nations General Assembly, began in Geneva, under the dome of Barceló, in the Human Rights Hall of the Palace of Nations and concluded in New York, in the General Assembly building. In between, as planned, there were dozens of central activities and thousands of local events, financed from the sector itself.

What it is essential now is to project into daily life this capacity for cooperation and innovation in the glass field. Advance the 2030 Agenda, leaving no country behind, until all the inhabitants of the planet can enjoy the levels of development, education and health that ensure the material conditions of their global citizenship. On that day, the values of the United Nations Charter will have become a reality and the original document will rest as a testimony of the past in its glass case.

For us it has been an honor and satisfying to have participated in this process.

Agustín Santos Maraver, *Ambassador of Spain*
Ana Alonso Giganto, *Counsellor of the Spanish Mission at the UN*





Alicia Durán and John M. Parker
Editors

Preface

This book is based on submissions by many different IYOG participants. Indeed, so many that inevitably not all are named, nor their contributions properly acknowledged. We sincerely apology for any omissions and hope that the mention of your favorite activity will be sufficient recompense. Equally far too many activities occurred for all to be included. Again, we apologize —please let us know of any significant gaps so that we can record them for posterity in our database or on the IYOG web site.

The book itself is intended as an informative report demonstrating how the year was structured and administered. As far as possible organization was devolved to local groups; no funds were available for a central organization —which also relied on unpaid volunteers. Indeed, the energy, enthusiasm and imagination of hundreds if not thousands of teams working together was immensely rewarding and more than justified this approach.

We hope that you will find this report both informative and heart-warming. We hope it will stimulate ongoing activity, and encourage a sense of a glass community, both locally and internationally. We hope that many existing organizations will take up the baton of 'The Age of Glass' and run with it. Indeed, my post this morning had a greeting card with just this message.

The book itself is structured historically starting with the Opening Ceremony in Geneva and concluding in Tokyo and New York. Individual sections are devoted to Education (Chapter 5), History and Museums (Chapters 5 and 6), significant themes throughout the year. Another chapter records the choice of 7 Wonders of the Glass

World. Chapter 9 lists many examples of books, articles and videos generated. Chapters 8 and 11 records the reactions of existing National and International Glass Organizations and our main sponsors and supporters. Chapter 4 is the heart of the book and almost half of the content —reports from the 18 regional organizations participating and indeed generating most of the year long program. Altogether there are some 372 pages of text which have been beautifully illustrated by a multitude of photographs through the efforts and energy of Prof. Durán. We have tried to avoid photographs of large anonymous groups. Many important individuals are pictured —if you are not included, again we sincerely apologize. Space is limited and so many of you were involved.

All hyperlinks have been embedded into the text. These will be live links in the electronic file that will be published alongside the paper copy. If perchance you only have a paper copy you will need to find an online copy of the text, for example on the IYOG web site. As a space saver, all dates have the format: month code and day; dates that do not mention a year are in 2022. Similarly, the International Year of Glass has become the IYOG. Similarly, the International Year of Glass has become the IYOG.

As we said at the beginning of IYOG: 'You know who you are, we know who you are. We hope the success of this amazing project will be a sufficient reward for your contribution'.

See you all walking and working together in the Age of Glass.

Alicia Durán and John M. Parker



Alicia Durán and John M. Parker

1. The United Nations International Year of Glass - its Origins

In May 2021 the Glass World was awakening to the possibilities offered by a United Nations sponsored International Year of Glass. Questions flowed concerning finance, organization, communications and they did not then have clear answers. At the same time the consequences of the aftermath of the COVID pandemic were still evident, imposing constraints on social mixing and travel.

This report explores the story leading up to the formal announcement and how events subsequently unfolded, those that were anticipated and those that were not. It begins with an ambitious dream, which then led to the presentation of a formal proposal to the United Nations and ultimately its approval by the United Nations General Assembly. What followed during 2022 went beyond our wildest imaginings and is recorded in subsequent chapters using as far as possible the words of the thousands involved. This record explains the financing, organization and impact, both short- and long-term, of thousands of events around the globe. We hope it will be an appropriate recognition of our debt of gratitude to the United Nations and that it will inspire and inform others so they can transform their own dreams to reality.

1.1. Early beginnings

The story began in 2014 when L. David Pye, Past President of the International Commission on Glass and the American Ceramic Society, learned that the United Nations General Assembly had declared 2015 an International Year of Light and Light-Based Technologies.

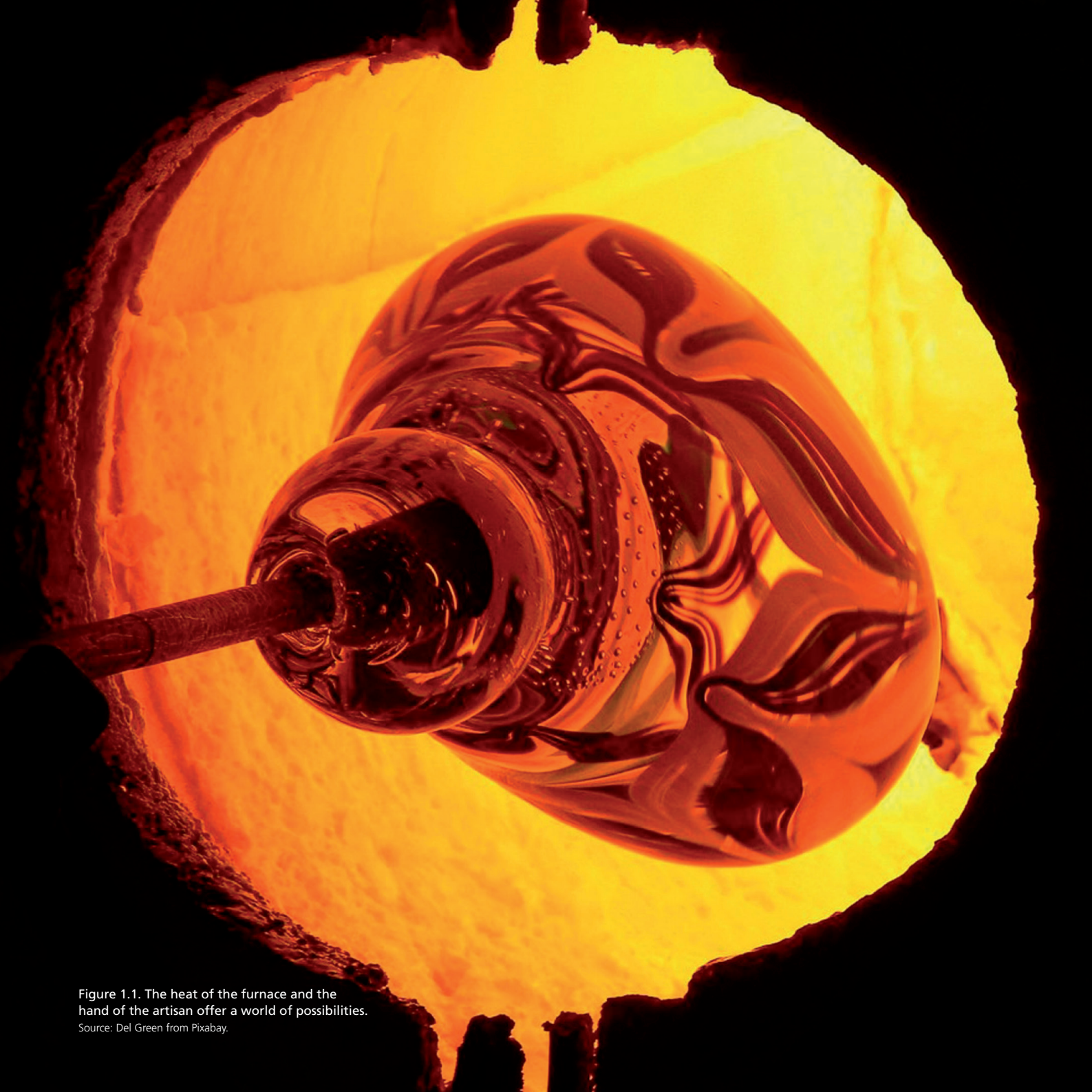


Figure 1.1. The heat of the furnace and the hand of the artisan offer a world of possibilities.
Source: Del Green from Pixabay.

As editor of *The International Journal of Applied Glass Science (IJAGS)* he grasped the opportunity to showcase "*Glass and Light*" in a special edition. A year later he reacted to the emerging paradigm that we have entered *The Age of Glass*. David L. Morse and Jeffrey W. Evenson, senior administrators, Corning Inc., (supported by others) eloquently summarized this new thinking in their contribution "*Welcome to the Glass Age*"[1]. They proposed that we are at a pivotal moment where the arrival of *The Age of Glass* can be declared by glass scientists, engineers, manufacturers, educators and artists around the globe.

They argued that glass had a major role in advancing civilization and mankind throughout history, be it in architecture, the arts, transportation, medicine, communications, or many branches of science. Without glass, the microscopic biological world might never have been revealed, nor would we have discovered the universe beyond the earth, moon and stars. How can we not marvel at the beauty and reverence of stained-glass artistry in cathedrals across the world while excluding cold, rain and snow? Or the simple filament lamp, providing light when darkness falls? Or the extending of our working lives by placing curved glass lenses before our eyes?

1. *Welcome to the Age of Glass*, edited by Alicia Durán and John M. Parker, publ CSIC. Chapter 1. A. Durán, J. M. Parker and D. Pye. Available online free of charge in English and in Spanish.

While many revolutionary innovations do not have glass at their heart, yet one of the greatest contributions of glass to life today is its role in advancing communication in ways unimaginable a century ago. Has not the world been transformed by the optical glass fiber networks that span the globe? Or by ultra-thin glass plates for television sets and protective covers for mobile phones? Then there is the remarkable story of a small company in Rochester, New York, that realized the potential of a light sensitive semiconducting glass for making possible high-speed reproduction of documents. This company was eventually renamed the Xerox Corporation. Many similar stories can be found in other emerging fields in glass such as healthcare or renewable energies. Notwithstanding this remarkable history, the view here is that the best is yet to come as glass science continues to evolve and be better understood. Heralding the advent of *The Age of Glass* will bring to the attention of the public at large the critical role glass has in our daily lives. Subsequent lectures by Manoj Choudhary, then ICG President, and David Pye given to international audiences explored the theme that glass science, engineering and art are entering new and profound chapters in their histories. Based on the above remarks, a sense of history, and appreciation of a seminal idea whose time has come, it is a great honor to chronicle here and affirm the advent of *The Age of Glass*, and by extension the declaration by the UN of an International Year of Glass.

Prompted by the very positive reactions to the above, David Pye discussed the concept of an International Year of Glass (IYOG) with Charles L. Craig, Senior Vice President, Science and Technology, Corning Inc. He was strongly supportive and encouraged its pursuit. Soon thereafter Profs. Choudhary and Pye introduced a motion in September 2018 at the Annual Meeting of the Council of the International Commission on Glass in Japan. It read:

The International Commission on Glass, representing organizations and individuals throughout the world dedicated to the promotion of science, technology, artistry and application of glass enthusiastically endorses the exploration of a future declaration of a Year of Glass by the United Nations.

Following its positive reception, Prof. Pye presented the concept to the American Ceramic Society and the Corning Museum of Glass (CMoG). Both embraced the idea, the latter leading Steven T. Gibbs, a senior administrator, to play a pivotal role in advancing IYOG2022 to the international art community. Buoyed by this groundswell of enthusiasm,



Figure 1.2. Flag of the United Nations adopted in December, 1946.
Source: Miguel Á. Padriñán from Pixabay.

ICG's then President, Alicia Durán, took up the baton to become Chair of an International Steering Committee for the proposed IYOG. The die was cast.

1.2. Presentation to the United Nations

Throughout the past 60 years the General Assembly of the United Nations (Figure 1.2.) has honored contributions to society in many fields by declaring '*International Years*'.

A UN badged International Year requires a United Nations Resolution. The Spanish ambassador at the Spanish Permanent Mission at the UN in New York, Agustín Santos Maraver, agreed to lead the process through the General Assembly of United Nations and explained the steps and documents needed. The application finally submitted had 1) a main document confirming the role of glass in supporting the Goals of Agenda 2030 (Figure 1.3.), 2) an eco-social document reporting the state of the art in the glass industry and 3) an Executive Summary. Together they showed how the glass community is supporting the 2030 UN developmental goals: responsible production and sustainability; innovation and infrastructure; affordable and clean energy; climate action; unpolluted water and oceans; sanitation, health and well-being; education and gender equality. From these documents, the final Resolution was written promoting glass, its past and its future potential.

The chair of the group that led to the 2015 International Year of Light, Prof. John Dudley, University of Franche-Comté, willingly shared his experiences on the negotiation process with an initial IYOG team consisting of Professors Durán, Pye and Parker and explained more of the procedures involved.

Being aware of their reputations and potential contributions the International Commission on Glass approached several glass-based organizations as possible working partners. The International Committee of Museums, along with the Community of Glass Associations promoted by VITRUM and the Italian Government, accepted the challenge and joined ICG, with its links to many national Glass Societies, as sponsors of IYOG.

A formal application for a *United Nations International Year of Glass for 2022* to celebrate the technological, scientific, artistic and economic role of glass as an enabling material crucial to many technologies and cultures was shifting from a possibility to a probability.

Many factors influenced the choice of year but high on the list were several important anniversaries. Of particular importance administratively was that

Figure 1.3. Sustainable development goals of Agenda 2030.
Source: United Nations.



2022 was the Centennial Anniversary of the German Society of Glass Technology but there were other noteworthy anniversaries too: the 100th anniversary of the opening of King Tutankhamun's tomb with its glass rich treasure, 200 years since the invention of the Fresnel lens, the 70th Anniversary of the Float Glass process, the 60th anniversary of the Studio Glass movement, and remarkably 670 years since the first painting showing someone wearing eyeglasses!

1.3. Assembling an application

Throughout these initial negotiations written documentation was in preparation. A 20 page position statement created from an initial draft prepared by Prof. John C. Mauro, The Pennsylvania State University, was enhanced by drawing on information from numerous other sources. More than 40 experts, mainly from ICG Technical Committees, participated in this main document. With the help of David Moore, Managing Editor, The Society of Glass Technology, it subsequently became an eight-page illustrated brochure. A paper on the global economics of the glass industry was also generated from a variety of sources and national reports; it finally became the eco-social document submitted to the UN. These documents can be downloaded from the IYOG website.

To supplement these written texts, a twenty-minute video was created by Prof. Julian Jones, Imperial College, and Mathieu Hubert, Development Associate, Corning Inc. In addition to the main authors, many experts and colleagues collaborated in creating this splendid film and the documentation justifying our project; while too many to mention individually we would like to acknowledge their support; they were always ready to assist and overflowing with ideas. The film can be viewed at this link; a version with Japanese subtitles has also been produced.

1.4. An advertising campaign

Before the final submission to the UN the next step was to generate international awareness and interest in the proposal for an International Year of Glass. Articles were written in Journals and Trade Magazines (see Chapter 9)

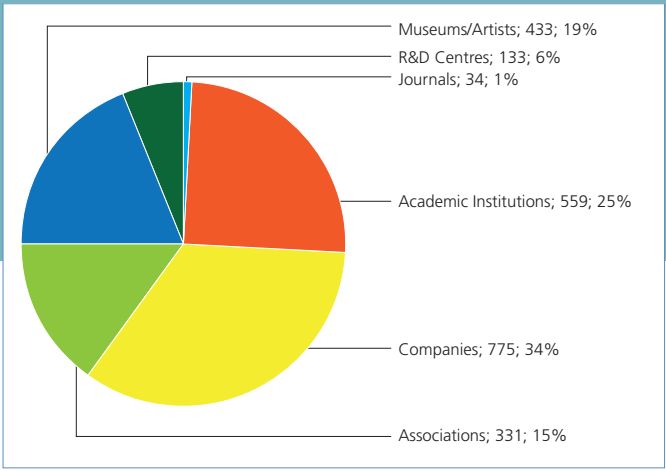


Figure 1.4. Showing the distribution of expressions of interest from various types of Institution.
Source: IYOG endorsers database.

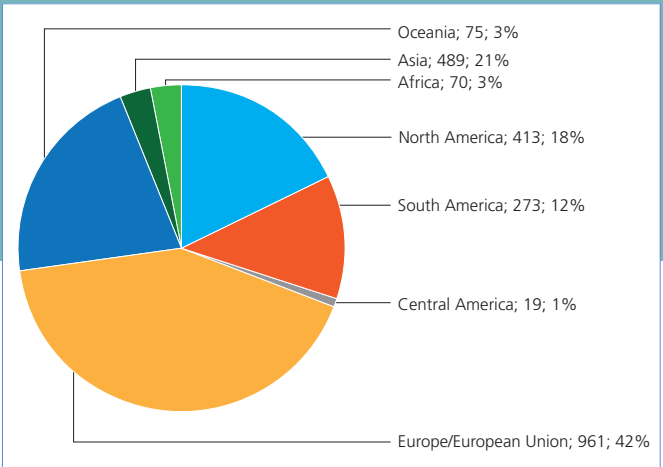


Figure 1.5. Showing the distribution of expressions of interest from different continents.
Source: IYOG endorsers database.

and a web site was developed (www.iyog2022.org). The documentation and videos created for the UN were helpful as publicity. A LinkedIn site was started and Glass Societies throughout the world were contacted to circulate information, particularly to disseminate links.

To harness the enthusiasm generated, a contact form was released on the International Year of Glass web site to gather the details of interested organizations and individuals. Subsequently this created an invaluable database, but initially the associated statistical information garnered became a significant plank in the evidence submitted to the United Nations. Figure 1.4 is a chart showing the types of Institutions offering support and Figure 1.5 indicates their geographical distribution.

By the end of 2021 enthusiastic support had been received from almost 2500 Universities and research centers, societies and associations, museums, artists, educators, manufacturers and companies in 96 countries spanning all five continents. Almost 1400 of these submissions were received in time for inclusion within our final documentation submitted to the UN. Dealing with communications on this scale required the use of specialist software such as Mailchimp which fortuitously was just becoming available on the market at low cost.

1.5. The proposal is accepted by the United Nations

The UN submission process was far from smooth; false starts were frequent, caused by the effects of the COVID-19 pandemic and the political sensitivities behind such submissions. Dates anticipated for a formal submission came and went without action because important meetings were delayed or not everyone agreed on the details of the submission. A further problem was the change of the approval method in the General Assembly, from majority to unanimity; this required a detailed and longer negotiation process amongst the participants of the GA. Eventually a draft Resolution outlining our ambitions

was negotiated and accepted by the Missions of a significant number of UN countries during April 2021. It successfully passed a silent process of approval on 11th May —that is no one objected. The formal resolution was agreed at the United Nations General Assembly on May 18th, 2021 during a meeting broadcasted by UN TVE; several IYOG committee members sat glued to their seats listening to the proceedings and their response to the unanimous vote echoed around the world.

Heartfelt thanks go especially to the Spanish Mission at the UN, particularly the Spanish Ambassador Agustín Santos Maraver and Ana Alonso, who led this process through the difficult twists and turns of diplomacy in stressful times. We are also grateful to the 19 countries that lent invaluable support as Co-Sponsors, formally endorsing the UN resolution.

1.6. Setting up an Administration Team

The initial planning had been mostly supported by the International Commission on Glass, a voluntary organization made up of officers of the main National Glass Societies around the world. Others from the much wider, global constituency were drawn in over time. Representation from Museums, History, Education and the Arts was also vital – each had their own important membership supporting different aspects of Glass. Some, still recovering from the aftermath of COVID, could not commit significant resources but finally *The International Committee of Museums (ICOM)* and *the Community of Glass Associations* joined ICG as major supporters. Other international working groups and associations with related aspirations also provided significant administrative support (Vitrum, FEVE, NGA, GE) and some have submitted individual reports (Chapters 6 and 8). Other commercial organizations took on specific tasks such as the preparation of a Web Page for the Opening Ceremony at no charge.

Once approval for IYOG2022 had been given by the United Nations a rapid gear shift was needed. A Core Team (Table 1.1) with the responsibilities listed sprang into action.

Two more people deserve a very special mention for their tireless support in vital administrative roles: Mrs. Kun Wang and Dr. Maria Pascual.

Mrs. Kun Wang of Triumph International, China and also the Executive Secretary of the International Commission of Glass provided

Prof. Alicia Durán (Spain):	Chair
Prof. John Parker (UK):	Documentation and Website
Mr. Patrick Gavaghan (Australia):	Fund Raising and Grants
Prof. Teresa Medici (Italy):	Museums and Art
Dr. Mathieu Hubert (USA):	Youth Outreach

Table 1.1. Core Team (Images shown in Figure 1.6).



Figure 1.6. The Core team.
Source: © IYOG archive.

invaluable support throughout: setting up online meetings, keeping records in shared online storage, creating Agenda and Minutes, and mostly undertaken in spite of the seriously antisocial working hours caused by international time differences.

Secondly Dr. Maria Pascual took on the task of Treasurer, a particular onerous position because many countries with different banking systems and currency were involved. She had already been an effective treasurer for ICG for many years and was able to create a parallel account within that of the ICG so that no new bank charges or auditing costs were incurred.

They met frequently on Zoom/ Teams throughout the second half of 2021 and the whole of 2022. Frequent emails, often with panic written between the lines of their brief messages, flew around the world and helped to solve the issue of time differences. Holidays taken that summer were brief!

United Nations protocol placed two major obligations on the IYOG2022 Organizing Committee. The first was to arrange an Opening Ceremony at the United Nations Headquarters in Geneva. Its theme was primarily to present to the UN ambassadors and secondly a worldwide audience a summary of the arguments used in the Application to justify the award of a UN sponsored International Year. It had to demonstrate how glassy materials were aiding the aspirations embodied within the UN 2030 humanitarian goals.
A further constraint was that this event had to be undertaken without charging a conference fee; at the same time some COVID restrictions were still being applied. A Closing Ceremony at the end of the year celebrating what had been achieved was the second requirement; it took place in Tokyo, Japan.

These events were of particular significance, and they merit extended commentaries in this report. So, Chapter 2 focusses on the Opening Ceremony while Chapter 10 describes the closing event in Japan, both through the eyes of the event organizers and others who were present. The program organizing committee for the Opening Ceremony was chaired by Prof. L. Wondraczek from Germany while the Closing

Ceremony organizing Committee was chaired by Profs. H. Inoue and S. Tanabe.

At the suggestion of the Spanish Ambassador to the UN, a prime mover in organizing the whole year and a vital contact point between the organizers and the UN, a shorter Debriefing Meeting was also held in December in the United Nations building in New York to present selected noteworthy outcomes from the Year in an easily digestible format for the UN Ambassadors. This forms part of Chapter 12 alongside other concluding remarks.

From the start, the core team realized a) the importance of a contact list and b) that the varied and multidimensional celebrations which an International Year deserved could not be organized solely by one central committee. Regional Organizations were created based on location, language and the geographical distribution of endorsers across the planet, 18 groups in total, listed in Table 1.2. Each group focused on coordination, advertising, sharing best practice and providing a supportive environment. An online database was created to collect and collate a list of planned activities. Its purpose was to be both an advertising resource and also a long-term record with more information than the wider public needed to see. Several Regional Organizing Committees also organized their own web sites which could then use the local language. Many of these sites can be found through links given in Chapter 4, which has reports from each committee summarizing their achievements.

RO01	Brazil
RO02	Germany; Liechtenstein
RO03	China
RO04	Turkey, Greece, Cyprus, Malta, Jordan, Saudi Arabia, Lebanon, United Arab Emirates, Bahrein, Israel, Bulgaria
RO05	Argentina, Bolivia, Chile, Peru, Uruguay
RO06	Mexico, Costa Rica, Dominican Republic, Ecuador, Guatemala, Colombia, Venezuela, El Salvador, Panama
RO07	USA, Canada
RO08	Spain, Portugal, Andorra
RO09	France, Belgium
RO10	Japan, Korea
RO11	Denmark, Finland, Norway, Sweden, Netherlands, Luxembourg, Latvia, Estonia, Lithuania
RO12	UK, Ireland
RO13	Russia, Poland, Armenia, Kazakhstan, Belarus, Uzbekistan, Moldavia, Ukraine
RO14	Hungary, Slovenia, Serbia, Romania, Slovak Republic, Czech Republic, Switzerland, Austria, Croatia
RO15	Algeria, Angola, Egypt, Eritrea, Morocco, Nigeria, South Africa, Swaziland, Tanzania, Ghana
RO16	Australia, Malaysia, New Zealand, Singapore, Vietnam, Indonesia, Philippines, Thailand
RO17	India, Iran, Pakistan
RO18	Italy

Table 1.2. List of Regional Organizing Committees (ROs).

Additionally, a Council, based principally on 2 or 3 representatives from each of the 18 Regional Organizations, Associations and magazines, promoted the best ideas, so multiplying their impact and was able to identify issues, react quickly and offer guidance as the need arose. They met monthly from October 2021 to December 2022, continuing through 2023 at a lower frequency.

From the date of the United Nations approval, the task of diffusion and coordination of thousands of activities

Diamond sponsors	Avventurina	Cristallo	Lattimo
AGC CORNING VITRUM ŞİŞECAM	LIBBEY SAINT-GOBAIN	glaston SPIE. NAZEING GLASSWORKS NIPRO	GLASS FOR EUROPE VICAL GRUPO VIDRIERO CENTROAMERICANO VERESCENCE Abividro GLASS FOR FUTURE Nippon Electric Glass Sumitomo SGD PHARMA NGA Springer

Table 1.3a. List of sponsors offering unrestricted funding, with their logos.

across the planet began: congresses and seminars, industrial fairs and glass schools co-existed with artistic exhibitions, books, social media, scientific, technical and general-interest magazines. Event planning relied on grass roots input, and delegation was indispensable. The huge network of volunteers is sadly too large to acknowledge individually. Chapter 4 with its reports from each Regional Organization illustrates the level of activity across the world.

1.7. Financing a Program

Financial arrangements for local activities were dealt with at a local level but a Sponsorship Program was created early in the process to provide financial support for the Opening and Closing Ceremonies required by the United Nations. Here we give a detailed account of the fund-raising campaign, the financial arrangements in place that underpinned the organization of the year and the funding available, with recognition of the many generous sponsors who facilitated the successful running of the year.

A major feature of the year was that our generous sponsors contributed sufficient funds so that not only were we able to sponsor the conference sessions required by the United Nations but we were also able to part-fund more than 80 additional projects around the globe. The sources and details of the financing of this program are described fully in Chapter 3.

Our fund-raising campaign began towards the end of 2021 and was led by Patrick Gavaghan. He defined from the beginning different levels of sponsorship and created a prospectus with a clear description of the benefits attached to each category. These requirements were presented to the industry in an 18-page prospectus. The most important sponsorships were categorized in relation to different styles of glass art; Diamond, Avventurina, Cristallo and Lattimo. Other opportunities to sponsor were related to particular cost-centers, the most prestigious being the Conference Dinner at the Opening Ceremony.

In total almost € 440,000 was raised. The Sponsors are listed in Tables 1.3a and 1.3b. Table 1.3a lists those who gave specific sums for unrestricted expenditure. Five sponsors each contributed € 50,000, seven Avventurina sponsors gave € 25,000 each, while four Lattimo sponsors committed € 10,000. Table 1.3b lists those who paid for

Gala Dinner	Welcome reception	Attendee bags/Red Carpet photographs	Lanyards	Technical Sponsors	Charge Station and Coffee Break
SCHOTT glass made of ideas	FEVE; glass packaging institute	IRIS Inspection machines	GS GLASS SERVICE	verarte	SG Stevanato Group

Table 1.3b. List of sponsors that pid for specific items.

Organizers
ICG International Commission on Glass; COMMUNITY of GLASS ASSOCIATIONS; GLASS
Supporter
CNBM | CTIEC

Table 1.3c. Contributions in kind to the administration.

specific items such as the conference dinner, reducing significantly the costs of running the Opening Ceremony in Geneva. In particular, the cost of the Gala Dinner was equivalent in value to a Diamond Sponsorship. Table 1.3c lists four organizations which contributed in kind by providing administrative and organisation support throughout the year.

We were also fortunate to gain access to lecture rooms in the United Nations Buildings that provided high quality conference space, namely the beautifully decorated and furnished Human Rights Room in the 'Palace of Nations' at no charge; this came with audiovisual and recording facilities, and manpower. The AV equipment was particularly important for the Opening Ceremony. It meant that the event could be streamed live around the world as well being recorded for posterity.

1.8. Creating an online presence

An early step was logo design. The one used (Figure 1.7) was created by a communications agency, paid for by the GlaSS group of Alicia Durán, and incorporating the logo for the International Commission on Glass. It was made available in a variety of electronic formats to the whole IYOG community as a download from the IYOG web site and could be added to individual emails or used in event promotional material. Those using it were asked to respect the UN humanitarian goals and not use it for merchandising or to endorse purely commercial activities.

The simplicity of the logo made small changes for local use straightforward: so modifications were suggested by the Japanese and in the case of Spain and Portugal/Brazil it was adapted by Marco Demichelis, Marco audiovisual". RO03 also had their own version, displayed in Chapter 4.

Since the close of 2022 a further adaptation has made it the symbol for 'The Age of Glass'.

The web pages created for IYOG were used for many purposes but particularly to create links to the downloadable Logo files, individual and



Figure 1.7. Official Logo of IYOG and a derivative logo.
Source: © IYOG archive.

event registration, and for documents and events of global significance, such as the forms submitted to the UN. The Opening and Closing Ceremonies had their own web sites. The IYOG web pages will be maintained and visible to the public for a further five years; they retain the facility for recording and advertising organized events. An early attempt to collect donations through the web site failed because of limitations to the commercial software available, that made it vulnerable to misuse.

Social media communications were via LinkedIn and were regularly monitored by one of Prof. Durán's students María Eugenia Cruz. She also supported and dealt with the endorsers lists, its updating, and the preparation of individual lists for each of the 18 Regional Organizations, including the frequent sending of messages during 2021 and 2022 by Mailchimp. The list of endorsers finally surpassed 2500 endorsers from 96 countries.

Many regional organizations created their own Social Media accounts and web sites. This facilitated regular updating and meant that the local language could be used. Examples are presented in the Regional Organization accounts in Chapter 4.

1.9. Handling Finances

Local expenses were mostly covered by the local regional committees who in turn expected individual event organizers to provide their own funding. This included almost all the conferences that took place during the year; the two exceptions were the Opening Ceremony in Geneva and the final Debriefing Event in New York because United Nations rules meant that a conference fee could not be charged. In both cases though the UN provided lecture rooms and AV facilities free of charge.

The other significant cost was the provision of grants to groups around the world chosen using a competitive selection process. The breakdown for these costs is outlined in Chapter 3. Dr. Pascual has created a closing account summarizing incomings and outgoings in Table 1.4.

The final balance on 30th May 2023 was € 11,604 and was allocated for spending on 1) Maintenance of an IYOG web site for 5 years, and 2) production of this IYOG final report as a book by CSIC and distribution to all the ROs. Specifically, 87 IYOG projects were funded at a cost of € 193,182. The remainder was spent on the Opening Ceremony in February 2022 in Geneva (€ 150,000), at the Debriefing event in December in New York (€ 48,500), on IYOG book printing and exhibitions/ posters (€ 11,300). Other minor costs were for support staff's travel expenses and the IYOG web site. Some financial service costs as well as an administrative load were occurred for money transfer across country boundaries, particular for the project grants, costs that were a significant fraction of the sums being transferred.

	2021	2022	Total
Income	€55,255	€384,362	€439,617
Expenditure	€54,486	€374,641	€429,127
Balance	€769	€9,721	€10,490

Table 1.4. Summarizing the overall income and outgoings for the IYOG2022.

1.10. Concluding remarks

As well as providing a background of the events leading up to the International Year of Glass, we have recorded here the organizational structure, the initial preparations and the running of the International Year of Glass. This volume in its entirety offers a snapshot of all the events of 2022 through the eyes of the many organizers, the participants and the major sponsors (Chapter 4: Regional Organizations; Chapter 5: Education and Young People; Chapter 6: Art and Museums report; Chapter 8: Associations Report; Chapter 11: a retrospective from the major sponsors). The reader can discover links to material that can be downloaded and used for its educational context, for example recordings of important conferences, short video clips demonstrating the importance of Glass, and Posters on Sustainability. Chapter 7 also provides an account of the identification of the Seven Glass Wonders of the World as seen through the eyes of a wide range of Glass Experts. We offer the volume as a record of an amazingly successful global event and hope too that it will be a useful guide to others organizing UN sponsored years in the future.

Following the example of the International Year of Light a committee continues to work on exploiting the many positive outcomes of 2022, outcomes that have been based on the UN 2030 goals —for example on equality, education and sustainability. Other outcomes have included the breaking down of geographical boundaries by recording numerous videos, printed texts, and online lectures. But perhaps the biggest success has been





the bringing together of artists, scientists, museum curators, archaeologists, teachers, gifted speakers, writers, even musicians to share and build the amazing Story of Glass!

In her closing speech by Prof. Alicia Durán at the United Nations Building in New York, emphasized that 2022 had been the start and not the conclusion of a journey to 'The Age of Glass'. The next 11 Chapters will demonstrate the veracity of that statement.

Figure 1.8. United Nations Headquarters, New York.
Source: Jörg Peter from Pixabay.

John Parker, Edgar Zanotto, Erik Muijsenberg And Alicia Durán

2. Opening Ceremony

2.1. Organizing the Opening in Geneva

The Opening Ceremony for the UN International Year of Glass took place from 9th to 11th February at the United Nations Headquarters in Geneva, in the Palais des Nations. The Ceremony was celebrated in the Human Rights Room by the special invitation of Miguel Ángel Moratinos, High Representative for the United Nations Alliance of Civilizations (UNAOC). The Human Rights Room, with its wonderful ceiling decorated by the Spanish ceramists Miquel Barcelo, was donated by Spain to the UN (Figure 1).

An invitation was issued to all the UN Ambassadors firstly to join the Glass Community so they could be thanked and secondly to learn more of the thinking behind the International Year of Glass. The other side of the coin was a summons to the Glass Community to gather, learn what to expect during 2022 and discover how they could contribute.

The beautiful lecture and debating space officially seated over 800 participants and was equipped with excellent audio-visual facilities that included worldwide internet streaming. Being inside the UN complex, entry was passport controlled; but the formalities were straightforward for those who pre-registered. The nearby Intercontinental Hotel was the recommended accommodation and also offered easy access to both the city center and main travel hubs using Public Transport. Many participants chose to stay more centrally but all the social events were held in the conference hotel.



Figure 2.1. Human Rights Room at the Palace of Nations in Geneva.
Source: © IYOG archive.

Unfortunately, in the months immediately preceding the ceremony Covid still held its sway over public transport, cross-border travel and close social contacts; and because of the Omicron variant wave, the number of seats was limited to only 170 in the lecture room. Travelling across country boundaries required certification of inoculation and/or evidence of a negative Covid test. These considerations complicated registration and inevitably reduced applications, even though attendance was free of charge.

Finally, 139 people were registered from 20 countries, with the split



shown in Table 2.1; the number actually present was a little lower because a few applicants who only intended to join online, registered for entry onto the UN site unnecessarily. Sadly too, some larger countries were notably under-represented because of their strict border controls.



Figure 2.2. Entrance to the room.
Source: © IYOG archive.

Country (alphabetical order)	Number
Australia	1
Austria	2
Belgium	8
Brazil	8
Canada	3
China	1
Czechia	2
France	15
Germany	19
India	1
Italy	10
Japan	1
Netherlands	2
Portugal	1
Russian Federation	2
Slovakia	1
Spain	7
Switzerland	20
Turkey	7
United Kingdom	18
United States	12

Table 2.1. Attendance at the Opening Ceremony by country.

Of the 139 attending, 55% were male and 45% female. 30 were speakers; and another 10 were involved in organization, in particular a group of 4 students and volunteers (Dr. Yolanda Castro plus Emilia Merino, Eugenia Cruz and Alberto López) from CSIC in Spain, who worked alongside Mr. P Gavaghan, Mrs. Kun Wang, Dr. María J. Pascual and Mrs. M Parker, as members of the IYOG team with John Parker and Alicia Durán. Their role was to facilitate conference administration by preparing and distributing conference bags containing registration badges, the conference program and a range of conference freebies. This intense activity was much facilitated by the Managers of the Palace of Nations, Anna Banchieri and Aoife Leahy, who were always



Figure 2.3. Roman bowl facsimile, hand-made at the Spanish Royal Factory of Glasses.
Source: © IYOG archive.

available from October 2021 when we first met them to familiarize ourselves with the organization. Without their help it would not have been possible to achieve a successful conference is such complicated times. Another important aide for moving around Geneva and contacting embassies, UN organizations and visas was Ruiz de Gopegui Aramburu, from the Permanent Mission of Spain at the UN, Geneva.

It had been the intention to give each attendee a free copy of the volume '*Welcome to the Glass Age*' but unfortunately, the books were delayed at the Swiss border. Representatives from each country were left with the task of completing the distribution after the meeting.

Although the IYOG volumes were unavailable, another conference gift was. Copies of a Roman bowl made in blue glass and handmade by the Royal Glass Factory in Spain as a limited edition did arrive (Figure 2.3). They were presented to each participant in their conference packs and were much appreciated.

Invited speakers had travel and accommodation expenses paid. Most lecturers were allocated 30 minutes for their presentations and to answer questions; just a few were limited to 20 minutes. The program ran for 4 sessions on each of 2 days (Thursday 10th and Friday 11th February). Session chairs were mainly members of the organizing committee and each session included up to 4 speakers, all of whom were invited. For just 8 talks, the presenters were online. A website was designed and linked to the IYOG main web by Lewis Wilson from IGS Magazine, who also designed the website for the New York Debriefing event in December.

The audio-visual facilities were organized by in-house technicians who worked extremely hard to ensure a disciplined presentation that ran to time. Yolanda Castro and Emilia Merino managed the Power Point presentations and videos to help in-house technicians achieve perfect coordination. A feature of the theatre was the provision of individual microphones for each attendee. Those on the top table

effectively controlled proceedings because their microphones took precedence.

The proceedings were streamed live to the internet and the link to connect had been sent out well in advance. Although the in-house audience had been decimated by COVID, nevertheless over 7000 external visitors joined the proceedings on Day 2, a record for any glass conference in history but also a record for a United Nations event. A summary of the lecture program is presented in Chapter 2.5 and the whole proceedings were recorded and archived by the United Nations. They can be accessed through the UN web site. The recordings can be listened to by session, but downloads are not possible.

2.2. Social Program alongside the Opening Conference

A welcome reception for attendees was arranged in the Intercontinental Hotel on Wednesday evening from 18:30 to 19:30, sponsored by FEVE and GPI. We were asked to wear masks and maintain social distancing but that did not significantly restrain those able to attend, most of whom had been starved for too long from such face-to-face contact and soaked up the opportunity for renewing long-standing friendships. The room was also large enough to avoid overcrowding (Figure 2.4).



Figure 2.4a, b, c, d. The Welcome Reception: a) Alicia Durán with Agustin Santos Maraver and Ana Alonso Giganto, ambassador and counselor of the Permanent Mission of Spain at UN; b) Fabio Nicoletti and Kun Wang; c) Matthias Muller and Reinhard Conradt; d) Italian delegation sharing drinks.
Source: © IYOG archive.



Figure 2.5a. The Gala Dinner including conference cocktails and banquet were sponsored by Schott AG.
Source: © IYOG archive.

On Thursday evening from 19:00 to 23:00 we had the Conference Banquet to which all the conference attendees and important United Nations dignitaries were invited. At the red carpeted entry, a photographer captured a record of everyone present against a background which listed all the sponsors. The banquet began with cocktails before guests moved onto the main Banqueting Hall where people were seated around tables of 12. A Flamenco singing and dancing show closed the dinner.

Here are some pictures from the Red Carpet and Dinner (Figures 2.5 and 2.6).







Figure 2.5b. The Turkish delegation. Figure 2.5c. Some UK representatives on the Red Carpet. Figure 2.5d. John and Mary Parker. Figure 2.5e. The Spanish delegation. Figure 2.5f. Erik and Jane Muijsenberg with Jean-Luc Logel.

Source: © IYOG archive.





Figure 2.6a, b. Flamenco show at the dinner.
Source: © IYOG archive.

2.3. Sponsorship

This whole event would not have been possible without the invaluable sponsorship from glass Companies. The sponsors have been individually acknowledged in Chapter 1.9 where there is more information on how these funds were spent.

We would also like to thank profusely the United Nations not only for the facilities provided but also for printing the Opening Ceremony brochure, designed beautifully by Simon Smith, UK.

2.4. Ariana Museum and exhibitions of contemporary glass art

Close to the United Nations buildings was the Ariana Museum, housing an historic glass collection, one of the most important in Switzerland. Among these was a significant collection of fine Venetian glass, colorful Flühli bottles, Bohemian crystal glass, English rummers, Art Nouveau objects, contemporary designer pieces and glass sculptures illustrating the history of glass making.

Although sadly Covid had reduced the number of Accompanying Persons

attending, nevertheless a small group of visitors joined with the Artists and Museum curators attending the main conference for a guided tour on the Friday morning of the conference at 10am. This included an exclusive preview of Hubert Crevoisier's temporary exhibition: "I'm blue, I'm yellow, I'm green glass and I see red!" with the artist.

The Museum Curator also played an invaluable role in bringing together a collection of beautifully designed glass items for the duration of the conference. These were displayed in the InterContinental Hotel and at the UN Palais des Nations for the duration of the conference (Figure 2.7).

Curated by VERARTE and the Permanent Mission of Slovakia, the exhibition included work by 17 Swiss Glass Artists, alongside that of Yan Zoritchak (Slovakia, 1944), who invited us to see his artworks 'Echoes of a Universe', an odyssey into space and time, in search of the origin of life and the place of man in the universe.



Figure 2.7a, b. Verarte exhibition at the Palace of Nations.
Source: © IYOG archive.





Figure 2.8a, b. Opening session. Alicia Durán, chair of IYOG, with Agustín Santos Maraver, Spanish ambassador at UN, H. E. Sadak Arslan, the Permanent Representative of Turkey UN and Reinhard Conradt, President of the ICG.
Source: © IYOG archive.

2.5. Organizing Lecture Content

The opening ceremony of the International Year of Glass 2022 in Geneva, Switzerland, featured 30 presentations highlighting the diverse roles and contributions of glass in various fields. Despite the distinct focuses of these presentations, there are connecting threads that illustrate the versatility, sustainability, and innovative potential of glass.

We would like to thank the Organizing Committee: Lothar Wondraczek, Edgar Dutra Zanotto, Setsu Tanabe, Mathieu Hubert, Teresa Medici, Kathleen Richardson, Hiro Inoue, Erik Muijsenberg, John Parker and Alicia Durán, for the selection of topics and speakers with international expertise covering every corner of glass field.

We also thank the chairs of our sessions: Reinhard Conradt (2), Alicia Durán (3), Matthieu Hubert, Teresa Medici (2), John Parker (1), and Lothar Wondraczeck (2).

2.6. Program

The main program began with an introduction and closed with a summary from IYOG Chair, Prof Alicia Durán. For the Opening Session she was joined by



Figure 2.9. Teresa Medici chairing the first panel with Ian Freestone and Dedo von Kerssonbrock-Krosigk.
Source: © IYOG archive.

Agustin Santos Maraver, the Spanish Ambassador at UN Spanish Mission in New York; H. E. Sadak Arslan, the Permanent Representative of Turkey UN, Mr. Ahmed Salama, Minister Plenipotentiary/Deputy Permanent Representative of Egypt, and Mr. SHEN Yanjie, Science and Technology Counsellor, Permanent Mission of China in Geneva. The General Secretary of the UN, Antonio Guterres sent a message of welcome. The program concluded on Friday afternoon with a 30 minute Panel Discussion after an online presentation from a Japanese Glass Artist.

Glass has for millennia been an important medium that has brought beauty into our lives. It could be argued that the polished obsidian glass mirrors created several millennia ago kick started the cosmetics industry. The Egyptians created perfume bottles for their Pharaohs, the Romans manufactured amazing tableware remarkable for the variety of its colors and forms; they even made prizes for their champion chariot racers. These early traditions have been captured in museums around the world and are now displayed alongside the many beautiful and intricate glass products made, used and collected at different stages of our history up to modern times. Archaeologists have applied sophisticated analytical tools that are allowing these ancient stories to be told in ever more detail.

The first day of the conference began with papers on this historical background and then moved to current commercial applications and new developments. Below are summaries of the presentations, written by Prof Edgar Zanotto and Dr Erik Muijsenberg, with a broader analysis of significant themes.

1. Ian Freestone, Professor of Archaeological Materials and Technologies, University College, London spoke on '*How it all began; the invention and re-invention of glass in the ancient world*'; he started with the production of beads, then talked on glass composition evolution in different parts of the world.

2. Dedo von Kerssonbrock-Krosigk, is widely experienced in the glass museum world and is director of the Glasmuseum Hentrich in the Kunstpalast, Düsseldorf, Germany. He spoke on the use of Glass over its 3500 years of history under the title '*Glass: a History of Meaning*'.

3. James Carpenter is a multi-award-winning glass architect with his own company: James Carpenter Design Associates. He spoke on '*Light in the public realm*'. He aims to use innovative strategies that merge program, performance, structure and light to reveal the unique characteristics of place and to embody a deeper collective experience of nature.

4. Andy McConnell is a journalist specializing in antique and vintage glass.



Figure 2.10. Andy McConnell.
Source: © IYOG archive.

He has written many books and articles but is probably best known as the first glass specialist on BBC TV's Antique Road Show. His most recent book focusses on The Decanter. He talked on his history, how his interest in glassware developed and his appreciation of the range of skills employed by the glassmaker, under the title: '*Making Glass Visible*'.

5. Another speaker, Courtney Calahoo spoke on '*Glass: shaping lives*'. Her specific theme was to examine how glassmaking is helping to break down barriers between indigenous populations and wider society in Canada. The remainder of the first day continued with themes such as Glass Living, Glasses in Optics, Photonic Technologies and Glass and innovation.

6. Glass for Sustainable Construction was the theme for Emmanuelle Gouillart, Scientific director of Gobain Research. Glass is omnipresent in construction, where it is associated with light and solidity for glazings, and thermal and sound insulation for mineral wool. She overviewed the performances of these materials and systems in construction and focused on how thin films and active technologies can optimize the optical and thermal properties of glazing, so reducing heating and cooling energy consumption. Also, she presented a roadmap of the flat and insulation glass industries designed to reduce their carbon footprint.

7. Andrea S.S. de Camargo demonstrated that glass research in Brazil is relatively young but developing vigorously. The first laboratory (LaMaV - UFSCar) dedicated to glass research was established 45 years ago, whereas, in 1962, the Brazilian Association of Glass Industries (ABIVIDRO) was founded to promote the production and use of technical glasses. In 2013, a select group of 14 researchers at three major universities in the state of São Paulo established CeRTEV —one of the world's largest academic centers dedicated to Research, Technology, and Education in Vitreous Materials. With other labs in the

Figure 2.11. Emma Gouillart.
Source: © IYOG archive.



country, it has placed Brazil among the 11 leading players in scientific and technological output in the area. Approximately 1% of the world papers on glasses are generated in São Carlos.

8. Kathleen A. Richardson reviewed general aspects of infrared glasses and glass-ceramics and how their unique capabilities offer solutions to multiple challenges. She demonstrated that new materials with unique functions are essential for new components and systems that are smaller, lighter, and require less power. Security and sensing devices must be versatile to work in a wide range of extreme environmental conditions; materials that transmit light in the infrared allow one to 'see' in these regions when visible imaging is not possible.

9. The difficulty of high-frequency 5G radio waves penetrating windows from the outside challenges the establishment of indoor wireless communication links. A novel technology that guides 28 GHz radio signals received from outdoors to indoors using a meta-surface lens was demonstrated by Naoki Sugimoto. In this way, glass becomes a window for light and the new generation of radio waves.

10. Masashi Onishi demonstrated that more than 4 billion kilometers of optical glass fibers have been installed and contribute to the efficient telecommunication networks of modern information society. He reviewed the optical fiber technology and its manufacturing process development history. Also, their future possibilities and challenges were presented.

11. Glass has played a crucial role in developing standard and quantum optics, and atomic physics. Lukas Novotny reviewed the role of glass in quantum science and technology and highlighted recent experiments where light was used to control quantum motion in glass. He dwelt on this topic, emphasizing that glass lenses, prisms, and beam splitters have allowed us to understand the fundamental properties of light on the quantum level and to manipulate atoms and molecules.

12. Falko Langenhorst addressed the formation mechanisms and significance of glasses for understanding the processes in space. Glasses form by various mechanisms in space: weathering, impacts, and igneous processes. The transition to glass occurs by solid-state processes or by melting/vaporization followed by a rapid quench. Despite its instability (against relaxation and devitrification), specific glasses are even older than the solar system and thus carry unique information on pre-solar processes.



Figure 2.12. Julian Jones.
Source: © IYOG archive.

13. Frederik Kotz-Helmer described a new material named Glassomer. It is a nanocomposite that can be processed like a polymer by casting, 3D printing, or injection molding. After structuring, the materials are turned into fused silica glass via thermal debinding and sintering. Sintered Glassomer is chemically and physically identical to commercial fused silica glass, showing the same high transparency in the UV, visible, and near infrared combined with the same mechanical strength, hardness, and chemical and thermal resistance. Glassomer enables many applications, from optics and photonics to life sciences, chemistry, and biotechnology.

14. Opportunities for glasses in healthcare are diverse, as the scientific community better understands how this class of materials interacts on a cellular level. Steve Jung described new applications of flexible water-soluble glasses that heal previously non-healing soft tissue wounds. The field of orthopedics is seeing increased use of 3D scaffolds made of bioactive glasses to improve bone-grafting products. Glasses are developing as coatings or additive to eliminate biofilm formation on medical devices, while other compositions treat inoperable cancers.

15. Leonid Glebov described Photo-thermo-refractive (PTR) glass that his team has helped to develop and optimize in the past 3 decades. It is a multicomponent silicate glass that shows permanent refractive index change after exposure to near-UV radiation followed by thermal treatment. This feature enables the fabrication of highly efficient and stable holographic optical elements that produce complex spectral and spatial operations with optical beams. These passive glass elements allow dramatic increases in the brightness of lasers and the resolution of spectrometers.

16. Samuel Poulain presented a panorama of the current and upcoming developments in fluoride glasses and their potential answers to future medical, industrial, and ecological challenges. Fluoride glasses and their technology have matured for over 45 years. The quality of fluoride glass fibers has substantially increased, while their costs have decreased significantly; hence, more fluoride glass-based devices have been integrated into scientific and industrial devices.

Talks 13) to 16) were organized as a unique session dedicated to SMES technological companies.

On Day 2, the presentations collectively underscored the ubiquity of glass across industries. The discussions highlighting how glass has evolved from a traditional material to a modern enabler had begun on Day 1 with the presentation by Emmanuelle Gouillart, which illustrated how glass had adapted to meet the evolving needs of construction. The following summaries list the papers presented on Day 2 and are followed by a broader analysis of significant themes. Whether it's in construction, life sciences, medicine, or packaging, glass plays an enabling role. The common thread is how glass seamlessly integrates these domains to enable progress and breakthroughs.

17. "*Glass – an enabler in life science and pharma*", by Fran Heinricht considered the role of glass as a structural material in the medical sciences,

18. Julian Jones spoke on glass as a regenerative material and its transformative nature in his talk on "*Bioglass: Glass for Regenerative Medicine*".

19. Sustainability and Environmental Responsibility: was the subject of Florian Kongoli who gave a broader presentation on the three key pillars needed to have a sustainable society, explaining the importance of the scientific principles underpinning these pillars.



Figure 2.13. Ilkay Sokmen.
Source: © IYOG archive.

20. The paper presented by Vitaliano Torno was on "*The Role of Sustainable Glass Packaging in the Circular Economy*" and explained the current statistics for recycling of glass within the European Community.

21. In the "*Sustainability in the Flat Glass Sector*" by Philippe Bastien glass's inherent properties were once seen as magical and now have become understood through scientific knowledge. Glass's continuous reinvention through technological advancements is a recurring theme.

22. '*Human Wellbeing and Innovation*': the discussions mentioned earlier underscore how glass contributes to human wellbeing through various applications. Whether it's in healthcare



Figure 2.14. Peng Shou online presentation.
Source: © IYOG archive.

technologies, medical treatments, or sustainable materials, glass's innovations serve to enhance quality of life and promote progress. Ilkay Sokmen, the Glass Technologies Director at Şişecam spoke on how "*Glass creates value*".

23. Peng Shou of the Chinese Academy of Science and Chairman of China Triumph International Engineering Co. Ltd. specifically focused on the theme "*Glasses for energy/solar*".

24. The Future of Glass: The closing presentation by Erik Muijsenberg spoke on the "*Furnace of the Future*" and reflected on the evolving technologies and designs that will shape the glass industry's future. It is possible to melt most of the produced glass with renewable electric energy, instead of burning fossil fuels that emit carbon into the earth atmosphere. This forward-looking perspective aligned with the broader theme of innovation and continuous improvement. The Speakers on Friday afternoon covered the theme of Glass Reaching Out, focusing particularly on Education and Academic Research.

25. Srikanth Sastry demonstrated that computational and theoretical investigations of the properties of glass formers and glasses have witnessed significant advances in recent years in India, leading to new insights regarding the glass transition and their properties. Improved methodologies have been developed for modeling and simulating these phenomena. He also showed a perspective of the glass science and technology landscape in India in the last decade, placing India amongst the five most prolific countries regarding glass research output.

26. Edgar Dutra Zanotto reviewed the history of glass research and education, including the pioneering groups in Jena, Alfred, Sheffield and Leningrad (St. Petersburg), which started in the late 1800s and early 1900s. He also covered glass research outputs and developments throughout



Figure 2.15. Edgar Zanotto online talk.
Source: © IYOG archive.

2021 with worldwide publication statistics. Prof. Zanotto concluded that the pioneers and most prolific researchers (many were named and cited) played a vital role via active teaching as the building blocks for training skilled engineers and researchers.

27. Two more papers on Education followed. Marcia Vilarigues spoke on the challenges of interdisciplinarity in dealing with the teaching of Glass Artists the technical aspects of Glass Making but also pointed out the positives of educating across such boundaries as a result of the differences in approach.

28. Corinne Claireaux, the manager of the Celsian Academy works on empowering the Glass Industry through training employees to have a more complete understanding of the material glass.

29. Finally, Jeffery Evensen, the Chairman of the Corning Museum of Glass and their chief strategy Officer spoke on how the extraordinary properties of glass, both technically and aesthetically have made it one of the most transformative materials of all time. He demonstrated how an in-depth understanding is leading to new capabilities at an accelerating pace, with glass being able to solve some of the world's toughest problems.

30. Kimiake Higuchi, a Japanese artist gave an online presentation of her *pâte de verre* techniques, using experience gained around 1988 in preparing for a glass exhibition in Tokyo. She related her work to creative instincts, honed in a forest environment.

Dr Erik Muijsenberg has also summarized the presentations given under more general headings:



Figure 2.16. Corinne Claireaux
Source: © IYOG archive.

Glass - an enabler in life science and pharma

Asked about life science and pharma nobody would naturally come up with glass as an enabler. But with a closer look it gets rather obvious, that without glass there would be no modern life science or pharma. Starting with the microscope empowered by Otto Schott with designed optical glasses, this was and is a key still today: from the invention of Penicillin over our understanding of cell division mechanisms until the latest gene technologies —the indispensable micro insights would not be possible without specialty glass. Another area for glass as hidden champion is state-of-the-art medical treatment technology: endoscopy or minimally invasive surgery are widely known and applied, but rarely is it recognized the role of glass in such technology. Once someone gets a drug injection, it is taken of course as given, that no contaminants or particles come along potentially harming the state of health. Safe drug storage and transportation is a prerequisite and there, glass is really a hero! But modern pharmacology is continuously challenging glass e.g. in areas like mRNA drugs or individual cancer therapy, so reinventing of glass never will stop. Therefore, one can expect for sure in the future further breakthrough achievements for the sake of human wellbeing!

Bioglass: Glass for regenerative medicine

In this talk, we celebrate 50 years of Bioglass, a material discovered by Larry L. Hench in 1969. It was the first material found to form a bond with bone, changing the mind-set of orthopedic surgeons. All previous biomaterials had triggered scar tissue formation. Bioglass bonds to bone faster than other bioceramics, and encourages more bone growth, which is attributed to the glass' dissolution products stimulating bone cells at the genetic level. Bioglass particulate has been used in more than 2 million patients worldwide and is now an active ingredient in toothpaste for sensitive teeth. More recently, Bioglass has been used to fight bone infections; porous scaffolds have been produced; fibrous glasses are used for healing chronic wounds and nanoparticles can be used as delivery vehicles for therapeutic ions.

Development and Trends of Glass Innovation under Global Climate Change

As materials create a better world, glass ushers in future lifestyles. As a basic functional material with a long history of use, glass connects the macro-universe with microstructures of materials, thus promoting the advances of science and technology and the progress of human civilization. As the era of worldwide low-carbon economy has dawned, glass will play a greater role in clean energy, industrial transformation and infrastructural building, becoming a "bridge" to connect us to an international community with a shared future, and contributing the "power of glass" to the global response to climate change and the building of a sustainable society.

Glass Creates Value

Glass, one of the materials that have changed the history of humanity, is among the products of the future, enabling innovative and sustainable solutions for many sectors in addition to its traditional uses. The glass industry, which provides long-term value with its constantly developing and expanding usage areas, promises endless potential in creating a sustainable future. Once it has been transformed to be a product in the form of a container, tableware, architectural or automotive application, glass is one the most environmentally neutral, safe and functional material we use. Based on this, the presentations provide information about innovative glass products that contribute to sustainable growth and add value to life, such as automotive and architectural glasses with functional coatings that provide significant energy savings by reducing heating and cooling needs, antireflective architectural glasses, antimicrobial glassware, the world's thinnest yet most durable glassware and 100% recyclable glassware.

Sustainability Framework and the Role of Science and Technology
The sustainability framework with its 3 main pillars (1) science & technology (2) governance & management, and (3) education & civil society will be presented along with its applications in various fields such as glass, materials science and engineering, recycling and landfilling, economic linearity and circularity as well as automation. The essential and irreplaceable role of science and technology in sustainability and the circular economy in glass industry was highlighted.

The role of sustainable glass packaging in the circular economy
The world is moving from a take-make-dispose model to a circular economy where only products and materials which are re-useable and infinitely recyclable will make environmental and business sense. Glass is a permanent material that is good for the planet, people and society. For over 50 years, our industry has been a Circular Economy pioneer at the heart of a closed loop production system. By 2030 our industry wants to collect 90% of all glass packaging put on the market and by 2050 become a climate neutral packaging system. Our industry goals perfectly match with UN Goals 11 and 12. Sustainability in the flat glass sector: a solid track record to transform an industry vision into reality Glass a unique material going through the centuries thanks to its continuous evolution and adaptability to the needs of people (safety, security, comfort, etc.) and to those of societies as they evolve towards greater energy and environmental conservation. These adaptations were made possible by the glass industry, which embraced these challenges to deliver solutions meeting new architectural and automotive trends. More than ever, the industry is ready to take up the sustainability challenge and to contribute to the fullest to the transition towards a climate neutral Europe. The European flat glass sector takes it as its role to produce the materials essential for renovating Europe's buildings, for supporting the clean mobility transition and for increasing the share of renewable solar energy in Europe. While already providing net carbon-avoidance products, the flat glass sector is looking into ways to massively scale up its contributions to the EU's climate neutrality objective, including by developing novel ways to lower its industrial emissions. Philippe Bastien gave an overview of the glass industry evolution and how the industry takes up this sustainability challenge.

Furnace of the future
With the realities of global warming and plans for CO_2 reduction, the interest in alternative furnace designs such as hybrid electric melting is receiving more attention. The generation of electricity by renewable energy sources is, of course, a great help as it finally brings costs of electricity down and will be CO_2 free. In Europe the average generation of electricity by renewable resources is already above 40%, coming from wind, solar, hydro and bio. Electricity storage however is complex and expensive, while transporting energy in the form of a gas via pipes is cheaper than via electric wires. An alternative renewable energy carrier is hydrogen. Hydrogen can be generated via electrolysis using electricity: this conversion, however, is only in the effective range of 65%. After this, hydrogen can be burned in a glass melting furnace with a typical efficiency of 50%. This paper presented Glass Service a.s. (GS) thermal efficiency studies showing if the future will be more likely using electric heating or hydrogen combustion. Results of mathematical modelling show the efficiency of the different technologies. What will be the furnace design of the future?

From Magic to Science… and Back
Extraordinary aesthetic and technical properties have made glass one of the most transformative materials of all time. People once believed these



Figure 2.17. Closing panel: A. Kirman, G. Zandonella and N. Sugimoto with A. Durán and R. Conradt.
Source: © IYOG archive.



Figure 2.18a, b. Attendees enjoying moments during the event.
Source: © IYOG archive.

properties were the result of magic. Today, our deep understanding of glass science not only explains these phenomena, but also allows researchers to unleash new capabilities that were once unimaginable. Dr. Evenson explained why the pace of glass innovation is accelerating, shared examples of how glass technologies can solve some of the world's toughest problems, and discussed why he believes the most exciting glass discoveries are still ahead. In summary, the presentations collectively paint a picture of glass as a dynamic and indispensable material that has played a historic role, continues to innovate across sectors, and holds immense potential for the future. The unifying themes of sustainability, innovation, science, and global impact underscore glass's transformative capabilities in various aspects of human life and progress.

The final panel for closing the event gathered the most Diamond sponsors that with their generosity permitted to organize this great event as well as to



Figure 2.19. IYOG Opening Ceremony Participants at the close of the event.
Source: © IYOG archive.

finance a major part of the international events.

This fantastic rich collection of talks, delivered by worldwide known experts, demonstrated the crucial role of glass in human well-being and the indissociability and synergism of science and technology!

Patrick Gavaghan, Teresa Medici, Alicia Durán, Mathieu Hubert and John M. Parker

3. Seed Funding Programme

3.1. Introduction

Although International Ceremonies had a significant role in the International Year of Glass, local activities represented the major part of what was achieved and had at least as much long-term impact. Too many events were recorded in our database to list them all and we know that they under-represent all that happened. Also, Chapter 4 gives a full account region by region of the activities took place across the globe through the eyes of the 18 regional organizing committees listed in Chapter 1.

Most of these events were entirely funded locally. Nevertheless, the monies raised through sponsorships (see Chapter 1.9) part-funded a significant number of activities (87). As described in Chapter 1, after the Opening Ceremony in Geneva, near half of the funds obtained in the Fundraising campaign remained unspent. An ambitious Seed Funding program was designed to give opportunities of co-financing to different initiatives across the world. These selected events were perceived: a) to be novel, b) to involve a large and all age audience, c) to carry an important message related to IYOG with its UN sustainability goals and d) to have the potential to generate income from other sources. The allocation of funding was based on team evaluations of the merits of different submissions; the members of this team were the authors listed for this chapter.

3.2. Selection process

The process was subdivided into several steps:

1. Call for applications,
2. Receipt and recording of submissions,
3. Assessment by the team members, following defined assessment criteria,
4. Decision on which proposals were not suitable,
5. Once accepted, a decision on proportion of funding that could be allocated,
6. Offer letters sent with request for banking information,
7. Funding sent in one or two tranches depending on total amount allocated,
8. Checks on completion,
9. There were 2 rounds, in April and August with roughly half the funding allocated to each.

These steps were supplemented by online meetings to compare our thinking in making evaluations and to ensure that we used a consistent approach. Detailed instructions on the philosophy of the awards and the information required was clearly set out. Our application forms were carefully designed to match these requirements. Applications were only accepted if they were on the official forms and so everyone followed a standard layout. These forms could be downloaded from the web and their existence was advertised through the Regional Organizations. An absolute deadline was imposed, a month after the initial announcement and launch of the call. An example of the wording of the Application Form for Round 2 follows and was similar to that for Round 1.

The International Council for IYOG 2022 has successfully completed Round one of the IYOG 2022 Seed funding project. Thanks to our sponsors' support, we supported over 40 activities across the world, promoting glass across all sectors through an amazing variety of events. We now launch Round 2 for projects later in 2022.

How will the round 2 funds be allocated?
The International Council has limited funds to distribute to appropriate activities across all the regional organizations. Allocation will be based on the "Seed funding" principle and will only be awarded where they supplement other grants, income and in-kind costs, to amplify their value. They are not designed for a few costly activities or for personal research but to ensure that as many, varied ideas as possible have the opportunity for financial support and a chance to blossom in 2022 with the potential for continuity into the future.

What is an activity?
The International Year of Glass 2022 has given all sectors of glass the opportunity to develop a range of activities supporting IYOG 2022 aspirations. An activity is anything that promotes glass positively. It can be across any sector and involve different disciplines. Engagement with the wider public and events with an educational flavor are encouraged. We hope to see applications for a diverse, novel and exciting range of activities. For information, the events page of the IYOG web site lists current plans. Activities must commence in 2022 but may complete in 2022 or 2023.

Measuring success of the activity
With the range of activities anticipated, creating a single set of success criteria applicable across all activities is inappropriate. Nevertheless, your application should: demonstrate clear and achievable outcomes as these will contribute to your success; name collaborators and confirm their willingness to be involved; and give a brief breakdown of anticipated costs.

Application process
The window for submitting an application for seed funding is:
1st to 31st July. Decisions by mid-August with funds dispersed by early September.
To ensure each application is treated equally, applications will only be accepted using the "Application for IYOG 2022 Activity seed funding Rd 2" pdf form attached. A word version is available if required. Funding will be in Euros and all local costs should be given in Euros.
All boxes must be completed. You will need to name your activity as this will become the reference for future communications. Types of activities are in a drop-down menu. You must select the one that best fits your activity. This is to ensure we can collate activities. NOTE: Your total stated income and your anticipated outgoings (costs) must balance.

Applications will be assessed by the Executive Committee and decisions approved by the IYOG International Council. Funds will be transferred quickly (goal: within 2 weeks). Any local taxes or charges will be the responsibility of the applicant. Please only return your completed application to fundallocation@iyog2022.org. Receipt will be acknowledged.
The Executive Committee looks forward to receiving your proposal.

The 90 funding requests received in Round 1 (deadline 1st-30th April) exceeded the available financial resources by a factor of 8 and therefore required very careful selection. An early decision was that major research projects could not be considered, nor should any projects for commercial gain or solely for advertising; such proposals were immediately rejected. Projects that had the potential for supplementary funding through other channels were more likely to be considered. Proposals that could create a long-term legacy were also favored and the probability of successful completion was also taken into account. Another factor was whether the application team were perceived as being capable of completing a particularly ambitious proposal.

Unsuccessful applicants from Round 1 were allowed to revise and resubmit proposals. The number of applications received for round 2 was similar to that for Round 1; the sums requested were more realistic though but still exceeded by a significant margin that funds that were available, in spite of a cap of € 8000. Judging therefore had to be strict and followed an agreed set of criteria like those in Round 1. Every project received at least 3 assessments and for those accepted, judges were also asked to rank the level of funding to be awarded. Ultimately, the approach adopted in both rounds was to award funds to almost half of the applications, but to give each only around 40% of what had been requested. A sliding scale was used which gave a larger proportion of the request to smaller applications; additionally, in all cases individual factors were taken into account.

3.3. Distribution of grants

We present the results of the allocation process in Tables 3.1 and 3.2, covering Rounds 1 and 2 submissions respectively. These tables give the amounts awarded, the country from which the application came, and the title of the proposal along with a category. The variety of subjects proposed is impressive.

Grant	Country	Title	Category
€ 2,500	Australia	GLAAS INC program of events 2022	Artistic Glass
€ 800	Australia	Glass: Vision Reflection Imagination	Conference
€ 3,000	Australia/NZ	Mosaic for Afghan Women: Human Rights through Mosaic Art	Exhibition/Community
€ 7,000	Brazil	IYOG K to 12 Educators Forum	Education
€ 3,000	Canada	Le verre: reflet de société, fenêtre sur les avancées technologiques	Conference
€ 3,000	China	Int. Contemporary Glass Art Exhibition	Artistic Glass
€ 3,000	Costa Rica	Glass Fashion Show	Artistic Glass
€ 2,500	Finland	The Glass Age, Exhibition of new glass art from Finland	Museums & Exhibitions
€ 3,000	Germany	Vignelli Dialogue 02 -Translucida	Artistic Glass
€ 3,500	Germany	Roman Glass Reloaded	Education
€ 2,500	Germany	Borg Furnace Project 2022	History/Archaeology
€ 2,000	Germany	GlasSpass	Education
€ 2,000	Germany	IYOG Picture and Video Contest among Students	Education
€ 550	Ireland/ Romania	Bringing the Light	Art & Sustainability
€ 4,500	Italy	The Floating Furnace	Museums & Exhibitions

Grant	Country	Title	Category
€ 2,000	Jordan	ZUJAJ workshops	Artistic Glass
€ 2,000	Philippines	Mappy's Arts Painting on Glass	Education
€ 1,000	Philippines	Glass is COOL: Webinar Series for Engineering students	Education, Sustainability
€ 800	Philippines	Emerald Glass Excellence Award (TEGEA)	Sustainability
€ 1,000	Scotland	Stories Exhibition - Taster Glass Workshops and Expert Talks	Artistic Glass
€ 2,000	Serbia	Creative Glass Laboratory	Education
€ 1,000	Slovakia	Junior FunGlass School	Education
€ 3,200	South Africa	Fired Up! - Celebrating Southern African Glass Art	Artistic Glass
€ 700	Spain	Exposicion de Peces De Cristal Artesano	Artistic Glass
€ 2,500	Spain	Towns Twinned by Glass	Glass Manufacture
€ 3,500	UK	Glass Lab Exhibition	Museums & Exhibitions
€ 900	UK	Celebrating Glass Day	Education
€ 1,800	UK	Community glass sculpture project	Artistic Glass
€ 700	UK	Celebrating the Birth of English and Irish Crystal Drinking Glass, 1640-1702	Conference
€ 2,500	Uruguay	Glass Woman uy 2022	Glass in Architecture
€ 2,500	USA	American Glass Guild Conference at Corning Museum of Glass	Conferences
€ 3,000	USA	2022 UrbanGlass' Artist Fellowship Program	Artistic Glass
€ 1,300	USA	Ginny Ruffner: Reforestation of the Imagination	Museums & Exhibitions
€ 2,500	USA	Hot Glass Outreach for MS&T 2022	Education
€ 3,000	USA	Project FIRE	Education
€ 3,500	USA	GEEX Talks: Expanded Glass Histories (Glass history & glass art virtual lectures)	Publications
€ 3,000	USA	The Gathering: A Fusion of Glass Art & Technology	Conference
€ 3,000	Uzbekistan	Innovative Technologies for Producing Glass, Ceramics & Binding Materials	Conference
€ 3,000	Wales	Gwydraid: Gwydr: Glass	Museums & Exhibitions

Table 3.1. Seed funding grants awarded to applications in Round 1.

Grant	Country	Title	Category
€ 2,160	Argentina	The force of grisailles	Museums & Exhibitions
€ 1,470	Argentina	Fabricación de placas con vidrio reciclado	Glass recycling
€ 1,000	Argentina	"Horno de soplado para Mendoza Argentina"	Artistic Glass
€ 1,920	Australia	GLASS@VILLA ALBA	Artistic Glass
€ 1,890	Australia	Documentary: War Commemoration in Glass	Education
€ 1,200	Australia	'Cutting Edge', Vicki Torr Retrospective	Artistic Glass
€ 1,200	Australia	Drysdale Community Hot Glass Art Workspace	Museums & Exhibitions
€ 1,000	Australia	Artistic Glass Workshops In Regional Australia.	Artistic Glass
€ 1,200	Belarus	Photo exhibition "Through the Glass"	Exhibitions
€ 2,880	Brazil	Reflections on reflections - cultural history of glass in architecture	Publications
€ 2,640	Brazil	Science and Art of Glass	Education
€ 1,000	Finland	Multidisciplinary Glass - exhibition	Museums & Exhibitions
€ 600	France	Exhibition Art Fair in Provence (France)	Artistic Glass
€ 2,520	Germany	Glass as a Medium of German-Czech Relations	Artistic Glass
€ 2,400	Germany	12. Int. Exhibition. Glass Sculpture & Garden 2022	Museums & Exhibitions

Grant	Country	Title	Category
€ 3,360	Hungary	Life cycle of glass in lighting technology	Education
€ 3,360	Indonesia	Indonesian Glass Art Festival	Conferences
€ 2,100	Ireland	Glass Festival Masterclasses	Education
€ 6,500	Japan	Support for the presentations of the Future Generation in the Closing Conference	Conferences
€ 2,697	Jordan	Flamework Training - Beyond Panels and Slumping	Education
€ 1,256	New Zealand	Recycled glass online workshops	Glass recycling
€ 1,000	New Zealand	Focus on Glass 2022 Exhibition	Museums & Exhibitions
€ 1,440	Norway	Norske glasskunstnere - Glassets år 2022	Museums & Exhibitions
€ 1,000	Norway	Renovation of a Sandberg Furnace	Glass manufacture
€ 2,678	Philippines	Project GLASS is BEST	Glass manufacture, recycling
€ 1,157	Philippines	PROJECT BRIDGES (Philippines)	Education
€ 985	Philippines	Cuadro Anexo de Vidrio	Artistic Glass
€ 3,840	RSA	MineGlass	Glass Science/Research
€ 2,940	Serbia	Glass in focus	Museums & Exhibitions
€ 2,400	South Korea	Int. Glass Art Object Project in Homage to IYOG2022	Artistic Glass
€ 4,050	Spain	Glass Well, a historical recovery for future	Education
€ 3,360	Spain	Closing Ceremony, IYOG, Spain	Museums & Exhibitions
€ 1,500	Thailand	Glass Industries-Thailand Best Practice Sharing	Conferences
€ 3,213	UK	Glass Garden, RHS Chelsea Flower Show 2022	Artistic Glass
€ 2,160	UK	Collaborations Catalogue	Artistic Glass
€ 2,100	UK	North Lands Creative Glass Tour Scotland	Education
€ 900	UK	Promoting glass history @ Catcliffe Cone, 1740	Education
€ 1,500	UK	International Festival of Glass	Artistic Glass
€ 1,584	Uruguay	Diseño, Arte, Ciencia e Industria del Vidrio	Conferences
€ 3,150	USA	Glass Comes Alive: Celebrating Interdisciplinary Approaches to Glass	Education
€ 2,932	USA	Elements of Style: Glass City Chic	Museums & Exhibitions
€ 2,196	USA	Bottle Underground	Glass recycling
€ 1,920	USA	Exhibition - To See a World in a Grain of Sand	Museums & Exhibitions
€ 1,764	USA	Vitreonics: Art Glass Shines in the Crystal City	Artistic Glass
€ 1,763	USA	The Glass Wing	Museums & Exhibitions
€ 1,181	USA	Wheaton Conversations	Museums & Exhibitions
€ 982	USA	Inspired by Glass	Education

Table 3.2. Seed funding grants awarded to applications in Round 2.

Once an offer had been decided, a letter was sent out, giving the amount allocated, the conditions of acceptance, which had to be signed and returned and a form requesting bank transfer details. Recipients of awards were universally grateful; just one was withdrawn because of COVID related constraints.

Figure 3.1 illustrates the geographical distribution of i) applications and ii) financed projects, while the chart shown in Figure 3.2 gives the breakdown of successful applications by topic.

Table 3.3. Lists countries from which applications were received and success rates. Over 2 rounds, 165 applications were received and 87 were accepted.

Country	Applications	Successful
Argentina	3	3
Australia	11	8
Belarus	1	1
Belgium	1	0
Brazil	3	3
Bulgaria	1	0
Canada	2	1
China	4	1
Costa Rica	1	1
Denmark	1	0
Finland	7	2
France	2	1
Germany	11	7
Ghana	1	0
Hungary	2	1
India	1	0
Indonesia	1	1
Ireland/Romania	5	2
Israel	1	0
Italy	8	1
Japan	2	1
Jordan	2	2

Country	Applications	Successful
Kenya	1	0
Netherlands	2	0
New Zealand	2	2
Norway	2	2
Philippines	6	6
Romania	2	0
RSA	4	2
Russia	1	0
Scotland	1	1
Serbia	2	2
Singapore	1	0
Slovakia	1	1
South Korea	1	1
Spain	5	4
Switzerland	3	0
Thailand	1	1
UK	17	9
Uruguay	3	2
USA	38	15
Uzbekistan	1	1
Wales	1	1
TOTALS	164	86





Figure 3.1. Shows a World Map indicating the applications and successful projects by country over both calls.
Source: © IYOG archive.

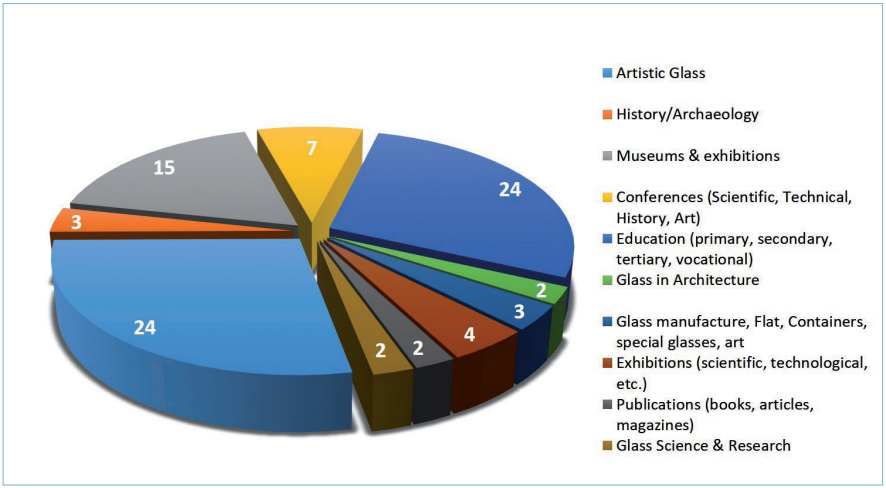


Figure 3.2. Distribution of the successful projects in the Seed Funding Initiative by topic.
Source: © IYOG archive.

Table 3.4. List of applicants receiving support to attend the ICG Congress in Berlin, Centenary of DGG
*Fees waived.

Campos, João Vitor	Brazil
Cruz, Maria Eugenia	Spain
Eriksson, Elin	Finland
Farrukh, Erkinov	Uzbekistan
Kirchner, Katelyn	USA
Layher, Anne-Marie	Germany
Mutlu, Nurshen	Slovakia
Nakamura, Takuma	Japan
Patra, Pritha	India
Sassi, Meriem	Hungary
Soubelet, Clara	Argentina
Szczodra, Agata	Finland
Tran, Thi Ngoc Lam	Vietnam
Zhou, Qi	USA
Dr. So, BJ*	Korea
Chahal, Shweta*	India
Lancelotti, Ricardo Felipe*	Brazil

3.4. Examples of support

A few applications were received from Conference organizers, particularly the ICG Congress in Germany and the Closing Ceremony in Japan, both central to the IYOG celebrations. Discussions with the event organizers led to a policy of supporting younger people who otherwise would have been unable to raise the funding to cover transport and accommodation costs. For the ICG celebrations in Germany € 15.000 was allocated to 17 candidates, termed Glass Future Fellows. This included 3 runners-up, who received "only" a conference fee voucher. Of the 17, 12 were female, 5 male; they represented 14 different countries (listed in Table 3.4).

For the closing ceremony the sum allocated was € 6.500. The candidates selected were given the title 'Future Generation Speakers' and allocated 15 minutes to present a paper at the Closing Ceremony. Eight delegates were selected, six in technical or scientific fields. Those chosen represented 6 different countries and were balanced between male and female. They are listed in the conference program in Chapter 10.

The reports from the Regional Organizations (Chapter 4) describe the outcomes of a great many IYOG activities, both supported and not. Chapter 5 (Education), Chapter 6 (Museums) and Chapter 11 (Publications) also highlight numerous success stories. These successes range from enhancing the lives of disadvantaged children in less well-off communities to encouraging cross border and cross-cultural collaborations to the mutual benefit of all involved. Some stories show how sustainability can be woven into people's lives, positive actions both scientific and practical can bring hope to struggling individuals and communities, and how small ripples can have long-ranging effects. They make a heart-warming read and also affirm the value of the effort that went into organizing the International Year.

A significant proportion of the support for funded activities went to projects with an educational flavor. The outcomes of many of these are described in more detail in Chapter 5. Other common themes in applications were art, museums and festivals. Many of the sponsored projects and their outcomes are described in the reports of the appropriate Regional Organizations (Chapter 4). Some are listed below with a link to the sections in this book where there is more detail. The selection made demonstrates the broad range of countries involved and the wide range of activities undertaken using the funding provided.

- One project promoted at the Closing Conference in Tokyo, concerned the judging of essays imagining a world without glass (Figure 3.3).
- Brazil ran some imaginative children's activities (Chapter 4.1.3.,



Figure 3.3. Awards ceremony for the competition 'World with and without Glass', financed as an IYOG seed project. Presentation to the prize winners by Prof S. Tanabe.
Source: © IYOG archive.

4.1.4., 4.1.5). Some were sponsored and had an international flavor.

- A Grant in Germany helped create a photographic map of architectural features with a significant glass content (4.2.6); a variant of this approach used videos (4.2.7).
- A project (China and USA) on Art Glass Education during an epidemic (4.3.1).
- Glass making in Jordan (4.4.3). A joint program of training particularly with unemployed youths in mind involving Canadian and Thai expertise.
- An imaginative project (4.4.5) in Bulgaria used a ham radio station in





Figure 3.4. Imagination Station Toledo fused fashion and science during a catwalk show. Elements of Style: Glass City Chic - presented by Comfort Line FiberFrame, NGA.
Source: © IYOG archive.







Figure 3.5. The UrbanGlass Visiting Artist and Designer Fellowship provides four artists or designers the opportunity to develop a new body of work using the medium of glass. a) UrbanGlass studios; b) Ghislaine-Sabiti; c) Work by Ghislaine-Sabiti.
Source: © IYOG archive.



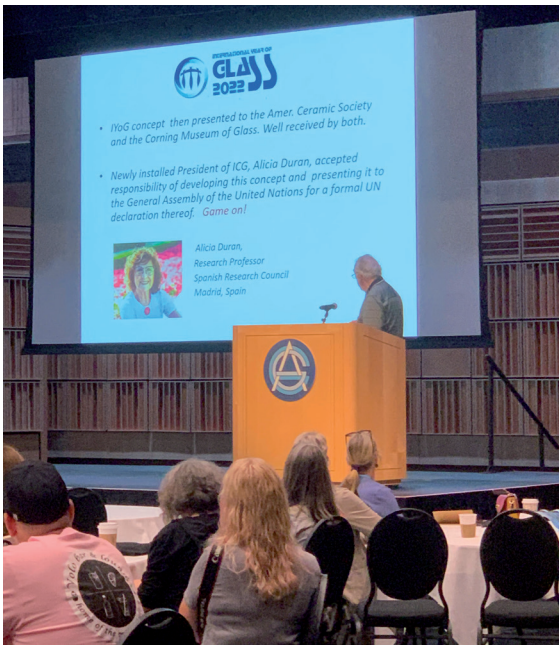


Figure 3.6. Lecture series on Glass Art during our 2022 Summer Conference at Corning Museum of Glass. a) Kathy Jordan speaking about Rose Windows; b) David Pye talk.
Source: © IYOG archive.

a primary school and pupils had to identify international Glass events.

- A glass fashion show in Costa Rica (4.6.2).
- The USA received several grants with an educational emphasis (4.1.4, 4.7.3). One was run jointly with several other countries, particularly Brazil, and examined new approaches to teaching at the secondary school level. Several others were focused on art, museums and exhibition.

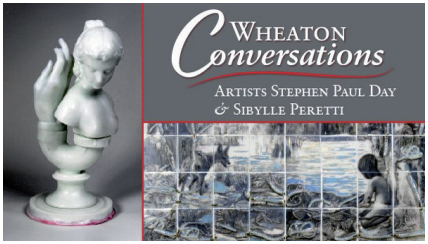


Figure 3.7. Wheaton Conversations is a virtual series highlighting a diverse community of Artists.
Source: © IYOG archive.

- Towns twinned by Glass (Spain) (4.8.2 and 5.5.1).
- In Japan the glass community created a comprehensive subject map and distributed it to school kids and students nationwide. The subject adopted for 2022 after a highly competitive national selection process was: "Glass, almighty material coexisting with and supporting human beings" (4.10.5). This was translated into English and Portuguese.
- Ireland, Romania, Scotland, Greece and the USA worked together on a Sustainability Theme with an IYOG grant (4.12.2),
- Argentina received support for 3 seed projects all focused on art and exhibitions.
- A grant to a Leeds Museum (UK) introduced a local ethnic minority group to creating glass art (4.12.1),
- Glass Art created by young artists was displayed at a flower show, and introduced topics such as sustainability (4.12.1),

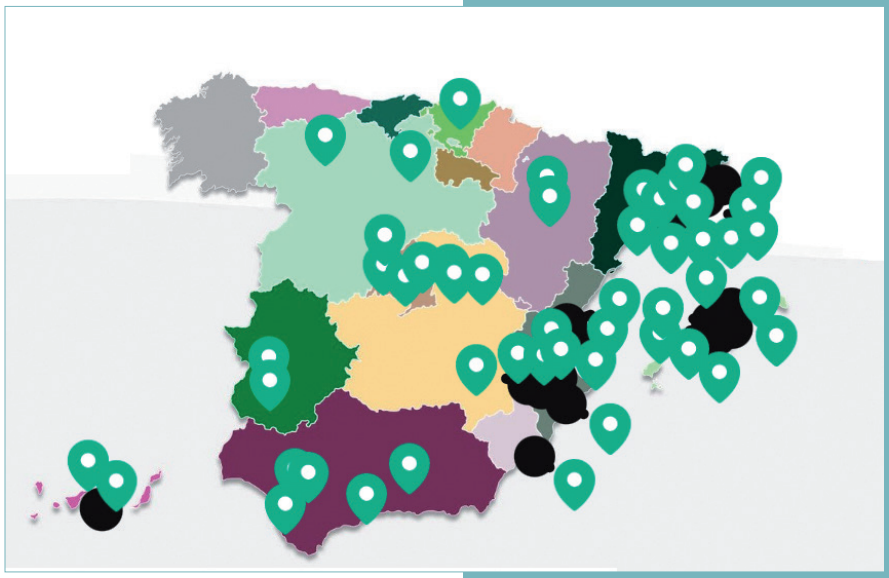


Figure 3.8. Map of the Towns twinned by glass in Spain.
Source: © ECOVIDRIO.

- A Junior FunGlass School in Slovakia (4.14.2),
- Sustainability was the theme of a significant workshop in Egypt, students' Glass Art was on display in Nigeria and South Africa (4.15.2),
- Encouraging younger children in the Philippines: (4.16.3, 5.2 and 5.6),
- An international initiative to highlight the plight of Afghan women by creating sections of a mosaic (4.16.2).
- 'Creative Glass of Serbia' is an initiative that connects glass heritage, creative industries, and handmade glass production in Serbia.









Figure 3.9. Mariela De Maio & Pablo Schapira, Randomness. Seven stained glass windows in Gothic window frames of 160 x 60 cm, with the symbology of the tarot cards: The Tower, the Wheel of Fortune, the Wizard, and the Star. They are located outdoors, on the ground, forming a circle with an open space that allows entry.

Source: © IYOG archive.



Figure 3.10. Alejandro Badillos, Guillermo Blanco & Gonzalo Álvarez. The force of grisaille.
Source: © IYOG archive.



Figure 3.11. Painting bottles at FunGlass School in Slovakia.
Source: © IYOG archive.

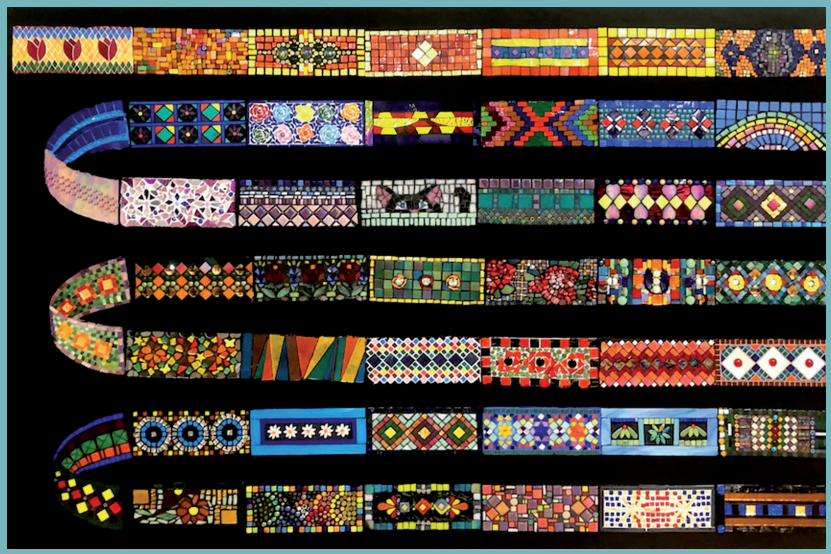


Figure 3.12. A glass mosaic capturing the complex patterns created by Afghan women.
Source: © IYOG archive.





Figure 3.13. Creative Glass LAB at Creative Glass of Serbia.
Source: © IYOG database.

4. Reports from around the world

Introduction

As explained in Chapter 2, the responsibility for organizing local events was placed with 18 Regional Organizations. These were selected according to geography, language, and the regional distribution of registrations of interest on our central database. Now the year is complete each regional organization has produced its own report summarizing the events that took place, and these are gathered into this chapter. The original reports have been edited so they have a degree of uniformity in style, but this has been kept to a minimum.

4.1. Activity Report from RO01 (Brazil)

Author: Ana C. Rodrigues and Edgar Zanotto

RO01 was composed solely of Brazil. Brazil had 82 endorsements to the International Year of Glass 2022 from academic institutions, glass companies and artists. The main Institutions during the year were: a) UFSCar - Federal University of São Carlos, Department of Materials Engineering b) USP: São Paulo State University, Chemistry Institute of São Carlos, Physics Institute of São Carlos, Engineering School of São Carlos, Chemistry Department at Ribeirão Preto, c) UNESP: Paulista State University, Chemistry Institute at Araraquara, and d) ABIVIDRO: Brazilian Association of Glass Industries.

Code	Countries in ROs	Authors
RO01	Brazil	Ana C. Rodrigues, Edgar Zanotto
RO02	Germany, Austria, Lichtenstein	Thomas Jüngling
RO03	China	Xiaoxin Fu
RO04	Turkey, Greece, Cyprus, Malta, Jordan, Saudi Arabia, Lebanon, United Arab Emirates, Bahrain, Israel, Bulgaria	Burcu Apak
RO05	Argentina, Bolivia, Chile, Peru, Uruguay	María Eugenia Diaz de Vivar
RO06	Mexico, Costa Rica, Dominican Republic, Ecuador, Guatemala, Colombia, Venezuela	Ruth Moreno Gómez
RO07	USA, Canada	Manoj K. Choudhary
RO08	Andorra, Portugal, Spain	Yolanda Castro, Francisco Muñoz, Paloma Pastor and Alicia Durán
RO09	France, Belgium	Daniel Neuville
RO10	Japan, South Korea	Setsu Tanabe
RO11	Denmark, Finland, Norway, Sweden, Netherlands, Luxembourg, Latvia, Estonia, Lithuania	Yuanzheng Yue
RO12	UK, Ireland	John M. Parker & Róisín de Buitléar
RO13	Russia, Poland, Armenia, Kazakhstan, Belarus, Uzbekistan, Moldavia, Ukraine	Tatyana Tsyganova
RO14	Hungary, Slovenia, Serbia, Romania, Slovak Republic. Czech Republic, Switzerland, Austria, Croatia	Ales Helebrant
RO15	Algeria, Angola, Egypt, Eritrea, Morocco, Nigeria, South Africa, Swaziland, Tanzania, Ghana	Lothar Böttcher
RO16	Australia, Malaysia, New Zealand, Singapore, Vietnam, Indonesia, Philippines, Thailand	Bronwyn Hughes
RO17	India, Iran, Pakistan	Vinit Kapur
RO18	Italy	Gabriele Peron

Index to Regional Organization Reports, Countries and Authors.

A video summary of activities can be accessed here [1]. The main activities in 2022 are listed below.

4.1.1. Museums & exhibitions

Chemistry Institute, USP. Mini Glass Museum one-week exhibition; Coordinator: Prof. Danilo Manzani



Figure 4.1.1. Mini Museum of Glass.
Source: © IYOG archive.

11th November 2022: workshop "The Glass Era" at Paula Souza with participation of ABIVIDRO and exhibition. The exhibition lasted two weeks in the main hall, where hundreds of people circulate daily.

Science and art: The exhibition "Science and Art in Glass" (Ademir Sertori, glass blower, and CeRTEV) took place at the UFSCar Community Library between Jul 10 and Aug 26. More than 300 visitors signed the



Figure 4.1.2a,b,c. Workshop "The Glass Era".
Source: © IYOG archive.

attendance booklet praising the exhibition and the work of the audiovisual technician Ademir Sertori, who has more than 40 years professional experience.

4.1.2. Theatrical and musical performances

Several theatre performances were held throughout the year. Among them were plays for children in kindergarten, elementary and high schools, and university audiences. The presentations were conducted in: traditional theatres, auditoriums, convention centers, community libraries, courtyards and classrooms, school cafeterias and open spaces, such as urban squares and event tents.

The plays for children were about ethics, environment, food, Marie Curie and glass. In addition, the group Vitreous Sound and Olhares/Ouroboros performed with the themes of diseases and vaccines, water and glass. There were 38 presentations for an audience of approximately 1,600 attendees in different Brazilian cities: São Carlos (SP), Ibaté (SP), São Paulo (SP), Ribeirão Preto (SP), Uberlândia (MG), Mossoró (RN) and even at an international environment, Rotterdam in the Netherlands. In addition to these face-to-face audiences, 646 views via the Facebook page have been recorded so far for the Vitreous Sound presentations.

4.1.3. Contest 'The Glass is…'

During two months via Google Forms and celebrating the IYOG, a phrase



Figure 4.1.3. 'Glass is...'.
Source: © IYOG archive.

contest was held: "*Glass is…*". Among the 39 people who participated in the contest by sending sentences about glass, five were chosen by a jury of 7 people, including UFSCar professors, postdoctoral students, and glass technicians. The winning sentence described glass as "*There is so much in glass that it deserves verses, a universe of possibilities, assuming various shapes and thicknesses, diversifying its meaning in museums. It protects and displays rare things; glass is also a celebration in the form of bowls, glass is delicate firm thermo-acoustic, glass it's like human beings, sometimes fragile, sometimes rustic…*".

4.1.4. Training and Research in Scientific Dissemination and Active Methodologies

Total Experience Learning - SRI and Albright College (7-13/10/22) - Reading PA, USA

The International Year of Glass supported the Total Experience Learning (TEL) project of the Science Research Institute (SRI) at Albright College, USA. The Brazilian school teacher Bárbara Rodrigues was accompanied by Prof. Karina Lupetti through a visit *in loco* to elementary schools in Reading, Pennsylvania, USA. In addition to the Brazilian team, professors and researchers from Germany, the Philippines, Croatia, and the United States were also present in this mission of recognition and exchange of experiences to show the local government of Reading the importance of the "Total Experience Learning" methodology. Scaling active methods to 5000 students is the project proposal with the partnership of the Institute for Scientific Research (SRI) in Biotechnology at Albright College and the local public-school Governor Mifflin. Material kits were developed and applied in partnership with the American Ceramic Society (ACerS), particularly on glass and its properties.

Abividro organized two educational projects: Educavidro, developed in Abividro and Abravidro and Ecoacircular - ecoacircular.com.br for primary and secondary schools. They have signed agreements with four states in Brazil to be extended to others.

Abividro also published the book, "Vidro Plano para edificações" from professor Fernando Westphal.

4.1.5. Ouroboros project

Elective subject "Stay Glassy" (Fique Vidrado) at public school EE Sebastião de Oliveira Rocha (August to December 2022).

The subject was offered with the participation of Professor Bárbara

Daniela Guedes Rodrigues, who teaches chemistry classes at the school. We also had the support of two students, one undergraduate and another graduate from UFSCar. The theme of the course had the IYOG as a reference, with a total of 30 hours of activities. Thirty-five enrolled students participated in workshops on antitype, lenses and mirrors, periscopes, edible glass, comics illustration (Japanese type Mangas), and lectures with specialists in the field of glass and photography. The students also visited UFSCar to know the hialotechnic laboratory. Activities with the ACeRS kit were also proposed.

4.1.6. Conferences organized by CeRTEV researchers

XIII BrazGlass - Brazilian Symposium on Glasses and Related Materials (jointly with the XX Brazil MRS Meeting), September 25-29, Foz do Iguaçu - PR, Brazil.

IV University-Industry Workshop on Vitreous Materials (Virtual), September, 2022.

5th Technical Meeting on Glass, São Paulo, October 2022.

4.1.7. Other Activities

250 Calendars —with comics in Manga style to celebrate IYOG— were printed and distributed in the Opening Ceremony at the ONU – Geneve.

The International Day of Light – UNESP/Araraquara, June 16th.

Chemist´s day —dedicated to glass— USP- São Carlos, June 18th.

The subtitles of the IYOG Video have been translated to Portuguese [2].

Pod cast at UFSCar radio: “The Vitreous Minutes”.

Participation in the IYOG young outreach group meetings.

Translation of the Japanese poster “International Year of Glass” to Portuguese —by João Vitor Campos.

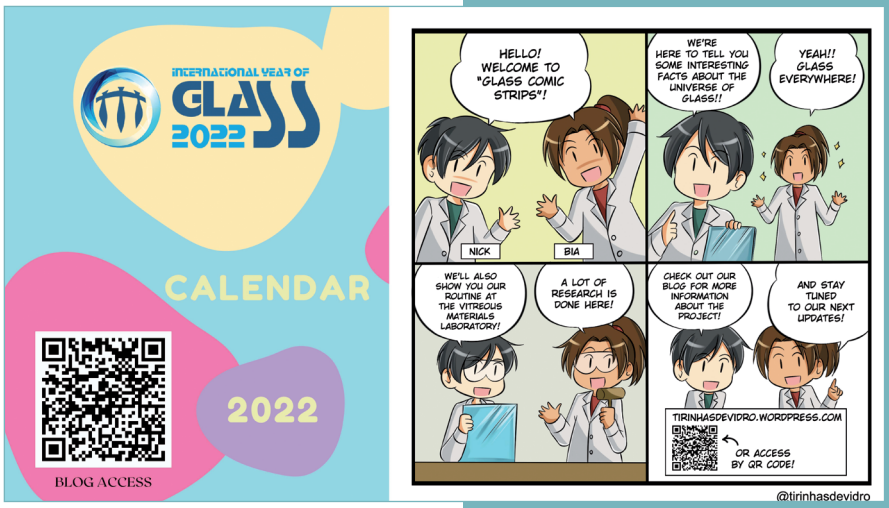


Figure 4.1.4. Calendar IYOG.
Source: © IYOG archive.



Figure 4.1.5. Translated Japanese poster IYOG.
Source: © IYOG archive.

Translation to English of new editions of "Glass Strips" (Tirinhas de Vidro). Glass strips Calendar and comics in Mangá style were distributed worldwide.

Interview with John Moran, the winner of Season 3 of the Netflix show "Blown Away".

19 Invited and plenary lectures delivered by CeRTEV researchers in honor of the IYOG.

References

[1] https://www.youtube.com/watch?v=Bm0k9_Ku0U8&t=21s.
[2] https://www.youtube.com/watch?v=mClgNwCvBuU.

4.2. Report from RO02 (Germany, Liechtenstein, and Austria)

Author: Thomas Jüngling

4.2.1. Regional Organization 2 (RO02) and Its Role

The committee of RO02 was formed by key figures in the glass industry within Germany, Liechtenstein, and Austria, united by the International Year of Glass 2022. Its purpose was to underscore the significance of glass, and it primarily leveraged social media, particularly through the Instagram channel "Jahr des Glases", as its main channel of communication and focus.

Members of RO02 Committee included:

- Associations: Bundesverband Glasindustrie e.V., Bundesverband Flachglas e.V., Deutsche Glastechnische Gesellschaft e.V. (DGG), Fachverband der Glasindustrie, Wirtschaftskammer Österreich, glasspool e.V., VDMA e.V.
- Industries: Ivoclar Vivadent GmbH, Schott AG.
- Museums: Glasmuseum Hentrich.
- Trade Fairs: glasstec 2022, Messe Düsseldorf.

The RO02 committee executed a coherent strategy, focusing on social media to celebrate glass. The coordinated activities included congresses, seminars, industrial fairs, artistic exhibitions, and more. Responsibilities encompassed advertising, sharing best practices, event planning, providing supportive environments, and primarily B2C communication through Instagram. Through these coordinated efforts, the committee successfully highlighted the value of glass in various aspects of life in 2022.



Figure 4.2.1. Logo of the Regional Organization 2, consisting of Germany, Liechtenstein, and Austria.
Source: © IYOG archive.

4.2.2. Glass Industry

Region 2 hosts around 400 sites specializing in glass manufacturing and finishing, supporting various sectors like construction, technology, and healthcare through its focus on sustainability and innovation. The production volume totals approximately 7.7 million tons of diverse glass types, including 4.6 million tons of container glass, 2.2 million tons of flat glass, 0.4 million tons each of fibers and utility/special glass, and 0.1 million tons of tableware. This highlights



Figure 4.2.2. Six distinct 'Places of Glass' from the 'Orte des Glases' campaign. Featured from top left to bottom right: Georg-August-Universität Göttingen, Coburger Glaspreis 2022, Eintracht-Grundschule, Dortmund Holzen, Sybille Homann (glass artist), Glashütte Lamberts, Waldsassen, Arnold-Akademie, Miedelsbach.
Source: © IYOG archive.

the multifaceted nature of the glass industry in RO02, catering to a broad spectrum of applications.

4.2.3. Key Activities of the Regional Committee

During the IYOG 2022, the Regional Committee in Germany, Liechtenstein, and Austria has undertaken various initiatives and activities to celebrate and promote the significance of glass. These encompass web-based outreach, press work, campaigns, competitions, events, and social media engagement. Each of these initiatives aimed to enhance the public's understanding of glass as a vital material and to showcase its diversity,



Figure 4.2.3. The two delighted winners of the "Inszeniere dich und andere mit Glas in deinem Alltag" (stage yourself and others with glass in your everyday life) competition, holding their awards at glasstec Messe in Düsseldorf. Their innovative videos explored the significance of glass in daily life, highlighting its sustainable and creative applications.
Source: © IYOG archive.

sustainability, and futuristic capabilities.

4.2.4. Website and Event Calendar

A dedicated website with a calendar featuring 71 diverse activities was launched, providing a central hub for public engagement with the glass industry and showcasing its regional and global importance.

4.2.5. Press Releases

Key press releases enhanced awareness about the IYOG and stimulated participation in photo and video competitions.

4.2.6. Campaign 'Orte des Glases' (Places of Glass)

The 'Orte des Glases' campaign was initiated to highlight the multifaceted and futuristic nature of glass to both the public and the glass industry. Featuring 12 unique locations that represent various aspects of glass, the campaign leveraged diverse communication channels to emphasize different activities and applications of glass. A jury from the Regional Organization 2 thoughtfully selected these special locations under the theme 'Places of Glass'.

The first 'Place of Glass' selected by the jury was Eintracht-Grundschule (an elementary school) in Dortmund Holzen. The school had submitted an innovative idea for a podcast about glass, with plans for the fourth-grade students to delve into the subject. They were to explore aspects of sustainability and potential applications during their science lessons, a concept that resonated with the selection committee.

Even though the IYOG 2022 has come to an end, the campaign continues to thrive, and new submissions are still being accepted. To learn more about all 12 featured places of glass, visit www.glasorte.de.

4.2.7. Video Competition

The video competition "Inszeniere dich und andere mit Glas in deinem Alltag" (stage yourself and others with glass in your everyday life) aimed to engage children and young adults aged 12 to 23, encouraging them to explore and express the applications and significance of glass in daily life. The initiative

sought to uncover creativity, versatility, and unique perspectives, enhancing the understanding of glass and its various applications, particularly focusing on sustainable and innovative aspects.

The competition was promoted through a dedicated webpage, regular press releases, and visual teasers on Instagram, effectively reaching the target age group. Submissions were evaluated by a panel of experts from the regional IYOG Committee, emphasizing originality, relevance, and artistic flair.

The best contributions were honored at glasstec Messe in Düsseldorf in September 2022, with awards totaling €5,000. Prizes included class trips, day excursions, and iPads [1].

4.2.8. Events and Exhibitions

Various events were held throughout the year to celebrate and highlight the diverse roles of glass in industry, art, design, and sustainability. These gatherings provided platforms for innovation, collaboration, and celebration of glass. Key events included the 26th International Glass Congress & 96th DGG Glass-Technology Conferences in Berlin, the BF-Glaskongress in Regensburg focusing on flat glass and sustainability, the 15th Trendtag Glas in Düsseldorf aligned with the International Year of Glass, the Annual Conference of the DGG Technical Committee V "Glass History and Glass Design" in Rostock, Germany [2], and GLASTECH, a global industry event dedicated to the glass manufacturing, processing, and application sectors [3].

4.2.9. Social Media and Community Engagement

Through the Instagram channel "jahr_des_glases", reaching nearly 2 million users, various activities including artist takeovers, the GLASFLUENCER Initiative, and the GLAS-BERUFE Collaboration were undertaken to boost awareness and interest in glass as art, industry, and innovation. Now renamed "glas.orte" and accessible at www.instagram.com/glas.orte, the channel continues as an engaging platform for glass enthusiasts, supported by leading German glass associations like Deutsche Glastechnische Gesellschaft e.V. (DGG), Bundesverband Glasindustrie e.V., glasstec - International Trade Fair Messe Düsseldorf and Bundesverband Flachglas e.V. This partnership ensures ongoing dialogue and exploration in the world of glass, catering to artists, students, and the broader public.

4.2.10. Achievements of RO02 and Alignment with United Nations Development Goals

RO02 has demonstrated a commitment to innovation, collaboration, and engagement in its various activities promoting the field of glass. These activities have not only increased awareness and knowledge but also played a significant role in connecting the organization's work with the broader sustainable development goals of the United Nations. Here's an overview of the achievements:

1. Reach and Uniqueness: By leveraging Instagram, Regional Organization 2 reached nearly 2 million users, creating targeted awareness of glass's multifaceted roles. This unique positioning, focusing on B2C communication and engaging the broader public, contributes to UN SDG 12, responsible consumption and production, by emphasizing the significance of glass and promoting sustainable practices.
2. Networking: The creation of a robust network across Germany, Liechtenstein, and Austria, further strengthened by organizing conferences and fairs, has fostered collaboration and bridged gaps within the glass industry. This alignment with UN SDG 9, emphasizing industry, innovation, and infrastructure, and UN SDG 17, focusing on partnership for the goals, has made this network a significant asset in connecting academia, industry, artists, and the general public.
3. Brand Establishment: "Orte des Glases" or "Places of Glass" has become an established brand, symbolizing a commitment to glass's importance in culture, architecture, art, and industry. This effort reflects

the spirit of UN SDG 11, which supports sustainable cities and communities.

The concerted efforts of RO02 during IYOG2022 not only increased awareness and knowledge about glass but also played a pivotal role in connecting the world of glass with broader global sustainability objectives, thereby contributing to the United Nations' agenda for a better future [4].

References

[1] https://www.instagram.com/reel/Ci0D3KtKD1-/?utm_source=ig_web_copy_link.
[2] https://www.linkedin.com/feed/update/urn:li:activity:6985149734533357568.
[3] https://www.linkedin.com/feed/update/urn:li:activity:6980171923682910208.
[4] https://www.linkedin.com/feed/update/urn:li:activity:7024386508568584192.

4.3. Report from RO03 (China)

Author: Xiaoxin Fu

4.3.1. International Contemporary Glass Art Forum in China

The 2022 Glass Language International Contemporary Glass Art Forum was held in Beijing, China, on November 5th, 2022. The Forum was organized by the Chinese Ceramic Society, the Chinese Arts and Crafts Society, the Academy of Arts and Design, Tsinghua University and the Guangzhou Academy of Fine Arts.



Figure 4.3.1. 2022 Glass Language • International Contemporary Glass Art Forum in China.
Source: © IYOG archive.

With the theme of "Glass and human civilization", the forum reviewed the ancient history of glass materials and processes, studied the cultural characteristics, aesthetics and thinking modes of glass in different times, and explored the past, present and future of glass and civilization. 5 keynote lectures were presented by:

Associate researcher of Shanghai Institute of Optics and Fine Mechanics



Figure 4.3.2a. 2022 Glass Language International Contemporary Glass Art Exhibition in China.
Source: © IYOG archive.



Figure 4.3.2b. Glass artwork.
Source: © IYOG archive.

(SIOM), Chinese Academy of Sciences (CAS), Mr. Song Liu *Ancient Chinese glass: Technological Exchange, Dissemination, and Fusion along the Silk Road.*

Professor of the Rhode Island School of Design, Ms. Rachel Berwick, *Rhode Island School of Design Glass Dept. RISD Glass.*

Professor of Eugeniusz Geppert Academy of Art and Design in Wroclaw, Mr. Kazimierz Pawlak, *Polish Art Glass.*

Associate Professor of Academy of Arts and Design, Tsinghua University, Mr. Jing Li, *the Tension of Modernity — "Production" and "Aesthetic Expression" of Glass Art in the 20th Century.*

Associate Professor of Rochester Institute of Technology, Mr. David Schnuckel, *"Gain & loss" — Studio Education in the Era of Epidemic.*

4.3.2. 2022 Glass Language International Contemporary Glass Art Exhibition in China

The 2022 Glass Language International Contemporary Glass Art Exhibition was held in Guangzhou from Sep 28 to Oct 23, and in Beijing from Nov 5 to 20. The Exhibition was organized by the Chinese Ceramic Society, the Chinese Arts and Crafts Society, Academy of Arts and Design, Tsinghua University and The Guangzhou Academy of Fine Arts. The exhibition showcased more than 100 pieces of contemporary glass art at home and abroad, showing the exchange and collision of Eastern and Western glass art. The theme and mission of this exhibition is letting the public understand the value of glass art works, letting glass art works into the life of the public.

4.3.3. Mechanical Performances Frontier Forum on Glasses in China

Mechanical Performances Frontier Forum on Glasses was held in Wuhan, China, from Jun 18-19, organized by the Chinese Ceramic Society and Wuhan University of Technology. Nearly 1,500 experts, scholars, graduate students and business representatives

attended this hybrid forum. During the conference, the international "three major glass giants" Japan AGC Company, Corning Company of the United States and Schott Company of Germany, as well as the domestic glass industry leaders China Building Materials Scientific Research Institute Co., LTD., Huawei Technologies Co., LTD., Shenguang Optical Group Co., LTD., Nanbo Group, Qibin Group, etc., set up a number of sub-venues. The advanced technologies and research achievements in glass material mechanics, mechanical simulation, material genetic engineering and other fields were discussed in a warm and in-depth way.

4.3.4. Functional Glass Symposium in China and International Forum in New Optoelectronic Materials in China

Functional Glass Symposium in China and International Forum in New Optoelectronic Materials was held online from August 19-20, organized by the Chinese Ceramic Society, Associate researcher of Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences and Qilu University of Technology.

This symposium is an important event in China to celebrate IYOG 2022. Sixteen experts and scholars from Chinese universities, research institutes, enterprises and institutions, as well as Denmark, Germany, the United States, France, Brazil and Japan made keynote reports at the symposium. In addition, 45 glass material experts from universities and scientific research institutes across the country made invited reports in four sessions: functional glass and application, glass basic research, optical functional glass and glass-ceramics, optical waveguide and optical fiber. The symposium reports cover the development history of glass, flat glass, electronic glass, intelligent glass, glass-ceramics,



Figure 4.3.3. Functional Glass Symposium in China and International Forum in New Optoelectronic Materials.
Source: © IYOG archive.



Figure 4.3.4. Special Issue of the IYOG in The Journal of the Chinese Ceramic Society.
Source: © IYOG archive.



light-emitting glass, high-strength anti-radiation glass, metal glass and basic research in the field of glass research, development, application, and the latest achievements. Report experts and participants interacted and answered questions on relevant issues, and the academic atmosphere was strong in the venue.

The symposium was also broadcast live on the Internet platform, and a total of more than 4,000 people watched it online.

4.3.5. IYOG Forum on International Engineering Science and Technology Strategy in China

IYOG Forum on International Engineering Science and Technology Strategy was held in Shenzhen, China, from January 6-8, 2023. This forum was organized by the Chinese Academy of Engineering, the Chinese Ceramic Society, China National Building Materials Group Corporation, Shenzhen Longhua District Government, National Innovation Centre of Glass New Materials. With theme of "Celebrating the past, present and future of glass for a sustainable, equitable and better tomorrow", the forum aims to create a high-level exchange platform and provide strategic opinions for the sustainable development of glass science and technology.

Academician of the Chinese Academy of Engineering, Chair of Advisory Committee of International Commission on Glass, Board Chairman of CTIEC, Prof. Peng Shou delivered a welcome address at the opening ceremony. 4 keynote lectures were given at this forum. They were:

Academician of the Chinese Academy of Science, Former President of Wuhan University of Technology Mr. Zhang Qingjie, *Strategic Research of Cross Frontier and Disruptive Innovation in Materials Industry for 2035.*

Academician of the Australian Academy of Engineering, Vice Director



Figure 4.4.1. Closing panel at the IYOG Opening Ceremony, Geneva.
Source: © IYOG archive.

of Academic Committee of Foshan Xianhu Laboratory Mr. Chen Yibin, *Disruptive Technology and Industrialization Model of Zero Carbon Combustion through the Integration of Ammonia and Hydrogen for High-Temperature Manufacturing Industry.*

Academician of the Chinese Academy of Engineering, President of Beijing University of Technology Mr. Tan Tianwei, *The 3rd Biological Manufacturing Powered by Renewable Energy*

Academician of the Chinese Academy of Engineering, Director of Hydrogen Science Centre of Shanghai Jiaotong University, Mr. Wenjiang Ding, *Innovation and Promotion Related to Hydrogen and Magnesium.*

The forum attracted more than 300 on-site participants and the online streaming of the forum reaped more than 30,000 views.

4.3.6. Publications

Special Issue for IYOG in *Laser & Optoelectronic Progress.*

Ebook: *Glass and Life.*

Glass Language, *Works of 2022 International Contemporary Glass Art Exhibition.*

4.4. Report from RO04 (Turkey, Greece, Cyprus, Malta, Jordan, Saudi Arabia, Lebanon, United Arab Emirates, Bahrein, Israel, Bulgaria)

Author: Burcu Apak

The following countries in this regional grouping were actively involved in IYOG. The figures indicate those activities that were added in the IYOG database: Turkey: 27; Jordan 5; Lebanon 2; Bulgaria 2; and Israel 1.

4.4.1. As the most active participant, this report begins with the information from Turkey

Şişecam in Turkey is a major international glass company and was



Figure 4.4.2. Images from the Şişecam 37th International Glass Conference.
Source: © IYOG archive.

a Diamond Sponsor of the International Year of Glass. Their Chairman and Executive Member of their Board, Prof. Dr. Ahmet Kırman participated in the closing session at the opening IYOG event in Geneva. He touched on the role of glass in human history and its contribution to the development of civilizations, emphasizing its importance, as a strategic material for the future as well as the present. He explained how Şişecam's technology- and sustainability-focuses on bringing new capabilities and functions to glass, with its infinite potential.

Şişecam conducted a comprehensive communication campaign in Türkiye, Bulgaria, and Italy to explain the miracles of glass in every field and raise public awareness, particularly to its sustainability. As part of the communication plan, all Group brands, especially Şişecam's corporate brand, communicated intensively the Year of Glass throughout the reporting period.

Şişecam produced and broadcasted an IYOG Film [1] on the miraculous properties of glass from the perspectives of sustainability and technology on digital channels and social media. The film was viewed more than 1.5 million times in Italy, Bulgaria, and Türkiye, and its social media activities registered nearly 60 million interactions.

In addition, within the communication campaign, advertising content was placed in leading business and economics magazines. They also organized several conferences and seminars under the IYOG banner.

Summary

- The film celebrating the International Year of Glass was viewed more than 1.5 million times in Italy, Bulgaria, and Türkiye, and its social media activities reached nearly 60 million interactions.
- Our PR work, conveying the message "We are Celebrating the Year of Glass", was published on more than 1000 sites and channels.
- Our Year of Glass messages on our billboards and digital outdoor channels reached millions in Istanbul.
- We conveyed our glass message to the business world with our

IYOG Visuals:



Figure 4.4.3a,b,c. Leaflets of Şişecam IYOG.
Source: © IYOG archive.

advertisements in economic magazines.

- We reached millions of people with the IYOG communications we made at the fairs and events we attended.
- "Şişecam 37th International Glass Conference" (https://glassconference.sisecam.com/en) with the theme of "Inspiration for Tomorrow: Celebrating International Year of Glass" was held in hybrid format: both virtually and in-person at the Sheraton Grand Istanbul Ataşehir Hotel in Istanbul, Turkey on Nov 17-18.
- Şişecam ran their own local Web Page. Among the activities they reported were the following:
  – Şişecam released a special celebration film for IYOG [2].
  – Şişecam and other Şişecam brands celebrated the IYOG in their digital channels. In addition, IYOG content has been presented in public transportation.

4.4.2. Other activities in Turkey

Camgeran 2022 International Glass Symposium

We celebrate the past, present and future of this transformative material in

Eskişehir, hosted by Anadolu University Faculty of Fine Arts Glass Department, and bring together institution academics, researchers, artists, designers, and industry representatives in the field of glass to search for potential openings to international cooperation and to create a dialogue.

Odunpazarı the 8th International Glass Festival
4 artists, 2 from Turkey, 1 from Germany and 1 from England, participated in this year's festival. A different artist worked every day for the first 4 days of the festival. On the last day of the festival, an exhibition opened to show the work created.

Billur/Crystal Glass Exhibition
A solo exhibition of the renowned Turkish glass artist Yasemin Aslan Bakiri, consisting of works that highlight Ottoman culture and way of life. A collection of her earlier and recent works which blend Turkey's historic and modern spirit. The glass exhibition took place in a restored hammam, built in 1802, showcasing the artist's creations that reflect the resplendent world of the sultans and their palaces. A video showing the artistic creation of glass art pieces was included in the exhibition.

Factory Open Days
Special educational visits by selected students to the research laboratories of Şişecam.

Glass Studios
In addition, numerous glass studios (>20) opened their doors at various points through the year to demonstrate and teach a wide range of glass lampworking skills. Different themes often taken from nature were adopted for these classes for the objects created.

Other major activities of members of RO04 were as follows:

4.4.3. Jordanian training/education

In Jordan there was a concerted effort to train artists in glass decoration techniques such as glass painting, staining and carving. They encouraged the use of not only new glass but also recycled glass and as well as working with trained artists, they visited a Senior High School to introduce glass-making techniques.

An IYOG grant allowed a Canadian/Thai flame-working specialist to assist with training 6 artists in a local collective.

4.4.4. Glass repairs in Lebanon

A major chemical explosion in 2020 seriously damaged ancient glass artefacts stored in the Archaeological Museum in Beirut and mixed the broken fragments with those of the glass storage cabinets. Painstaking collection of thousands of broken fragments has now led to the restoration of around 10% or more of the exhibits. IYOG has benefitted from their earlier gargantuan effort in that they set up a teaching exercise to pass on their skills in archaeology and glass vessel reconstruction. They worked with other international bodies such as the Cyprus Institute and the University of Trier. In turn, the IYOG encouraged the dissemination of some wider publicity on their work. More information is given in Chapter 6.3.

4.4.5. Activities in Bulgaria

A project entitled Glass Initial aimed to spread glass art made using different techniques to art lovers. They also set about presenting the material glass, as one of the sustainable materials of the 21st century, through short lectures, presentations, and demonstrations.

An innovative project involved primary school children. The HAM radio club and television LZ1KAK set up their club transceiver with the identification sign LZ1GLASS. The activity was part of the transdisciplinary STEAM project related to the IYOG at "Aleko Konstantinov" Primary School in Dimitrovgrad. Students made as many radio links as possible throughout 2022 to promote their glass projects around the world, such as videos and presentations on glass exhibitions and museum visits.

4.4.6. Activity in Israel

"Fabrication" was a Solo Exhibition-by Silvia Zimerman. The artist's intention was to transport the observer to her world of fabric. Following a long period of uncertainty, fear and anxiety, the artist chose to imagine the protected, carefree haven of her childhood. Flashes of piles of fabric and thread arise in memories connected to her father being a tailor and his workshop "El Taller", who passed away at a very young age. Imagining them created in glass is her way to keep her father close by.

References

[1] https://www.youtube.com/watch?v=kJMp5c3cEMQ.
[2] https://www.youtube.com/watch?v=kJMp5c3cEMQ.

4.5. Report from RO05 Latin America South (Argentina, Bolivia, Chile, Perú, Uruguay)

Author: María Eugenia Diaz de Vivar

Executive committee: Nora Pellegri, Instituto Fisica Rosario, FCEIyA-UNR-CONICET, Argentina, María Eugenia Diaz de Vivar, Objetos con Vidrio, Argentina, Nicolas Rendtorff, CETMIC-CONICET-UNLP-ATAC, Argentina, Mauricio Rodríguez, CURE - FQ - Udelar, Uruguay.

Art Commission: Beatriz Amorin, Escuela Diseño Carolina Frabasile, Escuela Diseño, Facultad de Arquitectrura, Udelar, Uruguay, Liliana Porfiri, Secretaría de Cultura Municipalidad de Berazategui, Argentina, Eugenia Castillo and Carlos Servat, Universidad Nacional de las Artes Departamento de Artes Visuales, Argentina, María Eugenia Diaz de Vivar, Objetos con Vidrio, Argentina, Martín Peralta, Cristal San Carlos, San Carlos Centro, Argentina, Walter Di Santo, Consejero Fundación Catedral dela Plata. Docente UNLP y UCALP, Argentina, Valentina Garretón, Freelance, Chile, Tauba Müller Freelance Chile.

Industry and Sustainability Commission: Nicolas Rendtorff, CETMIC-CONICET-UNLP-ATAC, Argentina, Ulses Gilabert, SEGEMAR-FRBA-UTN, Argentina, María Eugenia Diaz de Vivar, Objetos con Vidrio, Argentina, Lorena Piazze, VIdPIA CAVIPLAN, Argentina.

Scientific Commission: Nora Pellegri, Instituto Fisica Rosario, FCEIyA-UNR-CONICET, Argentina, Ulses Gilabert, SEGEMAR-FRBA-UTN, Argentina, Nicolas Rendtorff, CETMIC-CONICET-UNLP-ATAC, Argentina, Mauricio Rodríguez - CURE - FQ, Udelar, Uruguay, Josefina Ballarre, INTEMA - CONICET-UNMdP, Argentina.

History Culture and Heritage Commission: Liliana Porfiri, Secretaría de Cultura Municipalidad de Berazategui, Argentina, María Eugenia Diaz de Vivar, Objetos con Vidrio, Argentina, María Paula Farina Ruiz, Asesora en Comisión Nacional de Monumentos, de Lugares y de Bienes Históricos, Argentina, Mauricio Llorach, Vitralista, Uruguay.

Academic Institutions: Universidad Tecnológica Nacional de Buenos Aires, Argentina, Centro Universitario Regional del Este (CURE), Uruguay, Facultad de Química - Uruguay, Escuela Universitaria Centro de Diseño, Facultad de Arquitectura, Diseño y Urbanismo - Uruguay, Universidad Mayor de San Simón (UMSS), Bolivia, Universidad Nacional de Rosario (ARG), Argentina, Universidad Nacional de las Artes (Departamento de Artes Visuales) - (ARG), Argentina.

R&D centers: Consejo Nacional De Investigaciones Científicas y Técnicas (CONICET), Argentina, CIDEMAT, Ministerio de Desarrollo Productivo, Argentina, SGEMAR, Ministerio de Desarrollo Productivo, Argentina, INTEMA (CONICET-UNMdP), Argentina, CETMIC (CONICET-UNLP), Argentina, CONICET - CCT, Rosario Argentina, Ministerio de Educación y Cultura Programa de Desarrollo Ciencias Básicas, Uruguay.



Figure 4.5.1. Lorena Piazze en SAM2022.
Source: © IYOG archive.

Associations: Asociación Gremial Chilena del Vidrio, Aluminio y PVC Chile, Asociación Argentina de Materiales, Argentina, Fundación Manolo Lima, Uruguay, Asociación Técnica Argentina de Cerámica Argentina, Cámara Argentina de Vidrio Plano, Argentina, Cámara Uruguaya de Vidrio Plano, UruguaySociedad Uruguaya de Física Uruguay.

Companies: Yacimientos Petrolíferos Fiscales (YPF), Argentina, Ministerio de Proyectos, Argentina, Vidriería Argentina Sociedad Anónima VASA, Argentina, Arch. Florencia Garnica, Argentina, Vidriería BIA, Uruguay.

Journals: *Objetos con Vidrio,* Argentina. Web page in Spanish [1].

4.5.1. Activities

In the context of the International Year of Glass, RO05 [2] was noteworthy with over 150 events celebrating the versatility and significance of glass. These events are organized into thematic categories, reflecting the richness and diversity of local contributions to the world of glass.

Conferences and Academic Events
One highlight was the holding of conferences and academic events that brought together glass experts and professionals. The XX International Congress of Metallurgy and Materials, SAM 2022 stood out for its masterful presentations, round-tables and enriching dialogues; particularly noteworthy was Lorena Piazze who spoke on the challenges of flat glass in the sustainable development of the South. Similarly, the 5th JONICER provided a valuable platform for knowledge exchange and key aspects can be reviewed at this link [4].

During the "GustoaCiencias" event at Bar Ciudadela, Montevideo, the MSc. Maia Mombrú performed a monologue in which she told us in an atypical environment and in a relaxed way what glass is and where it is present in our lives. She also spoke on recycling and possible applications.

In October 2022, in the Montevideo Planetarium Agrim, Germán Barbato



Figure 4.5.2. Group-MAS-Q-VIDRIO, Uruguay.
Source: © IYOG archive.

carried out an activity entitled "The universe through glass", a compilation of milestones throughout history about the glass used in astronomy. Dr. Mauricio Rodríguez, Lic. Santiago Roland, Dr. Andrea Sosa, Dr. Sebastian Bruzzone participated in this, giving lectures; a telescope preparation workshop was held by Alejandro Galli. The activity was sponsored by the Uruguayan Astronomy Society and PEDECIBA.

In May 2023, the II Meeting of Researchers in Materials Science [5] was held in Montevideo; more than 150 researchers from Uruguay and the region attended. Prof. Alicia Durán talked on "Glass and sustainability", having earlier addressed the Faculty of Chemistry, in Montevideo, Uruguay.

Within the framework of the Ibero-American Night of Researchers [6], Dr. Mauricio Rodríguez spoke on

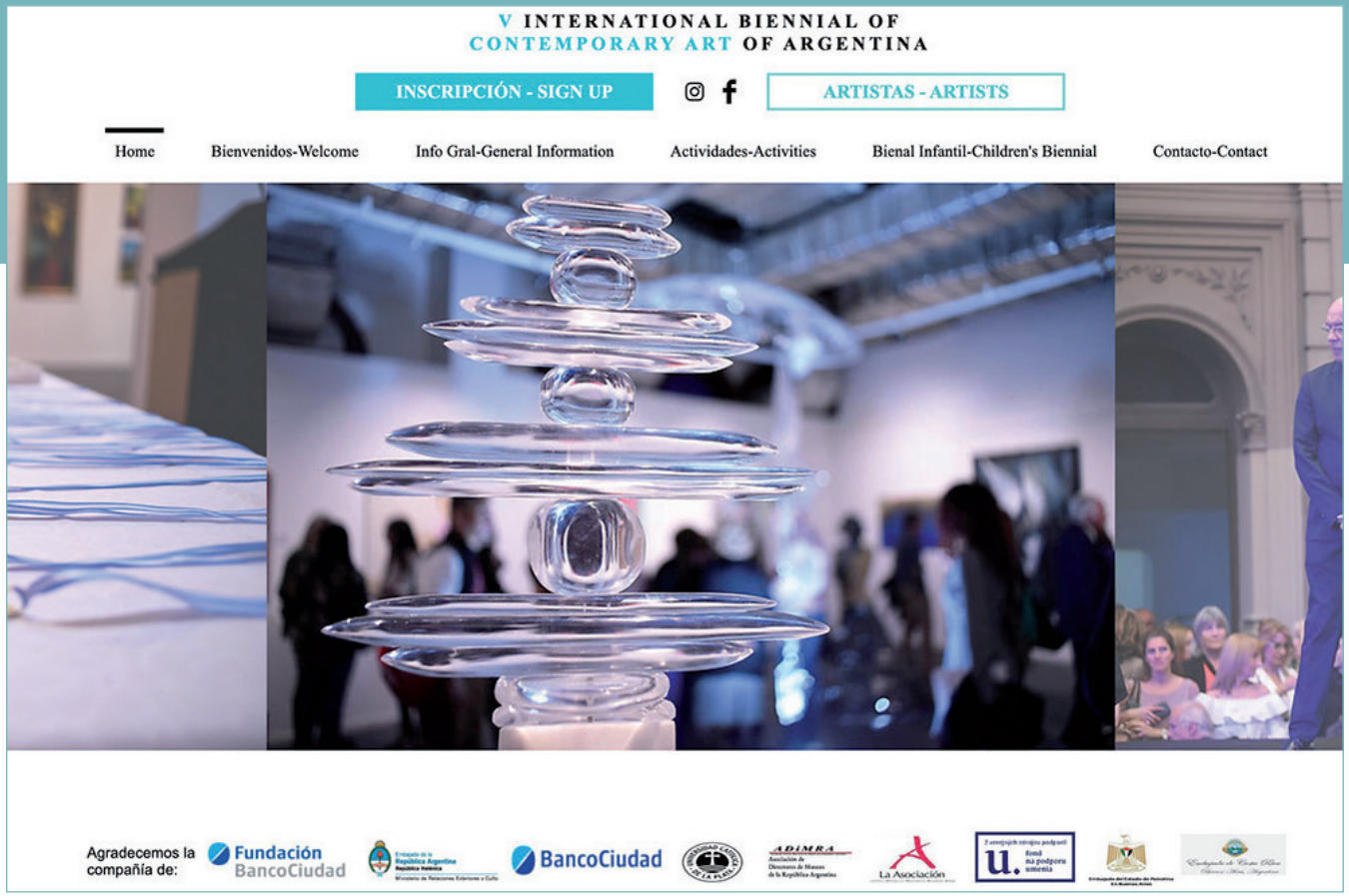


Figure 4.5.3. Biennial Internacional de Arte Contemporáneo de Argentina.
Source: © IYOG archive.

"The importance of disorder in our lives: the case of glass" available on YouTube [7].

In Uruguay, at the Faculty of Architecture, Design and Urbanism in Montevideo, the event "Design, art, science and glass industry in Uruguay" [8] was attended by representatives of local industries, businessmen, artists, designers and academics; several dissemination activities ensued and a round table on the use of glass in the context of sustainability was joined by authorities from the Ministry of the Environment.

Artistic Exhibitions

Art exhibitions played a fundamental role in the celebration, allowing glass to become a unique artistic expression. More than 150 artistic events have taken place in the region, truly an extraordinary year, which has brought together the local artistic community

and given it international exposure. This video [9] summaries the activities.

The "Ibero-American Congress on Women in Glass, Artists and Scientists" [10] featured an extraordinary exhibition showcasing fascinating work by Ibero-American women; associated events explored the connection between glass and art. Relive this experience through the Congress videos. At the Expo "Nítido", 40 Chilean stained glass artists [11] [12] participated, offering a different perspective and bringing together for the first time the community of Chilean stained glass artists in a single cultural space.

Another notable Expo was the one in Uruguay "VIDRIO.UY" [13]; 60 Uruguayan artists showed the quality and plastic diversity of their country. Venezuela joined our events and organized a large exhibition "+QUEVIDRIO" [14] with 65 artists; the call was extraordinary, they offered outstanding talks and material dissemination, and it toured Venezuela.

In Peru, 20 artists used glass in the Collective Exhibition "Transparente Híbrido" [15] and the prestigious "V International Biennial of Contemporary Art of Argentina" [16] gave first prize to a glass sculpture.

Another artistic activity in Uruguay was the 15th International Meeting of Sculptors in the city of Palmar, department of Soriano; they held an exhibition of glassy Mandalas [17].



Figure 4.5.4. Glassy mandalas.
Source: © IYOG archive.

The IYOG had a great impact in the region; many events that were held can be accessed at this link [18].

4.5.2. Educational Activities

Educational commitment was essential during the year. The "Glass: Science and Art" [19] Conference in Rosario, Santa Fe, Argentina and the "Conference on the Age of Glass" [20] at the La Plata Museum in Buenos Aires both offered workshops and other educational initiatives.

Together with the CEIBAL platform, a series of activities was designed and carried out within the framework of the "Scientists in the classroom program" [21] entitled "The thousand and one transformations of glass", an activity



Figure 4.5.5. Alicia Durán with Andrea da Ponte, Museo de la Plata, April 2023.
Source: © IYOG archive.



Figure 4.5.6. Congress Women in glass, MAVA, Madrid.
Source: © IYOG archive.

repeated annually in several schools from all over Uruguay.

Within the framework of the Science and Technology Week [22] in Uruguay, the activity "Glass and its many facets" was undertaken; several workshops were held with primary and secondary school students.

Two photography contests were held, the first [23] in conjunction with the Uruguayan Society of Physics (SUF) and the second [24] within the framework of the event in Montevideo.

Several in-person and virtual courses took place, among them stands out: 'product design from hollow glass cut cold in the territory'; 'creative transformation of glass'; 'molds for the creation of pieces in flat glass' carried out by the National School of Fine Arts and the University School of Design Center, and the Course of 'Postgraduate Vitreous and related materials; Fundamentals and Applications' with the participation of teachers from Brazil, Argentina and Uruguay.

4.5.3. Industry Events

We had two important inaugurations of flat glass plants: the leading company in



Figure 4.5.7a. Closing of IYOG in Argentina.
Source: © IYOG archive.



Figure 4.5.7b. Poster advertising conclusion of IYOG.
Source: © IYOG archive.

the region VASA, inaugurated its second plant [25] in Argentina; additionally, the Oriental Decorative and Safety Glass company in Bolivia inaugurated its second industrial plant for the processing of tempered glass using the latest technology. These two openings in RO05 highlight the great period of growth that the local industry is experiencing; and have been captured in video 1 [26] and video 2 [27].

4.5.4. Conferences and Congresses

In June of the International Year of Glass and the 25th anniversary of the Glass Art Museum in Alcorcón, the Ibero-American Congress on Women in Glass, Artists, and Scientists [28] was commemorated. The event aimed to foster connections among women professionals in the glass industry, blending art and science to celebrate the diverse facets of glass. Objetos con Vidrio, in collaboration with the Glass Art Museum and the Institute of Ceramics and Glass (CSIC), played a key role in organizing the conference. Over three days, the MAVA (Museum of Contemporary Glass Art in Alcorcón) became a hub of art, camaraderie and wisdom. Conference themes covered technical aspects, success stories, and future trends in glass, featuring notable speakers like Alicia Durán, President of the International Commission on Glass (ICG). There were more than 100 participants from Ibero America.

The Closing Day of the International Year of Glass in Argentina [29] was held at the ATAC (Argentine Technical Association of Ceramics) facilities in Buenos Aires, with four outstanding presentations by Silvia Levenson, Ruben Fasani, Andrea da Ponte and María Paula Farina Ruiz. They offered the public talks and presentations about their work and research that nourished the public and was recorded [30].

Webinars

"Cycle of Interviews with Stained Glass Artists".

To celebrate the 2022 International Year of Glass, ARCOVE and Objects with Glass, we joined together in a joint project, a cycle of six interviews with prominent stained glass artists: Guillermo Blanco [31], Sofía Villamarín [32], José Fernández Castrillo [33], Vetraria Muñoz de Pablos [34], Judith Schaechter [35] and Anika Van Der













Figure 4.5.8a-f. Cycle of Interviews with Stained Glass Artists.
Source: © IYOG archive.

Merwe [36]. The interviews were conducted by Maite Sabrina Mateo Redondo, secretary of ARCOVE, and María Eugenia Diaz de Vivar, director of Objetos con Vidrio [37], and throughout the year they will be published on the YouTube channel of ARCOVE and Objetos con Vidrio.

"Cycle of Interviews with Glass Artists" A series of interviews with artists: Ricardo Reh [38], Hebe Liz Schweistein [39], Miguel Diez [40], Alejandro Badilllos [41], and Joan Vila Grau y Antoni Vila Delclòs [42] carried out by Objetos con Vidrio, to celebrate IYOG2022.

In this link [43] are all the IYOG2022 videos.

Educational Activities

"Master class Heritage values of the corpus of stained glass windows from the fifth region of Valparaíso".

Andrea Araos presented a master class on the cultural values of stained glass in the Valparaíso region. This conference was part of the dissemination program of the project to enhance the stained glass windows of the Anglican Church of *Valparaíso*, financed by the National Cultural Heritage Service through the Cultural Heritage Fund (2021 call) of the Ministry of Cultures, Arts and Heritage, and sponsored by the Latin American Stained Glass Center [44].



Figure 4.5.9. Cycle of Interviews with Glass Artists.
Source: © IYOG archive.

Seminar "Challenges of Science and Technology in Glass" in Bolivia

The seminar highlighted the relevance of glass as a sustainable material with multiple applications. It focused on its role in art, science, communications and technology, highlighting its manufacturing at high temperatures with silica, limestone and sodium carbonate. The event took place at the Palace of Science and Culture of the Faculty of Sciences and Technology in Bolivia [45].

Some of the Artistic activities

Exhibition "EVERYTHING SOLID FADES INTO THE AIR… "Everything sacred is profaned".

As part of IYOG, a group of prominent artists exhibited a curated





Figure 4.5.10. Everything sacred is profaned. Mariela di Maio.
Source: © IYOG archive.

selection of works by Guillermo Patiño in Buenos Aires. The exhibition showcased the material in all its facets, highlighting its remarkable transformative and ductile qualities, capturing the ethereal essence. Participating artists: Alejandra Toribio, Alejandro Badillos, Antonella Perrone, Candelaria Tascheret, Edgardo De Bórtoli, Lucia Selser, María de los Santos, Mariela De Maio, Nicolás Cuevas, Pablo Glenza, and Teresa Apud [46].

LVII National meeting of Museum Directors (Argentina)

Within the framework of IYOG2022, the meeting revolved around glass, with exhibitions, talks and demonstrations with the directors of the country's museums [47].

Inauguration of the Glass Museum and temporary exhibition "Stained Glass. The glass women of Berazategui" [48]. Berazategui's glass identity dates back to 1906 when Cristalerías Rigolleau was established in the city, and urban development thrived. During the International Year of Glass, the Municipality of Berazategui fulfilled the vision of Ivone Necol de Rigolleau. In 1976, she envisioned and built a Glass Museum there to commemorate her husband, Léon [49].



Figure 4.5.11. Museum MUVI, Berazategui.
Source: © IYOG archive.

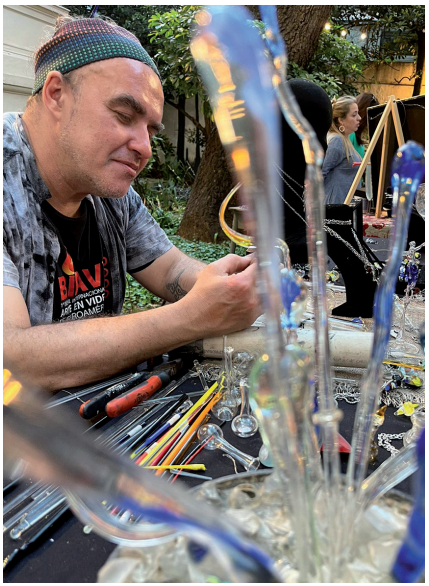


Figure 4.5.12. Art and Glass Fair.
Source: © IYOG archive.

"Museums in the moonlight"
The Library Museum of Chemistry and Pharmacy had glass as its main theme, to recognise "the International Year of Glass". In panels as an exhibition, the history of glass, the different types that we use in the laboratory, were briefly told. and that of the vitroplasty workshop of the Faculty of Exact Sciences. Different experiences related to this material and in particular its use in laboratory activities.

Members of the Berisso Art School exhibited in the Aula Magna de Química, works they made with different types of glass and techniques, with live demonstrations of their creation in one of the laboratories of the Chemistry Building [50]. Guest glass artist Andrea Da Ponte gave a lecture on 'fluorescence in glass and image transfer to glass'.

"The Art and Glass Fair"
The Ministry of Culture of the City of Buenos Aires presented The Art and Glass Fair, at the José Hernández Popular Art Museum. Participated: Fabio Reno Franceschini —sculptures and paintings with recycled glass, Rita Neumann —glass sculpture and fusion with Bullseye glass, Miguel Diez



Figure 4.5.13. Christmas glass tree made from Chilean Glass and created by 47 artists.
Source: © IYOG archive.



Figure 4.5.14. Pablo Schapira.
Source: © IYOG archive.

—vitrofusion and glass sculpture, Ariel Menniti —stained glass artist, Andrea Vanesa Wenner —contemporary mosaic and micro mosaic with glass, Pablo Glenza —flame glass, Gabriela Franco —enamel mosaic and glass pastes. There was an exhibition and demonstrations [51].

"Christmas Tree" made from Chilean Glass and created by 47 artists

An impressive artistic intervention was created in the Garden of the Arts of the Cultural Foundation of Providencia, Chile, using 300 glass plates created by Chilean artists. It is a large tree, 4 m high by 4 m wide and long, built mechanically from a modular structure that holds 300 glass plates in Christmas colors that glow according to the luminosity of the different hours of the day [52].

4.5.5. Dissemination Activities

Within the context of IYOG2022, the Visual Arts Research Institute of the UNA Department of Visual Arts hosted a Conversation, "Perspectives from the University about glass" on August 19. The specialized panelists included Liliana Conles (UNDAV, UNLP), Nora Pellegri (UNR), Nicolás Rendtorff Birrer (UNLP), Norma Rojas (UNR), Eugenia Castillo and Carlos Servat (UNA), and Martín Peralta (General Coordinator of Artistic Production at Cristalería San Carlos). Eugenia Castillo coordinated the meeting, and the event was organized by the Visual Arts Research Institute, UNA Visuales Research, and the Postgraduate Secretariat [53].

Finally, a great proposal: GLASS Artist Open Studios [54] in Buenos Aires. 18 workshops opened for: talks, demos, classes, exhibitions —was an appropriate celebration for the fabulous IYOG.

4.5.6. Press Releases

Diario Crónicas de Mercedes - Abril 2022 (Uruguay),
Entrevista La Canoa - Abril 2022 (Uruguay),

Radio Nacional - Marzo 2022 (Argentina),
Presentación El Jardín de la Inocencia - Enero 2022 (Argentina).
Publicación en Diario La Nación - Enero 2022 (Argentina),
Presentación proyecto Lucky Glass - Enero 2022 (Chile),
Publicación en Diario La Diaria - Diciembre 2021 (Uruguay),
Publicación en Diario de Cuyo - Diciembre 2021 (Argentina),
Presentación El Arte del Vitral y el Vidrio - Octubre 2021 (Argentina),
Publicación Revista Artesanos [55] - Octubre 2021 (Argentina),
Publicación Revista Cerámica de Argentina [56] - Septiembre 2022 (Argentina),
Publicación Diario del Este - Agosto 2021 (Uruguay),
Publicación sitio Objetos con vidrio - IYOG2022 (Argentina)

References

[1] https://objetosconvidrio.com/.
[2] https://aiv2022.cure.edu.uy/.
[3] https://intema.gob.ar/sam2022/index.html.
[4] https://sedici.unlp.edu.ar/handle/10915/148605.
[5] https://eicm.cure.edu.uy/.
[6] https://nocheiberoamericanainvestigadores.oei.int/.[7] https://www.youtube.com/watch?v=LHbo5Osq9I0.
[8] https://niv.cure.edu.uy/evento/.
[9] https://www.youtube.com/watch?v=sFLvvSxiYH0&list=PLFmLWFD9I_ps5w-UuP6Z4CXpB5oNUSYo5c &index=100.
[10] https://objetosconvidrio.com/congreso-iberoamericano-mujeres-en-el-vidrio-artistas-y-cientificas/.
[11] https://objetosconvidrio.com/expo-nitido-chile/
[12] https://www.youtube.com/watch?v=cOCPURMc0jU.
[13] https://objetosconvidrio.com/exposicion-vidrio-uy-en-la-facultad-de-arquitectura-diseno-y-urbanismo-montevideo-uruguay/.
[14] https://objetosconvidrio.com/lo-que-ha-significado-quevidrio-en-la-comunidad-artistica-en-venezuela-por-pili-arrojo/.
[15] https://objetosconvidrio.com/exposicion-colectiva-en-peru/.
[16] https://objetosconvidrio.com/v-bienal-internacional-arte-contemporaneo-argentina/.
[17] https://www.youtube.com/watch?v=F-lIv11G5jI&t=2s.
[18] https://objetosconvidrio.com/congreso-iberoamericano-mujeres-en-el-vidrio-artistas-y-cientificas/.
[19] https://objetosconvidrio.com/jornada-ciencia-arte/.
[20] https://objetosconvidrio.com/jornada-edad-del-vidrio/.
[21] https://ceibal.edu.uy/desarrollo-docente/formacion-e-innovacion-pedagogica/?utm_source=redireccion.
[22] https://semanacyt.org.uy/.
[23] https://fotofisicaeduuy.blogspot.com/p/galeria-22.html.
[24] https://niv.cure.edu.uy/concurso/.
[25] https://www.caviplan.org.ar/la-evolucion-en-la-fabricacion-de-vidrios/.
[26] https://www.youtube.com/watch?v=2jO9y3Xs7WQ.
[27] https://www.youtube.com/watch?v=3_uqy8ZmqLs.
[28] https://objetosconvidrio.com/congreso-iberoamericano-mujeres-en-el-vidrio-artistas-y-cientificas/.
[29] https://objetosconvidrio.com/jornada-de-clausura-iyog2022/.
[30] https://www.youtube.com/watch?v=VWbNE0bxp-M&t=1s.
[31] https://www.youtube.com/watch?v=_asT6BUy94k.
[32] https://www.youtube.com/watch?v=je62MnxBRNA.
[33] https://www.youtube.com/watch?v=wrEy6CKkBOw.
[34] https://www.youtube.com/watch?v=HgTpvo2-2OU.
[35] https://www.youtube.com/watch?v=nMBu2cPZhzo.
[36] https://www.youtube.com/watch?v=0r2P2oYhLMY.
[37] https://objetosconvidrio.com/ciclo-entrevistas-vitralistas-2022/.
[38] https://www.youtube.com/watch?v=5R9ddhdcKSM

[39] https://www.youtube.com/watch?v=P1tr4FVqdTo&list=PLFmLWFD9Ips4UAOzUQJCp4uafPSXC6774&index=11
[41] https://www.youtube.com/watch?v=4lLav82lPuE&list=PLFmLWFD9Ips4UAOzUQJCp4uafPSXC6774&index=23.
[42] https://www.youtube.com/watch?v=cRVPA4-0H_k&list=PLFmLWFD9Ips4UAOzUQJCp4uafPSXC6774&index=5.
[43] https://www.youtube.com/watch?v=vDAphYWnqGY&list=PLFmLWFD9Ips5w-UuP6Z4CXpB5oNUSYo5c
[44] https://objetosconvidrio.com/clase-magistral-valores-patrimoniales-del-corpus-de-vitrales-de-la-quinta-region-de-valparaiso/.
[45] https://objetosconvidrio.com/seminario-retos-de-la-ciencia-y-tecnologia-en-el-vidrio-en-bolivia/.
[46] https://objetosconvidrio.com/exposicion-todo-lo-solido-se-desvanece-en-el-aire/.
[47] https://objetosconvidrio.com/encuentro-nacional-directores-de-museos/.
[48] https://objetosconvidrio.com/inauguracion-del-museo-del-vidrio-de-berazategui/.
[49] https://www.youtube.com/watch?v=3jb0EdflQ54.
[50] https://objetosconvidrio.com/museos-a-la-luz-de-la-luna-2022-en-la-plata/.
[51] https://objetosconvidrio.com/feria-del-arte-y-el-vidrio-en-el-museo-de-arte-popular-jose-hernandez-el-5-y-6-de-noviembre/.
[52] https://www.youtube.com/watch?v=5yY1ypeyJGA.
[53] https://www.youtube.com/watch?v=XViFQkMBkE0.
[54] https://objetosconvidrio.com/glass-artist-open-studio/.
[55] https://www.revistaartesanos.com/#!/categoria/0/pagina/0/.
[56] http://revistaceramica.com.ar/2022-ano-internacional-del-vidrio10828-2/.
[57] https://objetosconvidrio.com/2022-iyog/.

4.6. Report from RO06 (Mexico, Costa Rica, Dominican Republic, Ecuador, Guatemala, Colombia, Venezuela, El Salvador, Panamá)

Author: Ruth Moreno Gómez

4.6.1. Projects

Began in Sep 2021: Organize artists from region 6 countries to conduct individual and joint activities to commemorate the International Year of Glass 2022. Glass artists from México,



Figure 4.6.1. Ruth Moreno, chair of IYOG RO06.
Source: © IYOG archive.



Figure 4.6.2. Glass Fashion-show.
Source: © IYOG archive.

Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panamá, Venezuela and Ecuador and the Caribbean participated. Additional glass artists from Brazil, Uruguay, Chile, and Argentina later joined.

4.6.2. Activities conducted throughout 2022

Participatory art experiences. Interventions of the same piece by different artists. Pieces and country chosen at random from Ibero-American participant countries. This activity finished with a virtual exhibition.

Individual exhibitions of glass artists from RO06, on different dates:

Aug 21. Welcome reception at Puntarenas for artists and glassmakers. Cocos Restaurant.

Aug 4 to Sep 6.

Conferences and presentations by renown artists at the Ibero-American and international level. University of Costa Rica. Rodrigo Facio University Campus.

Training courses in glass techniques and workshops in private local artist studios.

Live demonstrations of glass-working techniques. University of Costa Rica, Pacific Headquarters - Puntarenas.

Jewelry parade. Works made and exhibited by glass artists themselves. Studio Hotel Boutique, Santa Ana, San José.

Parade of clothing made with glass, each dress created and exhibited on a catwalk, garments modelled by the artist or a friend. Paseo Metrópolis Shopping Center, Cartago.

From Aug 29 to Oct 23.

FIRST INTERNATIONAL GLASS ART BIENNIAL OF IBEROAMERICA 2022. Municipal Museum of Cartago, Costa Rica.

Organizing Committee: Ruth Moreno Gómez (Costa Rica) general manager and Coordinator, Marco Romero, and Débora Gurman de Romero (México), Teresa Apud (Argentina), Jaqueline Noleto (Brazil), Jesús Guillermo Morfin (México), Ale Moshenek (Ecuador) and Cristine Valente (Brazil).

Special collaboration of: Francisco Quesada, director Municipal Museum of Cartago, Sfefanny Forester, Cultural Management at the University of Costa Rica, Luis Alejandro Conejo, Vical Group Recycling Department, Carlos Brenes, president Chamber of Commerce of Cartago, José Leandro, manager INA - Cartago Headquarters, Catherine Kauffmann, Architecture Department Head at the University of Costa Rica, Iría Salas, Plastic Art School director at the University of Costa Rica, Juan Antonio Arias, Honorary Consul from Costa Rica, Hamilton New Zealand and Marvin Bermúdez, Brand Manager Aldo Nero, Costa Rica of the



Figure 4.6.3. Banner for 1st International Biennal on Art in IberoAmerican Glass.
Source: © IYOG archive.

Studio Boutique Hotel, Santa Ana, Costa Rica. Vita Decorations-Costa Rica. The above-mentioned people participated in and coordinated activities with great professionalism.

A special thank you to the ladies: Jane Buckman and Trish Duggan of the Imagine Museum, St. Petersburg, Tampa-Florida. USA; to the Glass Museums of Vical-Guatemala, the Glass Museum of Bogotá-Colombia, the Costa Rican Institute of Tourism of Costa Rica, Berazategui Glass School of Argentina, to Mr. Corey Hampson of Habatat Galleries, USA, and the Commite of the UN IYOG for their support. Artists and glassmakers represented twenty-seven countries.

The great international glass artists: Narciso Quagliata, Miriam Di Fiore, and Silvia Levenson, received special recognitions. David Guibernau, Barcelona-Spain. These artists highlighted the activities with their presence.

The ambassadors of: Spain, Israel, Brazil, Ecuador, Japan, Argentina, Colombia to Costa Rica, and representatives of the government of Costa Rica and the University of Costa Rica participated in the biennial activities.

The First International Biennial of Glass Art of Ibero-America BIAVI 2022, held at the Municipal Museum of Cartago, had 243 artists register, 300 works of all glass techniques, a new record of visits to the museum was established, it was the reason of reports at the Latin American level on television and in the press.

It can be stated, without fear of being wrong, that organized activities did not only celebrate the IYOG 2022 in a big way, but it was also possible to establish ties with the majority of glass artists and craftsmen in Latin America, and also with some artists from Australia, Iran, Italy, Egypt, Israel, Canada, United States of America, Japan.



Figure 4.6.4. Glass pieces at the Biennal.
Source: © IYOG archive.

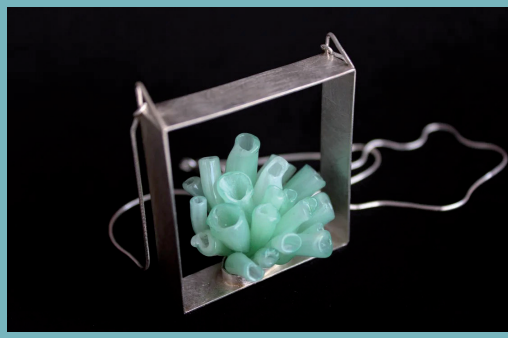


Figure 4.6.5. Nuria-Torrente at the Biennal.
Source: © IYOG archive.

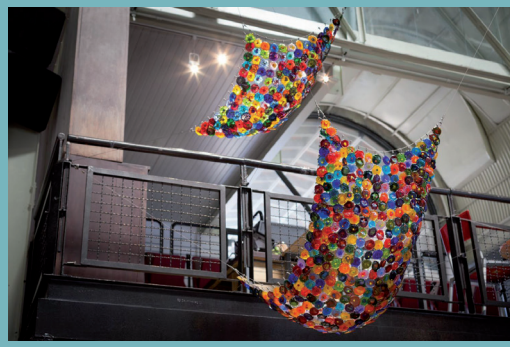


Figure 4.6.6. Iberoamerican Biennal of Art in Glass.
Source: © IYOG archive.

This video [1] summarizes all the glass pieces presented, coming from 22 countries and 200 artists.

The call had a response exceeding all expectations.

Links to other presentations and talks at the School of Architecture of the University of Costa Rica

- David Gibernau, Talk about the construction of "The Star of the Sagrada Familia" [2]. Barcelona, Spain.
- Teresa Apud, "Research on the glass paste technique" [3]. Argentina
- Narciso Quagliata, "Talk: Painting with light" [4]. USA/Mexico
- Miriam Di Fiore, Talk about his work [5]. Italy
- Silvia Levenson, Chat [6]. Italy
- Sallie Portnoy, Through a looking glass [7]. Australia
- Pablo Schapira, Stained glass path [8]. Argentina
- Claudia Golzman, Reflections [9]. Argentina
- Hector Flores [10], Mexico
- Tarasieh Vahdat, History of glass in Iran
- Arturo de la Riva, Architectural glass in Guatemala
- Daniel Castillo, Glass and architecture Colombia
- Paula Lekerman, Argentina
- Juan Robles, Smart residences Costa Rica
- Montserrat Muntadas, Canada
- Maria Torrendel, Art in reused glass. Uruguay.

References

[1] https://www.youtube.com/watch?v=H4fQSYMb250
[2] https://www.youtube.com/watch?v=tvrkvWsRNeE.
[3] https://www.youtube.com/watch?v=VrzcMr7flAE.
[4] https://www.youtube.com/watch?v=VrzcMr7flAE.
[5] https://www.youtube.com/watch?v=RBbkbQfZ6xg
[6] https://www.youtube.com/watch?v=EO7Kkdk8Z58
[7] https://www.youtube.com/watch?v=_JVSrtstG80
[8] https://www.youtube.com/watch?v=ClVRYwjSXQs
[9] https://www.youtube.com/watch?v=fBQZOQJ0a6M
[10] https://www.youtube.com/watch?v=C9IYRc5Ck30

4.7. Report from RO07 (USA, Canada)

Author: Manoj K. Choudhary

From the Dept. of Materials Science & Engineering, the Ohio State University, Columbus, Ohio, USA, was the Chair of the North American Steering Committee for the UN International Year of Glass.

4.7.1. Introduction

The North American Steering Committee for the UN International Year of Glass (NASCIYOG) was formed in August 2021 to provide a common platform to the diverse communities of glass academe, research institutions, industry, artists, museums, and the wider community for the planning, organizing, and the execution of the International Year of Glass (IYOG) events in the US and Canada. These two countries constituted the Regional Organization RO07. The Committee acted as a forum not only for collaboration, coordination, and communication among the glass constituencies in RO07 but also for engagement of RO07 with other ROs and the International Commission on Glass (ICG). The NASCIYOG represented a historic and an unprecedented coalition of the glass communities in the RO07 geographical domain. It organized, facilitated, supported, and participated in over 50 major events during December 2021-December 2022 in the US and Canada. It also participated in the organization of the Debriefing Ceremony at the United Nations Headquarters in New York City on December 13-14, 2022. This brief report is a highly abridged catalog of the immense range of events the NASCIYOG was involved in.

4.7.2. Structure of the NASCIYOG

The NASCIYOG was sponsored by the American Ceramic Society (ACerS). It was chaired by Manoj Choudhary and co-chaired by Younès Messadeq and Kathy Jordan. During October-November 2022, Laurence Sibrack was its acting chair. Sue LaBute was the Executive Assistant. Figure 1 shows the photos of the members of the Steering Committee. The NASCIYOG consisted of 9 working groups. The groups and their members are listed below.

Art & Museum Coordination Committee - Kathy Jordan (Chair, the American Glass Guild), Karol Wight (Corning Museum of Glass), Lawrence Sibrack (Art Alliance for Contemporary Glass), Brandi Clark (Glass Art Society).

National Day of Glass Coordination Committee - Kathleen Richardson (Chair, Central Florida University), Mario Affatigato (co-Chair, Coe College), David Pye (Alfred University).

Finance Committee - Arun Varshneya (Chair, Saxon Glass), Robert Lipetz (Glass Manufacturing Industry Council), Marcus Fish (the American Ceramic Society).

Canada IYOG Committee - Younès Messadeq (Chair, Université Laval), Federico Rosei (INRS, Canada)

Glass & Optical Materials Division - Gang Chen (Chair, Ohio University), Steve Martin (Iowa State University), Doris Möncke (Alfred University), John Mauro (Penn State University), Hong Li (NEG).

Glass Industry Committee - Robert Lipetz (Glass Manufacturing Industry Council).

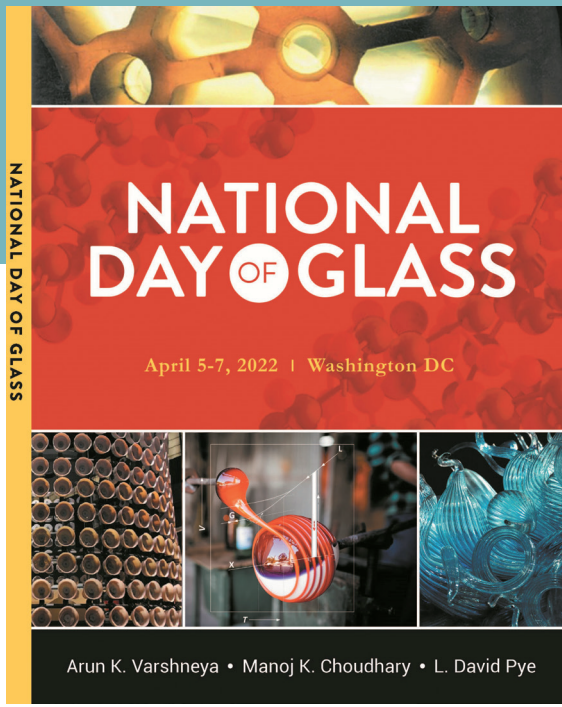
Architectural Glass Committee - Urmilla Jokhu-Sowell (Chair, National Glass Association).

Ceramic & Glass Industry Foundation - Marcus Fish (the American Ceramic Society).



Figure 4.7.1. Members of the North American Steering Committee for the International Year of Glass. The photos are identified left to right in each row from the top to the bottom
Top: Manoj Choudhary, Younès Messadeq, Kathy Jordan, Mark Mecklenborg, Kathleen Richardson, Mario Affatigato
2nd Row: David Pye, Arun Varshneya, Karol Wight, Sue LaBute
3rd Row: Laurence Sibrack, Gang Chen, Steve Martin, Andrea Ross, Robert Lipetz, Eileen De Guire
4th Row: Doris Möncke, Urmilla Jokhu-Sowell, Marcus Fish, Hong Li, Federico Rosei, Brandi Clark
Source: © IYOG archive.

Figure 4.7.2. The National Day of Glass book and front covers (eds. Varshneya, Choudhary, Pye).
Source: © IYOG archive.



The American Ceramic Society Liaison Committee - Mark Mecklenborg (Chair), Eileen De Guire, Andrea Ross.

Each working group represented many organizations and individuals. For example, the Art & Museum Coordination Committee represented an immensely diverse community of the glass artist, arts organizations, and museums, including Art Alliance for Contemporary Glass, the American Glass Guild, and the Corning Museum of Glass to organize glass art, workshop, and museum events in US Canada throughout 2022. Similarly, the National Day of Glass Committee worked with a very broad range of glass communities, the wider community beyond glass (e.g., high schools), and relevant governmental entities to organize the National Glass Day events in Washington DC during Apr 5-7.

4.7.3. Summary of Key IYOG Events

A video catalog of the North American IYOG Celebrations was placed on LinkedIn [1] in December 2022 and gives a valuable pictorial overview. Given below is a brief but representative sample of the myriads of North American IYOG activities. Many of the events catalogued here had multifaceted attributes (e.g., they combined glass art, science, and education) and putting them in a specific category is somewhat arbitrary, albeit necessary for the ease of writing.

2021-2022: Introducing the IYOG

- IYOG Keynote Lecture by Manoj Choudhary at the 82nd Conference on Glass Problems, Columbus, Ohio, Nov 1-4, 2021.
- IYOG Keynote Lecture by Manoj Choudhary at the 14th Pacific Rim Conference on Glass Science & Technology, Virtual Conference, Dec 13-16, 2021.
- Welcome to the IYOG2022 Podcast by Manoj Choudhary and Kathleen Richardson, Feb 9.

2022: IYOG Events

National Day of Glass, Washington D.C., Apr 5-7

The National Day of Glass Conference, co-chaired by Drs. Kathleen Richardson and Mario Affatigato, brought together eminent glass artists, scientists, engineers from North America to commence, on a grand scale, the IYOG celebrations in US and Canada. The landmark commemorative book, "National Day of Glass", edited by Varshneya, Choudhary, and Pye has brief but authoritative updates on glass science, engineering and art as well as abridged versions of the conference presentations (Figure 4.7.2).

Glass Art & Museum IYOG Celebrations

- Capturing the Light: Glass Art Inspired by Nature; Jun 22, 2021-Jun 16 Santa Fe Botanical Gardens, Santa Fe, New Mexico.
- Chameleon Effects: Glass (Un) Defined; Toledo Museum of Art, May 27, 2021-Mar 27, Toledo, Ohio.
- Celebrating 50 Years of Glass Art Society; May 18-21, Tacoma, Washington.
- Past/Present: Expanding the Stories of Glass; May 14 - Jan 8, 2023, Corning Museum of Glass, Corning, New York.
- Blown Away Session 3: Netflix Series; Corning Museum of Glass, launched Jul 22.
- American Glass Guild Summer Conference; Jul 14-17, Corning Museum of Glass, New York.
- Glass Art Exhibition at Coppin State University; May-Jun, Baltimore, Maryland.
- The 2022 Annual Conference of the Stained Glass Association of America and the Society of American Mosaic Artists; Jun 27-30, Toledo, Ohio.
- The Canadian Clay & Glass Exhibit "Voices"; Sep 24, 2022- Jan 15, 2023, Waterloo, Ontario, Canada.
- GlassArt 22 Exhibition (Saskatoon Glass Workers' Guild); Sep 30 - Oct, 2022, Saskatoon, Saskatchewan, Canada.
- Glass Art Installation (Recycled Glass, LED, Optical Fibers) at the Center for Optics, Photonics, and Lasers at Université Laval, May 9-13, 2022, Québec, Canada.
- Wildfire Sculpture by Natalie Tyler at UN Headquarters, Dec 13, 2022- Jan 5, 2023.



Figure 4.7.3. The Wildfire sculpture at the UN building. Left to right: Natalie Tyler (Artist), Kathy Jordan, Connie & David Pye, and Manoj Choudhary.
Source: © IYOG archive.

Glass Science, Engineering, and Education IYOG Events

- 89th Congress of the Association Francophone pour le Savoir



Figure 4.7.4. Special issue of IJAGS celebrating IYOG (May 2022).
Source: © IYOG archive.

(ACFAS); May 9 - 13, 2022, Université Laval, Québec, Canada.
- GOMD Annual Meeting; May 22-26, Baltimore, Maryland.
- Baltimore High School Outreach Event; May 27, Baltimore, Maryland.
- Iberoamerican Year of Glass: Webinar on Glass Science and Art; summer, University of San Diego CaliBaja Center for Resilient Materials and Systems.
- Glass Science Kit; summer 2022, developed Ceramic and Glass Industry Foundation (ACerS) in collaboration with Ursinus College.
- All Iowa Glass Conference; Jul 28; Iowa State University.
- Glass Sustainability Conference; Sep 8-9, Alfred University, Alfred, New York.
- International K-12 Educator Workshop held at Albright College and at the MS&T meeting, Oct 6-12.
- 60th Annual Seminar on Glass, Corning Museum of Glass, Oct 7-8.
- Toledo: The Glass City; Twelve-part Lecture Series; Sep 15-Oct 28, Libbey House Foundation, and the Toledo Arts Commission, Toledo, Ohio.
- Glass/Glazing Career Opportunities to Students of Prairie View A&M University: Nov 15, National Glass Association.
- IYOG International Graduate Course on the Structure of Glass; Sep 6-Dec 8, Iowa State University [sponsored by GOMD and ICG].
- International Journal of Applied Glass Science, Special Issue: Celebrating the IYOG, Vol. 13, Issue 3, Jul 2022.
- The Journal of American Ceramic Society collection of legacy and contemporary articles issued on a monthly basis on the theme Glass: Then and Now.
- ACerS Bulletin feature articles on glass topics (Apr - Aug, 2022).

Glass Industry and IYOG

Robert Lipetz, the then Executive Director of GMIC, played a key role in engaging the GMIC members and the glass manufacturers in general throughout 2021-22. Several companies provided letters of support for the IYOG petition to the UN, and extended financial support for several activities listed above, including the National Day of Glass, the Commemorative Book, and the closing ceremony at the UN Headquarters. Wendell Weeks CEO of Corning, Ludovic Gallette, VP of O-I, and Sheldon Davis, VP of Guardian spoke at the National Day of Glass. Scott Cooper of O-I participated in a panel on workforce education.

Outreach to the International Glass Community

Manoj Choudhary was a member of the International Executive Committee for

the IYOG and was the principal liaison between the North American and the International IYOG working groups and organizations throughout 2021 and 2022. In addition, many other members of the NASCIYOG (Karol Wight, Robert Lipetz, Arun Varshneya, Laurence Sibrack, Kathy Jordan, Urmilla Jokhu-Sowell, Steve Martin, Hong Li, and Doris Möncke) interacted with the International Commission on Glass in various capacities. Given below are highlights of the outreach to the international IYOG groups:

- Manoj Choudhary gave the closing keynote lecture on "Glass: An Indispensable Material for Sustainable Development" at the International Conference on Advances in Glass and Glass Ceramics" organized by the Central Glass and Ceramic Research Institute of India in August 2022.
- Karol Wight, Laurence Sibrack, Kathy Jordan collaborated closely with Teresa Medici of the International Council of Museums to coordinate glass art and museum related programs.
- Urmilla Jokhu-Sowell, and through her the NGA, provided crucial support for the IYOG debriefing ceremony at the UN Headquarters.
- Manoj Choudhary taught a short course on "Special Topics in Glass Melting" during June 28-July 2, 2022 at the Alexander Dubček University of Trenčín, Slovakia. He was invited by the Centre for Functional and Surface Functionalized Glass (FunGlass).
- Manoj Choudhary and Irene Patterson represented ACerS at the International Congress on Glass held in Berlin during July 3-8, 2022 and presented ACerS' gift to the German Glass Society (DGG) on its centennial.
- Manoj Choudhary gave a plenary lecture on Glass and Sustainability at the IYOG Closing Ceremony in Tokyo (December 8-9, 2022) and also pointed out that the idea of IYOG was first proposed to the ICG by David Pye and Manoj Choudhary in Yokohama, Japan in 2018.
- Arun Varshneya gave talks on Wonders of Glass and IYOG, emphasizing Mahatma Gandhi's teaching "Keep the Earth Clean" to students at St. Thomas Girls School and at Delhi Technical College, on November 30, 2022, at the invitation of All India Glass Manufacturers' Federation.
- Arun Varshneya conveyed greetings from ACerS and the Society of Glass Technology at the Tokyo Closing Ceremony and provided a brief update on the National Day of Glass.
- Two of the three entries submitted by RO07 were selected among the "Seven Glass Wonders of the World". These were the Hubble Space Telescope and the Optical Fibers. In addition, Corning Museum of Glass was also selected as one of the Seven Glass Wonders.

4.7.4. Concluding remarks

The NASCIYOG was an incredibly productive and collegial group as even a cursory outline of its activities included in this report makes abundantly clear. It put together a historic and an unprecedented alliance of the diverse glass communities in US and Canada. The alliances forged among these communities working together for over 16 months will endure well beyond the IYOG 2022. For the author of this report, it was a most fulfilling end of the journey that began in 2016 during his presidency of the ICG. With the encouragement of and in partnership with David Pye he became a global ambassador for the Glass Age, an endeavor that culminated in the two of them bringing the idea of the IYOG to the ICG in 2018. The author deeply appreciates and extends heartfelt gratitude to David Pye, Alicia Duran, Mark Mecklenborg, Sue LaBute, as



Figure 4.7.5. A collage of a few of the over 50 glass art, museum, science, engineering, education, industry, and community outreach events held in US and Canada to celebrate IYOG.
Source: © IYOG archive.

well as colleagues within NASCIYOG and the worldwide glass community, for crafting a truly unforgettable celebration of glass.

References

[1] https://www.linkedin.com/feed/update/urn:li:activity:7007419502367846400/.

4.8. Report from RO08 (Spain, Portugal, Andorra)

Authors: Yolanda Castro, Francisco Muñoz, Teresa Palomar, Paloma Pastor and Alicia Durán

RO08 (https://secv.es/iyog/) gathered 50 representatives from Andorra, Portugal, Spain, members of the Spanish National Research Council (CSIC), Glass Industry associations (ANFEVI, CONFEVICEX, ECOVIDRIO, VIDRIO ESPAÑA, MGV, CTCV and AIVE Portugal) and the Spanish Royal Factory of Crystals Foundation (FCNV).

The Opening Conference of the IYOG in Spain was celebrated on Jun 13 in the Royal Botanic Garden (CSIC). ANFEVI, VIDRIO ESPAÑA, FCNV,

ECOVIDRIO, ANAREVI, CONFEVICEX with senior representatives of important glass companies in Spain attended. Five speakers highlighted recent advances related to sustainability, education and sciences.

Members of RO08 were involved in many successful events: 1) the Opening Ceremony at the Palace of Nations, Geneva (Feb 10-11), broadcast live and featuring 30 world-class speakers; 2) the closing ceremony celebrated in Tokyo, Japan on Dec 8-9 and 3) the Debriefing IYOG event held at the United Nations headquarters in New York on Dec 14, summarizing the most important activities of the year in the 96 countries supporting the project.

Finally, after a year in which we invested considerable effort and immense enthusiasm, RO08 celebrated with a Closing Ceremony at the FCNV, the Spanish Royal Factory of Crystals on December 2 and the next week. Activities carried out were summarized for important representatives from the glass industry, museums and artists.

A full program morning-to-night was organized daily until Dec 11 at the Royal Factory, including: free entry to the museum and workshops; demonstrations of glass blowing by specialists from: the Royal Glass Factory, the USA (Marc Barreda and Keep Brooklyn) and the Czech Republic (Martin Janecky); and of lampworking by the Asociación Española de Vidrio Soplado (by Emilio Elvira); lectures; book presentations ("Las Colecciones de vidrio en España" by Teresa Palomar y Paloma Pastor, "La esfera invisible" by Teresa Gomez Blesa); films ("Construyendo la Luz. Carlos Muñoz de Pablos", "Carrera de Indias" by MUCAIN); night workshops; workshops for adults and children, etc. In addition, fairs and gastronomic tastings gave a varied program that continued almost throughout December and fulfilled, as far as possible, the objective of making everything that can be made with glass.



Figure 4.8.1. Opening ceremony for IYOG in Spain.
Source: © IYOG archive.





Figure 4.8.2a,b. Attendees at the Closing Ceremony in Spain in the library of the Royal Glass Factory and Women in the Closing ceremony.
Source: © IYOG archive.

RO08 also organized conferences and congresses, exhibitions, competitions, scientific literature, contributed to special journal issues, scientific dissemination activities, and photographic contests. Hundreds of activities were developed at the national and international level, highlighting the advances in glass over the years and how it has helped to develop a more just and sustainable society. A summary of the most remarkable activities is presented below.

4.8.1. Conferences and Congresses

From May 3-6, the LVIII Congress of the Spanish Society of Ceramics and Glass (SECV) was held in Madrid, and a Symposium dedicated to the IYOG was organized by the Glass division of the SECV. The event gathered national and international experts under a wide variety of topics: basic science, industrial applications and conservation. The twenty contributions included three invited talks by renowned scientists. Alicia Durán was the plenary speaker with a talk entitled "The International Year of Glass: glasses and glass-ceramics for a sustainable society" (https://secv.es/congreso-secv-2022).

XVI National Congress of Materials in Ciudad Real, Jun 28, where Prof. Alicia Duran received the Spanish Society of Materials Award (SOCIEMAT) for her scientific career in Ceramic and Glass Materials. She gave

the plenary lecture “Welcome to the Glass Age” (https://cnmat2022.com/).

Iberoamerican Congress Women in Glass celebrated in Alcorcon, Jun 24. The congress was focused on the current state and role of women in the world of glass, considering the double vision “artists” and “scientists”. Speakers from Spain, Portugal and many countries of Latin America participated, speaking their native languages. The conference included a collective exhibition of Ibero-American women artists, that showed glass pieces by innovative artists, an extraordinary opportunity for glass art and networking.

The 30th International Colloquium of the Corpus Vitrearum in Barcelona, Jul 4-7, was a scholarly presentation on the investigation and documentation of stained-glass windows.

Many activities were developed in different Universities around the country. In particular, the Faculty of Fine Arts organized the 1st International Conference on Glass Art, on Oct 24 with a series of conferences and a workshop. Different scientific seminars were organized by the Chemists College in the Miguel Hernandez University of Elche in March, directed by Dr Jesús Ma. Rincón. Conferences took place in the Art and Chemistry Faculties of Universidad Complutense de Madrid (UCM) in May and November. Other meetings were organized in Barcelona, Mallorca and Valencia.



Figure 4.8.3. Participants in the Women in Glass congress.
Source: © IYOG archive.

Various members of RO08 participated as editors or authors in special issues of the more relevant scientific glass journals, such as the International Journal of Applied Glass Science (IJAGS), Journal of Non-Crystalline Solids (JNCS), Journal of Sol-gel Science and Technology (JSGST), and Optical Materials (Opt. Mater.).

A series of seminars and conferences were organized by FCNV; in particular:

- III Encuentro de Gestores del PCI (Intangible Cultural Heritage) of the



Figure 4.8.4. International Conference at Marinha Grande, Portugal.
Source: © IYOG archive.

Ministry of Culture. "El taller de vidrio soplado y los programas formativos en la Real Fábrica de Cristales" by Paloma Pastor at El Salvador Cultural Center, in Talavera de la Reina, Toledo, Dec 13,

- Museum of Natural Sciences of Madrid. "La Real Fábrica de Cristales y el comercio con el Virreinato", by Paloma Pastor, Institute of Language, Literature and Anthropology, CSIC. Nov 3,
- Biblioteca Pública in Segovia "Las artesanías del vidrio, un bien de interés cultural en peligro", by Paloma Pastor. May 27.

The Municipality of Marinha Grande organized the International Conference: "Glass today, a bridge to the future", from Nov 17 to 19, at the Casa da Cultura Teatro Stephens, within the framework of the International Year of Glass. The initiative involved nearly 30 national and foreign speakers in Marinha Grande who debated topics such as the history and heritage of glass; glass education and training; glass art and design; glass in the community; and sustainability, innovation and technology. In addition to the communications and debates, the program included visits to glass factories in the municipality, glass blowing demonstrations at the Estúdio PoeirasGlass, a glass printing masterclass with the Argentine artist Silvia Levenson and the opening of an exhibition of glass Christmas decorations. Paloma Pastor talked on the topic "El Museo de la Real Fábrica de Cristales y su comunidad en el Real Sitio".

On Jun 10 the book "Espejos para una Corte", a historical novel on French espionage in Murano and the manufacture of mirrors in the France of Louis XIV written by Prof. Mª Concepción Porras Gil, University of Valladolid, was presented to the Library of the Royal Glass Factory by Paloma Pastor.

4.8.2. Dissemination activities and exhibitions

Ecovidrio, ANFEVI, ANAREVI and CSIC promoted the Towns Twinned by Glass initiative, a symbolic alliance to recognize those towns that have been linked to glass historically and to emphasize its sustainable and circular qualities. The objective was to spread and support the commemoration of 2022 as the IYOG of the United Nations, and to commit municipalities to promote the selective collection of glass containers through green bins, encouraging the transition to a circular economy. 55 Spanish cities received a hand-made key of recycled glass to symbolize their union.

Berazategui, Buenos Aires, Argentina, recognized as the Capital of Glass by the Senate of Argentina, joined





Figure 4.8.5. a) Keys made by hand from recycled glass to symbolize the municipalities twining and b) Sculpture made from glass recycled symbolizing "A circular economy".
Source: © IYOG archive.

the Spanish network in April 2023 opening the International Network of Towns Twinned by Glass (INTTG). At least 3 candidates will join shortly. The INTTG continues promoting glass and its applications, emphasizing its infinite life. To formalize this 'twinning', the town mayors received a key.

Ecovidrio and CSIC honoured the IYOG together at the Congress of Deputies. The Deputies received a glass piece, "A circular economy", handmade by the Spanish Royal Factory of Crystals on La Granja de San Ildefonso. The sculpture was made from glass recycled by Spanish citizens.

CSIC, Ecovidrio and ANFEFI organized two itinerant public exhibitions; "Glass: Circular Present and Future" and "The Age of Glass". The first explained how glass containers are manufactured and recycled, an excellent example of a circular economy. It answered interesting questions on the origin of glass and the difference between glass and crystal. The second exhibition explained how glass has transformed: medicine, energy generation, telecommunications, architecture, food and art throughout history, demonstrating how it can help achieve the UN Sustainable Development Goals.

The display "La Mirada de Cajal" opened at the Pamplona Planetarium, with the Age of Glass exhibition, a part of IYOG activities. The director of the UiS and curator of the exhibition, Juan José Rubio, led a guided tour.

- ANFEVI's theatrical event had the glass containers industry celebrating the IYOG. Carlos Latre performed a brilliant monologue after visiting a glass factory.
- On May 30, the Spanish version, La Edad del Vidrio, of the book edited by CSIC "Welcome to the Glass Age" was presented to the Library Eugenio Trías at: the Madrid Books Fair: 2022 edition [1].
- Exhibition of glass pieces from Spanish Royal Factory of Crystals in Tres Cantos municipality. The exhibition included machinery, molds and utensils for glass making, as well as many original pieces and reproductions made and decorated





Figure 4.8.6. CSIC itinerant exhibitions. - "The Age of Glass" and "Glass: Present and Circular Future" organized by CSIC, IYOG2022, ANFEVI, ECOVIDRIO, VIDRIO ESPAÑA. 2022.
Source: © IYOG archive.





Figure 4.8.7. Carlos Latre monologue.
Source: © IYOG archive.

by different techniques, from different European and Spanish Schools. During the inauguration, glass blowing techniques were demonstrated live.

- RO8 proposed León Cathedral as candidate to be one of the 7 Glass Wonders (Chapter 7).
- The 2022 Science Week of the CSIC included many IYOG activities: the film "Construyendo la luz"; various exhibitions about "Vidrio, Arte y Ciencia; a workshop about "El año internacional del Vidrio en el Museo Nacional de Artes Decorativas"; and an open day at the Ceramics and Glass Institute.
- Another new activity was the "Glass well, a historical recovery for future", undertaken to keep alive the memory of the Malatosca-Surroca valley and its glass history, requiring not just documentation but live action uniting past and present, with public glass art workshops.
- Awareness campaigns in schools across the country as part of the "Recreos Residuo Cero" initiative (Zero Waste Playgrounds) were organized by Friends of Glass Spain and Teachers for Future, a teachers association to show students how to change the world for a sustainable future. Children learned about glass, as an eco-friendly packaging material.



Figure 4.8.8. Presentation of the "Welcome to the Glass Age" book.
Source: © IYOG archive.

A special mention to the Exhibitions at the Glass Museum of the Royal Glass Factory in La Granja.

- "La técnica del vidrio soplado: Patrimonio Cultural in material de España". On the occasion of the declaration of the blown glass technique as an Intangible





Figure 4.8.9. a) Marc Barreda & Keep Brooklyn, and b) Martin Janecky at FCNV.
Source: © IYOG archive.

Cultural Heritage in Spain. 2022.

- "Luis Moro. La esfera invisible", Castilla y León Award Arts. 2022.
- "Check in. Czech glass innovations in the world" and "Christmas Treasurer. Czech Glass Christmas Ornaments" with the collaboration of the Glass and Jewelry Museum of Jablonec, Czech Embassy and Centro Checo in Madrid. Jul 7 to Sep 15.
- Itinerary exhibition at the Museo de Cerámica y Artes Suntuarias González Martí in Valencia and The Museo Cerralbo in Madrid: "La eclosión del vidrio contemporáneo. Recordando VICOINTER, 83".

Conferences and round tables on contemporary glass were organized at both museums.

4.8.3. Media Appearances

- The initiative of Municipalities Twinned by Glass had great impact: 17 press events and over 100 media reports.
- Television, radio, press or other similar medium of Spain, Andorra and Portugal included news and interviews in the context of the IYOG in their repertoire.
- The Spanish glass packaging industry wrote more press releases than ever before, and the number



Figure 4.8.10. Exhibitions at the FCNV during 2022 a) FCNV programme, b) Intimate sphere-blown glass, c) Banner CZECH exhibition.
Source: © IYOG archive.



Figure 4.8.11. Exhibition at Museum Cerralbo.
Source: © IYOG archive.

of interview requests increased substantially.

- Friends of Glass Spain collaborated with 11 different influencers to celebrate the IYOG, by spreading their love for glass and the commitment to always recycle.
- A website was created called "May the Glass be with you" [2]. More than 365 videos of artistic glass were prepared and uploaded, one with RO08 collaboration. This website has audio-visual material linked to the glass world: artistic; handcrafted; and functional.

4.8.4. Knowledge, craft techniques and skills of handmade glass production, applicant for the UNESCO Intangible Cultural Heritage list

A very important activity carried out in 2022 was a multinational submission on March 20 to UNESCO concerning their Representative List for the Safeguarding of Intangible Cultural Heritage of Humanity. The purpose was to inscribe the knowledge, craft techniques, and skills of handmade glass production. It was jointly nominated by the Czech Republic, Finland, Germany, Hungary, and Spain and coordinated by the French Ministry of Culture. Handmade glass production has certain specificities across the submitting states, but there are many common traits and steps in the production process.

All participating States had agreed to inscribe on the UNESCO list the following steps of handmade glass production: the creation of a substance used to produce objects, the shaping of the material in its viscous state with a blowpipe or by flame working with a torch in a hot shop, and finally the blowing, flame working, and then cold work, which includes many techniques used to alter or decorate glass when it is cooled (cutting wheel with abrasives, engraving, polishing, painting, gilding, application of illustrations or decorative patterns).

On Dec 6, 2023, the Intergovernmental Committee for the Safeguarding of the Intangible Cultural Heritage, meeting in Kasane (Botswana), decided to add knowledge, craft and skills of handmade glass production to the Intangible Cultural Heritage of Humanity list.

UNESCO established that traditional handmade glass production entails shaping and decorating hot and cold glass to produce hollow glass objects, flat glass, and crown glass. It is characterized by the high degree of craftsmanship inherent to the work and by strong team values due to the need to respect the previous steps performed by other glassmakers. Most practitioners work in small or medium-sized glassworks or studios.

The knowledge and skills related to handmade glass production are transmitted within families or through



Figure 4.8.12. UNESCO Ambassadors of the six countries signing the multinational file.
Source: © IYOG archive.

apprenticeships in glassworks. The practice is also transmitted through formal training, such as in vocational schools, high schools, colleges, and universities. The characteristics of handmade glass production generate a strong sense of belonging, respect, and solidarity among practitioners.

This inclusion on the Representative List is the result of several years of cooperation and commitment between France, Czech Republic, Finland, Germany, Hungary, and Spain alongside fellow glassmakers and crystal makers, with the aim of promoting the beauty, diversity, and creativity of glassmaking among the public. And it was wonderful news to celebrate the Age of Glass.

References

[1] https://www.csic.es/es/ciencia-y-sociedad/libros-de-divulgacion/coleccion-divulgacion/la-edad-del-vidrio.

[2] https://www.maytheglassbewithyou.com/.

4.9. Report from RO09 (France, Belgium)

Author: Daniel Neuville

4.9.1. Committee Members

Wilfried Blanc, Jacques Bordat, Xavier Capilla, Monique Comte, Laurent Cormier, Françoise Gandon, Isabelle Giboire, Elodie Gillet, Matthieu Lancry, Gérald Lelong, Daniel R. Neuville (chair), Corinne Rouillard.

The French team has represented the Fédération des chambres des métiers du verre, the Fédération du cristal et du verre, the Fédération des professionnels du verre, and the Union pour la Science et la Technologie Verrières (USTV). The committee has met at least once every two weeks. The committee has represented all glass manufacturers, universities and R&D laboratories, and associations (USTV, AVAF [1], Verre et Histoire [2]).

4.9.2. Events

During 2022, numerous events took place throughout the French-speaking world, in Belgium (workshop Apr 21-22, organizer S. Godet) and in Quebec as part of the ACFAS congress [3] from May 10 to 13 (organizer Y. Messadek).

Throughout the year, numerous exhibitions were organized all over in



Figure 4.9.1. A French book distributed free of charge to schools to explain the secrets of glass to young people.
Source: © IYOG archive.



Figure 4.9.2. Allain Guillot, French glass artist and a student from the Lycée Jean Monnet d'Yzeure.
Source: © IYOG archive.

France. Without making an exhaustive list, let's mention: glass in the Middle Ages at the Musée d'Ecouen [4]; the glassmaking gesture [5] at the CNAM, the Biot biennial [6], a retrospective of 60 years of work [7] by master glassmaker Claude Baillon in Millau, glass in Conques, the reopening of the Musée de Conche [8]…

This International Year was a tool for the entire French-speaking community to get to know each other better and learn to work together to promote glass in all its facets.

Together, the industrial and academic players set up a website [9] listing all the industrial players, artists and training courses, as well as creating board games on glass (card games, goose games, quizzes, etc.), all of which are still available on the website. Educational kits have been made available to all primary and secondary schools to explain glass, recycling and many other aspects of glass. A series of "glass talk" films [10] explaining the glass professions are also available. And for a more specialized audience or university students, a series of webinars [11] on glass is available.

Numerous regional events [12] have also been organized.

To sum up this International Year, it began in France with a one-day conference at the French Senate on Feb 11.

For the first time in France, a glass week [13] was organized at the Lycée Jean Monnet d'Yzeure from Apr 4 to 8. The week brought together students and teachers working on glasses from Lycées Lucas de Nehou, Dorian and Jean Monnet, glass artists and teacher-researchers from several French academic laboratories. Over 300 participants attended this event. The week was organized around lectures in the mornings and hands-on workshops in the afternoons. In the mornings, students and teachers from the high



Figure 4.9.3. Announcement of the Stained Glass Day in Sorbonne University.
Source: © IYOG archive.

schools received lectures on the latest developments in the world of glassmaking, and in the afternoons, teachers from the high schools gave lectures on stained glass and glassblowing techniques.

On Apr 14, over 300 participants gathered in the large amphitheater at Sorbonne University for a day-long conference [14] featuring museum curators, physicists, artists and historians, to retrace the history and specific features of stained glass. During the day, topics as varied as origins, colors and technical specificities were addressed.

Glass is a natural material that has been used by mankind for over 10,000 years, enabling our ancestors to carve super tools. During a one-day conference held on Jun 30 at the IPGP [15], several speakers demonstrated the different aspects of natural glass.

BIOT Biennial [16] was organized at the same time as the national glass days.

Nov 25 was the closing day of the Year of Glass, a one-day conference on glass from yesterday to tomorrow at the IPGP (Paris):

- Here is a selection of press releases in the French media:
  - https://lejournal.cnrs.fr/billets/le-verre-materiau-aux-mille-facettes.
  - https://lejournal.cnrs.fr/articles/quand-le-verre-et-la-lumiere-font-des-etincelles.





Figure 4.9.4. "Glass: art and matter" exhibition at the IPGP Paris, featuring numerous works by glass artists.
Source: © IYOG archive.

  - https://www.inp.cnrs.fr/fr/reflets-de-la-physique-74.
  - https://www.mattech-journal.org/component/toc?task=topic&id=1725.
- The French Academy of Sciences has produced two special issues on glass, one for Geoscience and the other for Physics:
  - https://comptes-rendus.academie-sciences.fr/page/le-verre_fr.
- The French Physical Society has released a special issue:
  - https://www.refletsdelaphysique.fr/articles/refdp/abs/2022/04/contents/contents.html.



Figure 4.10.1. Image of postcards with QR link to the Japanese web site.
Source: © IYOG archive.

References

[1] https://afaverre.fr/Afaverre/.
[2] https://www.verre-histoire.org/.
[3] https://www.acfas.ca/evenements/congresprogramme/89/600/619/c.
[4] https://musee-renaissance.fr/agenda/evenement/emailler-le-verre-la-renaissance.
[5] https://www.arts-et-metiers.net/musee/le-savoir-verre-capturing-craft.
[6] https://www.biot.fr/biot-international-glass-festival-biot-capitale-du-verre/.
[7] https://www.millau-patrimoine.fr/Blog/Post/4191/Exposition-Claude-Baillon-Dans-le-ciel-Etoile-plan%C3%A8tes-vitraux.
[8] https://museeduverre.fr/fr.
[9] https://www.anneeduverre2022.fr/routes-du-verre/.
[10] https://www.anneeduverre2022.fr/parlons-verre/.
[11] https://ustverre.fr/ressources/replays-des-webinaires/.
[12] https://www.anneeduverre2022.fr/routes-du-verre/.
[13] https://ustverre.fr/agenda/moulins-2022-le-verre-dans-tous-ses-etat/.
[14] https://ustverre.fr/agenda/vitraux-a-la-croisee-des-disciplines-histoire-science-et-artisanat/.
[15] https://ustverre.fr/agenda/les-verres-naturels/.
[16] https://ustverre.fr/agenda/journees-verre-2022/.

4.10. Report from RO10 (Japan, Korea)

Author: Setsuhisa Tanabe

The Japan IYOG2022 Committee was founded in Dec. 2020 and activities started. 18 Working Groups with 46 members were formed.

Chair: S. Tanabe (Kyoto U), Vice Chair: H. Inoue (U Tokyo), Secretary: S. Yoshida (AGC), and most of the CerSJ Glass Division members including T. Yano (Division Chair).

4.10.1. Positives worth sharing

Distributing thousands of postcards with QR-code link to the Japanese IYOG website. The Japanese IYOG website was open from June 2021: iyog2022.jp had an Events list, Educational materials, Endorsers list, and so on.

Event name	Venue	dates	Organizer
50th Anniversary, Glass '21 in Japan, Travelling exhibition	Himeji Notojima	June 1-3 Mar 12-Aug 29	Japan Glass Art & Crafts Association
35th JSR Annual Meeting: Radiation Photoscience Joint Symposium	online	July 1	Japanese Society for Synchrotron Radiation Research
IYOG2022: Opening ceremony	online	Jan 28	Japan committee IYOG
Ten people, ten colors. Glass Exhibition, Vol.11	Yokohama	Mar 10-15	
2021 Annual Meeting (IYOG2022 talks)	Tokyo	Mar 10-12	The Ceramic Society of Japan
The 69th Spring Meeting/Symposium	Sagamihara	Mar 22-26	Japan Soc. of Applied Physics
The 102nd CSJ Annual Meeting (2022). Co-creation of Innovation (CIP) program	Nishinomiya	Mar 25	The Chemical Society of Japan
Annual meeting 2022 IYOG session	Niigata	May 24-26	Japan Society of Powder and Powder Metallurgy
The JSGS seminar: IYOG session		May 25-27	The Japanese Sol-Gel Society
The SSISJ Seminar	-	June 20-21	The Solid State Ionics Society of Japan
The JSGS 20th Annual Meeting	Tokyo	July 11	The Japanese Sol-Gel Society
The 53rd Summer Seminar for Young Glass Scientists	Toyohashi	Aug 3	The Ceramic Society of Japan (Glass Division)
35th Annual Fall Meeting: Sessions on SGDs and Glass	Tokushima	Sep 14-16	The Ceramic Society of Japan
The 83rd Autumn Meeting (Symposium)	Sendai	Sep 20-23	The Japan Society of Applied Physics
Youngsters' Science Festival: Discovery of Glass	Tokyo	Sep 18-20	Glass Industry Conference of Japan
NAGAHAMA GLASS FES 2021	Shiga	Nov 20-22	NAGAHAMA GLASS FES committee
44th Annual Meeting	Tokyo	Nov 28-30	The Japanese Society for Biomaterials
63rd Symposium on Glasses &Photonic Materials	Tokyo	Dec 6-7	The Ceramic Society of Japan (Glass Division)
The International Closing Conference	Tokyo	Dec 8-9	IYOG Japan committee
Spring Meeting	Yeosu	Apr 13-15	Korean Ceramic Society
Seminar for Glass Engineers	Seoul	Jun 24	Glass Division, KCerS
Short Course for Field Engineers	Seoul	Aug 8-10	Korea Flat and Window Association
Fundamentals of Glass Science and Technology, Short Course	Seoul	Sep - Oct	Academy of Ceramic R&D Experts
Fall Meeting	Seoul	Oct 26-28	Korean Ceramic Society
Glass Symposium	Seoul	Dec2	Glass Division, KCerS

Table 4.10.1. Planned events for RO10.

4.10.2. Japanese Local Opening Ceremony on Jan 28

The Japanese Opening Ceremony was held online on Jan 28, organized by Prof. K.Tadanaga, Hokkaido Univ., the WG Chair of the Japanese IYOG Committee. Three past ICG Presidents, N. Soga, M. Choudhary and A. Duran, were invited to give speeches as well as K. Kuroda, the President of CerSJ and 8 others. 665 participants joined online.

4.10.3. 'Special Issue of IYOG' published in March Issue of Bulletin of CerSJ

Special Issue: "International Year of Glass 2022: Glass Contributing to the SDGs", 14 articles were published in March 2022 Issue of Bull. CerSJ; the electronic version is open to the members of the Ceramic Society of Japan (CerSJ).

CONTENTS Vol.57 No.3 (2022)
Process for UN Declaration of International Year of Glass 2022 and Its Activity Plans (Setsuhisa TANABE, 122); History of Glass and Its Contribution to the SDGs (Hiroki YAMAZAKI, 126); Glass for Healthcare Applications·(Chikara OHTSUKI, Taishi YOKOI and Masakazu KAWASHITA, 133); Expectations for Ion-conducting Glasses and the Future (Yusuke DAIKO, Atsushi SAKUDA, Tsuyoshi HONMA and Akitoshi HAYASHI, 137); Glass



Figure 4.10.2. A snapshot just after closing the online Opening Ceremony in January.
Source: © IYOG archive.



Figure 4.10.3 Cover of the Special Issue dedicated to IYOG by the Bull. of the Ceram. Soc. Japan.
Source: © IYOG archive.

Contributing to Energy Saving and Energy Creation (Kira FUJISAWA 141); The Current Situation and Contribution to SDGs of Glass Bottle 3R·(Ryota TSUJI, 145); Sustainable Development of Radioactive Wastes Vitrification·(Akira SAKAI, 149); Progress of Glass for Display Substrates (Hirofumi TOKUNAGA, 154); Silica Glass Optical Fibers -Progress and the Future (Tadashi ENOMOTO, 158); How Glass Fiber Products Relate to SDGs·(Masanori OTANI, 162); Contemporary Glass in Japan: Past and Future, (Atsushi TAKEDA, 166); Structural Analysis of Glassy Materials via Topological Analyses —Data Driven Approach toward Extraction of Order Hidden in Disordered Structure (Yohei ONODERA, 171); Glass and Architecture, (Tomo INOUE, 178); Automotive Glazing for Sustainable Development Goals (Atsushi TAKAMATSU,182)

4.10.4. An IYOG seminar was organized at the Annual Meeting of The Ceramic Society of Japan on Mar 11

Opening remarks K.Kuroda (President CerSJ).

Activity Plans of IYOG S.Tanabe (Kyoto Univ., Jpn IYOG Committee).

Progress of Human beings & Glass; God created Obsidian and Human made Glass M.Arioka (NEG).

History of Glass Industry Development and Role in Society K. Yamamura (Nippon Yamaura Glass).

Closing Remarks T. Yano (Tokyo IT).



Figure 4.10.4. Poster MEXT Japan Glass, almighty material coexisting with and supporting human being.
Source: © IYOG archive.

4.10.5. Special IYOG2022 symposium organized at the Annual Spring Meeting of *Chem. Soc. Jpn.* on Mar 25.

"International Year of Glass: Materials Evolving with New Functions toward Frontier Applications": Organizers: H.Sasakura, S.Tanabe, K.Uchiyama, K. Hirao, A. Hayashi (Online).

Contribution of glass to society Naoki Sugimoto, (AGC Inc.); Innovative Potential of Glass: Ultra-thin Glass, Hiroki Mori, Yoshinori Hasegawa (Nippon Electric Glass Co., Ltd.); Synthesis and properties of glassy state of metal-organic frameworks (MOFs), Satoshi Horike (Kyoto University; Fluorescence of glass containing rare earth ions, Naruhito Sawanobori (Sumita Optical Glass Inc.), Glass moving forward with development -New functionalities and application prospects, Tetsuji Yanoi (Tokyo Institute of Technology); Anti-bacterial and Anti-viral coating for glass by Sol-gel method, Mizuho Matsuda (NIPPON SHEET GLASS CO., LTD.); Review of optically transparent RIS technology for coverage improvement of millimeter and terahertz waves toward 5G evolution &6G, Daisuke Kitayama (NTT Corp.); Development of glass appearance simulation, Ken Uemura (AGC Inc.); Why is Glass so Breakable? Atomistic Mechanism and Strengthening, Jun Matsuoka (University of Shiga Prefecture): Microscopic and thermodynamic understanding of atomic diffusion in oxide glass melts under a temperature gradient, Masahiro Shimizu (Kyoto Univ., Development of functional transparent silica glass with various shape using 3D laser fabrication method, Shigeru Fujino (Kyushu University), Progress of glass electrolyte for all-solid-state battery, Akitoshi Hayashi (Osaka Prefecture University).

Concluding Remarks S.Tanabe (Kyoto Univ.).



Figure 4.10.5. Speak Hope: Glass Arts Exhibition in Homage to IYOG 2022.
Source: © IYOG archive.

4.10.6. Japanese Government, MEXT announced the 2022 subject of *'One Map in Every Home'*

The Division of "Science and Technology Week" in MEXT of the Japanese Government identifies one subject each year for general educational enlightenment. A comprehensive subject map is produced and distributed to school kids and students nationwide. The subject adopted for 2022 after a highly competitive selection process was: "Glass, almighty material coexisting with and supporting human beings". The map working group members of the Japanese IYOG committee, led by Dr. M. Ono, the WG chair, created the content and design after 6 months effort. 300,000 copies of the final version of the map were completed and distributed to all schools nationwide this April.

The website for the glass map [1] is open and explains its content. The audience visiting the Home Page can enjoy two versions of the educational videos (in Japanese). Some pages have been updated, describing the roles of different glass materials. A Seminar on the Glass Map was organized. Details are given here [2].

4.10.7. IYOG organizing committee of the Korean Ceramic Society

The IYOG organizing committee of the Korean Ceramic Society held a status meeting on Apr 19 to plan a Glass Technology Seminar, which took place on Jul 1. This event was accompanied by an official ceremony. Several congratulatory speeches were delivered by a member of the National Assembly, a high-ranking Government official, CEOs, and renowned professors. In addition, up to 6 technical presentations were presented by Corning, Samsung Display Co. and various institutes and universities.

4.10.8. News from the Glass Division of the Korean Ceramic Society

A large and successful exhibition entitled "Speak Hope: Glass Arts Exhibition in Homage to IYOG2022" was held from Apr 27 to May 10, showing glass works by approximately 60 artists from 5 different countries. A Korean



Figure 4.10.6. Recruiting poster for the contest "World without and with glass", distributed nationwide in Japan.
Source: © IYOG archive.

IYOG2022 website [3] listed each of their meaningful events.

4.10.9. News from Japan

An English version of "The Glass Map" was completed, 10,000 were printed; 1,000 in A2 size were sent to Berlin and distributed at the ICG2022 Congress during Jul 3-8. The original Japanese versions (A1 & A2 size) were distributed nationwide in 320,000 in April. A special website for the Glass Map [1] is open and explains the content on the map. You can also download an A3 PDF.

4.10.10. A Special Issue on 'Glass Science in IYOG2022'

This special issue in '*Chemistry and Chemical Industry*' was published in May. The contents and contributing authors list was new and different from the special issue in *Ceramics Japan*, published earlier in March.

4.10.11. News from the Glass Division of the Korean Ceramic Society

The 28th Glass Technology Seminar was held on Jul 1, and was one of 3 major events scheduled in Korea to celebrate IYOG2022. It was sponsored by more than 20 companies and organizations, including Corning Korea as a Diamond Sponsor. The program included an official ceremony and 7 technical presentations by renowned speakers from industry and academia.

4.10.12. July 2022. 'The Glass Map'

700 maps (A2 size) were sent to Berlin and distributed at the ICG2022 Congress during Jul 3-8. Dr. Madoka Ono, the project leader, explained the concept of the Glass Map at the Closing ceremony of the Congress on Jul 8. The original Japanese versions (A1 & A2 size) were already distributed nationwide in April. A special website [1] for the Glass Map has been opened, which explains the details of the map. You can also download the PDF (A3) at the Science & Technology Week website [4] of MEXT Japan.

4.10.13. Contest of Movie and Still Pictures on 'World without and with Glass'

This competition began accepting entries in June. Funds for about 10 prizes for the best works were available. The contest [5] had support from MEXT and the Minister's prize was awarded for the best one. We accepted submissions up to Aug 31.

4.10.14. News from the Glass Division of the Korean Ceramic Society

A professional journal, *Ceramist* published a special glass issue in August.

It consisted of 8 invited papers focused on various aspects of glass.

4.10.15. IYOG2022 Journal Issue and Special Symposium

In August, a special IYOG 2022 issue was published in J. Ceram. Soc. Japan while in September a symposium [6] was held on Sept. 30 at the Lecture Hall of Science Council of Japan, Tokyo, co-organized by the Science Council of Japan and the Japan Executive Committee of IYOG in a hybrid form. Dr. M. Arioka (NEG), Prof. M. Nakazawa (Tohoku U), Dr. A. Koike (AGC), S. Tanabe (Kyoto U), Prof. A. Hayashi (Osaka Met. U) and Dr. R. Oda (Bordeaux U) were lecturers.
A panel discussion and exhibitions of commercial glass and optical fiber products were also held.

4.10.16. Closing Ceremony in Japan

The IYOG2022 Closing Conference was held at the University of Tokyo on Dec 8-9. A full description of the event is given in Chapter 10.

For the IYOG '7 Glass Wonders' presented in Tokyo please see Chapter 7 and for the Awards Ceremony for the Movie and Picture competition "World with and without Glass" please see Chapter 10.

References

[1] https://glass-poster.iyog2022.jp/.
[2] https://iyog2022.jp/event/220423/.
[3] https://blog.naver.com/iyog2022/.
[4] https://www.mext.go.jp/stw/common/pdf/series/glass/map_english-A3-final.pdf.
[5] https://iyog2022.jp/contest/.
[6] https://www.scj.go.jp/ja/event/2022/328-s-0930.html.

4.11. Report from RO11 (Denmark, Finland, Norway, Sweden, Netherlands, Luxembourg, Latvia, Estonia, Lithuania)

Author: Yuanzheng Yue

RO11 had members from 9 countries: Denmark, Finland, Norway, Sweden, Netherlands, Luxembourg, Estonia, Lithuania, Latvia, and Professor Yuanzheng Yue, Denmark was the coordinator. RO11 organized several regular online meetings to plan IYOG activities. The activities of RO11 are listed below.

4.11.1. Organized conferences related to IYOG2022

International Year of Glass Symposium in Denmark
RO11, Danish Ceramic Society, Danish Glass Industry and Aalborg University jointly held a successful IYOG Symposium at Aalborg University, May 18-19, 2022. The symposium exhibited a diverse program that addressed glass science, technology, applications, building glasses, art glasses and glass history, featuring contributions from glass research, public institutions, and industry. 20 outstanding lectures and 37 Posters were given by the participants from RO11 countries. The vice president of Aalborg University gave a welcome speech. The president of the IYOG Committee, Professor Alicia Duran gave an opening online-lecture. The IYOG representative John Parker gave the Keynote lecture. There were great discussions during the symposium. The organizers were Mette Solvang, Morten Mattrup Smedskjaer and Yuanzheng Yue.

Glass Congress in Denmark
To celebrate IYOG2022, the Scandinavia Glass Association (Glasindustrien) organized a glass congress in Hindsgavl Slot, Middelfart, Denmark, Nov 22, 2022. The aim of this congress was to address the role of glass in developing a sustainable society, particularly in a green transition of modern buildings. The speakers from both industry and academia delivered interesting presentations that covered a large range of topics related to glass and sustainable buildings.
The organizer was the chairman of the



Figure 4.11.1. The Drunk Chicks glasses. Netherlands.
Source: © Tanja van Harten and Jenne Bleijenburg.

Scandinavia Glass Association, Mr. Poul Sabroe.

Conferences in Finland

- Nordic Corrosion Congress May 31 - Jun 2 (Turku, Finland).
- Finnish Ceramic Society, annual meeting, spring 2022. The theme was recycling (also a topical issue for glasses).

Conferences in Sweden

- Nordbygg, 26-29 April 2022 (Stockholm, Sweden). The Fair Nordbygg is the largest building fair of the Nordic countries and takes place every second year. It attracts about 900 exhibitors and ca. 35,000 visitors from mainly Sweden but also from the rest of Scandinavia, The Baltic States and Europe. The Swedish Federation of Glazing Contractors (Glasbranschföreningen) was co-organizer of the fair and the main theme of their exhibition stand was the International Year of Glass. It was expressed visually through the graphic material, print and digital, and through the seminars on the glass stage. On two other stages, the Main Stage and the Innovation Stage, were talks on Glass also given in honor to the IYOG.
- Glasdagen, 7 October 2022, (Stockholm, Sweden). Glasdagen is the Swedish Flat Glass Association annual conference and 2022 it was celebrated in relation to the IYOG with a special emphasis on Sustainability with selected speakers.

Conference in Latvia

Scandinavian Society of Biomaterials was held in Jurmala, Jun 13-15, 2022, where bioglass was also a topic.

4.11.2. Exhibitions

Exhibition in the Netherlands

A glass exhibition held in the Netherlands, was organized by Krista Israel together with artists, glass instructors, and students at the Vrije Academie voor Beeldende Kunsten in Nunspeet (Netherlands). It was a wonderful celebration of IYOG and a great learning process for students. Figure 4.11.1 shows the photos of *the Drunk Chicks glasses*, created by Tanja van Harten and photographed by Jenne Bleijenburg.

Exhibitions in Finland

These two exhibitions took place at Nuutajärvi Glass Village (https://www.finnstyle.com/nuutajarvi.html), Finland:

- An educational Multidisciplinary Glass-exhibition was held at Design Museum Nuutajärvi, Finland,



Figure 4.11.2. Glas Helder Exhibition, Temse.
Source: © IYOG archive.

between Jul 04 and Sep 30. Many companies and schools were involved in the exhibition. There were about 3000 visitors. The exhibition concept and curation were thanks to Sara Hulkkonen.
- The Glass Age - Exhibition of New Glass Art. This show exhibited New Finnish glass by 33 contemporary artists and makers. Organizer: Nuutajärvi Gallery Cooperative NuGO, and the show was presented at the Lasimakasiini building May 27-Sep 11, 2022.

Three Exhibitions in Sweden

- The Glass Factory - About 10 different exhibitions on glass art but also on the history of glass design and technology, for instance pressed glass which during the industrial revolution changed the way to form glass in the 19th century.
- Glasstress at Millersgården, Stockholm, Sweden. An exhibition with support of the Istituto Italiano di Cultura Stoccolma, showing a new array of artworks, from international artists, created over the last few years including works by Ai Weiwei, Charles Avery, Ernst Billgren, María Magdalena Campo-Pons, Mat Collishaw, Tony Cragg, Jimmie Durham, Marie-Louise Ekman, Carlos Garaicoa, Kendell Geers, Josh Hershman, Ilya & Emilia Kabakov, Kiki Kogelnik, Jone Kvie, Karen LaMonte, Massimo Lunardon, Stefania Mazzola, Denise Milan, Vik Muniz, Hans Op de Beeck, Tony Oursler, Jaume Plensa, Laure Prouvost, Antonio Riello, Wael Shawky, Lino Tagliapietra, Thomas Schütte, Koen Vanmechelen, Fred Wilson, Rose Wylie and Erwin Wurm. The exhibition was open from Sep 17, 2022 to Jan 29, 2023.
- Glasakademin, an organization for Swedish glass artists organized the exhibition Jugend 2.0 at Hallwylska Palatset during Stockholm Craft Week, Oct 5-16, 2022.
- Prof. Erika Lagerbielke had several exhibitions, "*En Blå Planet*" (A Blue Planet) in collaboration with Kosta Boda at Galleri Glas, Stockholm Mar 03-to Apr 13. "*Ljus – skugga" (Light – Shadow)* – Erika Lagerbielde 40 years with Orrefors Kosta Boda, in collaboration with Kosta Boda at Kosta Art Gallery, Kosta 22/10/20 -19/03/2023.

There were also exhibitions held at Smålands Museum / Sweden's Glass Museum, Johansfors Gallery.

4.11.3. Other activities

Numerous activities held in Finland (as listed in IYOG webpages or elsewhere), such as:

- Sini Majuri, KotiArts (Arts/ Museum), Jan 30-Apr 17.
- 32nd Joensuu Summer School on Optics (Lecture), Aug 9-16.
- Optics & Photonics Days 2022 (Conference), Sep 6-9.
- Nordic Corrosion Congress Turku, Finland (Conference), May 31 to Jun 2.
- Lasin maailma (Eng. Glass' world), Special articles about IYOG (Publication).
- Monialainen lasi – Multidisciplinary Glass, Designmuseo Nuutajärvi (Museum), Jun 4 to Sep 30.
- Finnish Flat Glass Association seminar (Seminar), May 5.
- Finnish Ceramic Society, annual meeting (seminar).
- Turku Biomaterials Days — Glass technology across healthcare industry and science, Oct 27-28.
- Some museum exhibitions for general audience and some publications.

Events and publications in Sweden
There were 19 Museums & Exhibitions; 3 Industrial fairs, industrial events; 1 workshop; 6 publications; 2 artistic glass exhibitions. More information on some is given below.

Dr. Stefan Karlsson at RISE Research Institutes of Sweden organized a series of online seminars on various Glass Science topics.



Figure 4.11.3. The GLAS magazine, Sweden.
Source: © IYOG archive.

The Glass magazine, The Swedish Federation of Glazing contractors publishes a magazine called Glass (in Swedish "Glas"). The magazine is published four times a year and during the IYOG, different perspectives were highlighted on how glass solutions contribute to a better society from a scientific, economic and cultural perspective.

A Spotify Playlist [1] dedicated to Glass in celebration of IYOG2022 was compiled by Melinda Lemke and Dr. Stefan Karlsson.

Glasakademin, an organization for Swedish glass artists had a project together with The Glass Factory about the "Silent Knowledge within Glass Manufacturing". The purpose of the project was to preserve, use and develop the cultural heritage by documentation and knowledge-transfer of the immaterial heritage of manual glass manufacturing. Several movies and illustrations were published on The Glass Factory's Youtube channel (@ theglassfactory9369).

High-school teachers' activity

Professor Leena Hupa introduced IYOG to around 180 high-school teachers in physics and chemistry on their annual education day in Finland, Nov 18-20, 2022. Leena gave a presentation entitled "Chemists developing materials for the human body. Glass in the body".

Public lectures, publications, and public websites

In connection with IYOG2022, Prof. Morten Mattrup Smedskjaer and Professor Yuanzheng Yue as well as some Ph.D. students and postdocs delivered public lectures on the history and role of glass in our society development throughout the entire year. The IYOG2022 was announced in professional societies and universities. The Danish glass magazine called "Magasinet GLAS" is published quarterly. During the IYOG, the magazine has highlighted both the IYOG activities and the crucial role of glass in the development of sustainable society, particularly smart applications in buildings.

References

[1] https://open.spotify.com/playlist/3Wt1FRmvYjhwYG0ZA6NWL7?si=f82c957a478c4aea&nd=1&dlsi=b58a964c0eb2427c.

4.12. Report from RO12 (UK & Ireland)

Author: John M Parker & Róisín de Buitléar

4.12.1. UK Activities

RO12 covered England, Scotland, Wales and Ireland (North and South). Ireland (North and South) worked together and produced their own report, below. Scotland and Wales too had strong glass communities pre-existing the IYOG. In England several Glass Societies exist to meet the needs of the scientific, technical and artistic communities as well as those who are collectors rather than makers. So, creating a coherent team to work together with the limited resources available was complicated. Moreover, 200 people from the region had responded to the initial call from IYOG for support. Our approach was to promote the IYOG, encourage action and concentrate on communications based on what was happening internally and externally rather than impose a top-down organizational structure.

So, newsletters were circulated to a wide audience on an almost monthly basis in the early months to keep all informed of key international events, dates for grant applications, recording information on the IYOG web site and so on. At the same time monthly online meetings gave everyone the opportunity to meet, learn more about what was happening and in particular to ask questions and raise concerns. These meetings were arranged through the auspices of the Society of Glass Technology.

71 recorded events formed the heart of the program within the UK. Many were in Art Galleries and consisted of specially curated exhibitions (Table 1). Following COVID regulations, the opportunities for social events was particularly welcome. Some were linked to live demonstrations of glass making which were especially popular among younger children who had for too long lacked opportunities for social mixing.

Days	Subject	No.	Subject area	Venue
92	Brains in a Dish: Cooper Gallery, Barnsley	1000	Arts, Design	Barnsley
1	Turner Museum Open Day	30	Arts, Design	Sheffield
1	Open Day at the Turner Museum of Glass	30	Arts, Design	Sheffield
8	Coastal Myths	2	Arts, Design	London
72	Neil Wilkin & Rachael Woodman - Harvest: Fruit Gathering	15000	Arts, Design	Ruthin
186	The Glasshouse Project – Heritage	18000	History	Doncaster
37	Stevens Architectural Glass Competition Exhibition	30	Arts, Design	Ely
182	Gwydraid: Gwydr: Glass	200000	Arts, Design	Swansea
251	Land, Sea and Sky	500	Arts, Design	Pendle
37	The Glass Lab	15000	Arts, Design	Stourbridge
9	Stories - Whispers from the Past and Present	40	Arts, Design	Glasgow
43	Joyful Reflections - Celebrating the IYOG	15	Arts, Design	Farnham
108	A State of Matter: Modern and Contemporary Glass Sculpture	20000	Arts, Design	Leeds
43	"Glass Now" Online Exhibition	500	Arts, Design	Online
43	"Joyful Reflections" Exhibition	1000	Arts, Design	Farnham
96	"Glorious Glass" Exhibition	1000	Arts, Design	Leeds
58	"FLOW" Exhibition	1000	Arts, Design	Cardiff
58	"It's All in the Technique" Exhibition	1000	Arts, Design	Sunderland
5	Chelsea Flower Show Container Garden, In Celebration of Glass	145000	Arts, Design	London
12	Tours of the Turner Museum	100	Arts, Design	Sheffield
1	Handmade Glassblowing Demo., E & M Glass	120	Arts, Design	Ruthin
21	Alison Kinnaird - Art in Glass 2022	1	Arts, Design	Edinburgh

Table 4.12.1. RO12 Activities in Galleries and Museums.



Figure 4.12.1. The Glass Garden at Chelsea Flower Show under construction.
Source: © IYOG archive.



Figure 4.12.2. Alicia Durán celebrating the IYOG at the British Glass Biennale in Stourbridge.
Source: © IYOG archive.

Live demonstrations also gave an opportunity for conversations among the presenters often centered around the subjects of safety and of economics, so furnace design was a 'hot' topic.

A particularly good example of what could be achieved was a display called 'Brains in a dish', which had combined the skills of a glass artist with those of a bio-scientist working in the area to create a working model of the human brain. This exhibition had been part sponsored by the Alzheimer's Society and was being used to stimulate valuable conversations involving the older population who were being affected by the disease and younger people who were considering the career paths.

Demonstrations organized as part of a larger event also provided the chance of being seen by a wider audience. A good example of this was the display arranged by the Glass Sellers at the London Lord Mayor's parade. It was seen live by around 5 million people and was also televised. Television cameras were there and the IYOG display team were interviewed about what they represented.

A second, equally important attraction supported by an IYOG grant was the Chelsea Flower Show which included a Glass Garden seen by some 150 000 visitors. A number of both utilitarian and artistic glass artefacts were displayed among the flowers and greenery, for example a miniature glasshouse and a large pair of angel wings, positioned so that visitors could be photographed in front of them. To increase impact a team of glass artists and other experts were there to speak to visitors; the team included one or two television personalities who added interest while bringing an understanding of what visitors wanted to hear. This project moved in 2023 to a permanent display - a newly created Prairie Garden south of London open to visitors and designed to imagine the future of UK gardens in a warming climate.

Another feature of the year was the frequent use of lectures/talks that were widely available online. For some, a small fee had to be paid but many gave the opportunity of participation to a wider audience than could not otherwise have joined in; indeed, almost for the first time this could include participants from overseas and even in some cases the speakers. One popular example that was given by a Ukrainian Stained Glass Artist who talked about the value of stained-glass installations which were part of the historical heritage in a war-torn country and had an important role in maintaining morale.

Several conferences had an IYOG badge, although a part of the normal annual calendar. In particular, the Annual Meeting of the Society of Glass Technology in September attracted a larger audience than normal as did the Biennale at Stourbridge, with almost 10,000 people visitors throughout the

Lecture topic	No.	Subject area	Venue
Local History of Glass Making	8	History	Dronfield
Guest Seminar, Prof P Bingham, Sheffield Hallam University	30	Research	Sheffield
Modern English Stained Glass	30	Arts, Design	London
The Immobilization Science Laboratory Invited talks	30	Research	Sheffield
Turner Memorial Lecture	50	Optics	Sheffield
Jane Bruce - "'Towards Understanding - There and Back Again"	250	Arts, Design	Online
Han de Kluijver - "Faith in the Promise of the Material"	250	Arts, Design	Online
Tom Moore,"Metatamorphic Muse/Glass is Glue!	250	Arts, Design	Online
Elliot Walker & Bethany Wood - "The Future: Introducing Our Plans for a New Hybrid Workshop and Gallery Space"	250	Arts, Design	Online
Peter Layton - "Reflections - the Journey of a Lifetime"	250	Arts, Design	Online
Andy McConnell: "The Impact of Glass"	250	Arts, Design	Online
Annual Ravenscroft Lecture	20	History	London
Conservation of Archaeological Glass	60	Archaeology	Online
Ukrainian Stained Glass	150	Arts, Design	Online

Table 4.12.2. Talks presented during the IYOG.

Days	CONFERENCE/FESTIVAL TITLE	No.	Subject area	Venue
1	Caithness International Science Festival 2022	500	Education	Wick
2	Glass In the North	40	Archaeology	Newcastle on Tyne
3	Annual Meeting: Society of Glass Technology	150	Research	Cambridge
1	The Power of Glass Symposium	200	Arts, Design	Edinburgh
1	Zak World of Façades London 2022	1000	Architecture	London
2	Glass in the North	40	History	Newcastle on Tyne
2	Late Bronze Age Glass	50	History	Oxford
1	Celebrating the Birth of English and Irish Crystal Drinking Glass, 1640-1702	40	History	London
2	Furnace Solutions and Training Day	100	Industry	St Helens
6	The 16th International Conference on the Physics of Non-Crystalline Solids	150	Science	Canterbury
37	British Glass Biennale	9000	Arts, Design	Stourbridge
2	The Power of Glass Symposium	50	Arts. Design	Edinburgh

Table 4.12.3. A list of Conferences and Festivals held during the IYOG.



Figure 4.12.3. Ducks in a garden showing off students' work at Chelsea.
Source: © IYOG archive



long weekend. The organizers of the Biennale had invited several artists from the Far East to talk about and demonstrate their special glass making skills, for example in bead making, reinforcing a deliberate IYOG policy of international collaboration.

Of course, Education has a wide role to play in informing people about the past, present and future of glassy materials. Apart from the practical aspects already mentioned, several events focused on classroom education at various levels up to tertiary (Table 4.12.4).

Another important thread that has re-occurred throughout the year is that of heritage, being aware of our past and the lessons it can teach us Table 4.12.5. One good example has been a local group of enthusiasts in Rotherham, UK who are keen to promote and preserve their Glass Heritage, a Glass Cone built in 1740 using around 140,000 bricks. While certainly the oldest one in the UK it now seems that it is probably the oldest in the world and deserves appropriate care and attention. This group were given a small IYOG grant to help them maintain a program involving events such as glass making demonstrations for local families and schools and computer-controlled lighting.

They introduced musical entertainment as part of their activities inside the cone and this has led to the writing of folk songs telling the stories of the building and its history. This approach has also been adopted elsewhere. For example, local musicians in Stourbridge have created and are

Days	Subject	No.	Topic	Venue
365	GGF SKILLED PATHWAYS	20	Education	Online
4	Publication: 'JUST GLASS - BROUGHT TO LIGHT'	100	Arts, Design	London
366	Bringing glass back to the primary science classroom	11000	Education	Bristol
1	UK Glass Recycling Summit 2022	75	Sustainability	Online

Table 4.12.4. Educational Activities.

Days	Subject	No.	Subject	Venue
11	Voices from the Cones: Celebrating 400 years of glassmaking. ALBUM LAUNCH	200	History	Stourbridge
1	Traditional Glass Blowing Demonstration	80	Education	Rotherham
1	How Old is this Glass?	80	Arts, Design	Online
27	Stories - Whispers from the Past and the Present	40	Arts, Design	Inverness
43	A Thread of Light - three generations of kiln cast glass artists	6000	Museums	Stroud
1	Voices From the Cones - a narrated history and song cycle history and community of glass workers in Stourbridge Glass Works	880	History	Stourbridge
1	40 Years building a collection:	80	History	Online
1	Projection at the kiln	250	History	Rotherham

Table 4.12.5. A list of Educational Activities.



Figure 4.12.4. David Dalton, GTS speaking at the House of Lords, London on Recycling during the IYOG.
Source: © IYOG archive.

Days	Title	Nos.	Subject	Venue
2	Hot Glass Brain Cell Demos + Workshops	5000	Arts, Design	South Yorkshire
1	Glass Futures: Friday Forum, V&A Museum	100	Research	London
1	"Hands On!" A day of discussion and exploration	50	Arts, Design	Stourbridge
91	Glass Sculpture Project, inspired by Lungiswa Gqunta: 'Sleep in Witness'	12		Leeds
161	An introduction to glass objects from excavations in Chester	20	Archaeology	Chester
2	Melting Pot: Hot Glass Gathering	300	Arts, Design	Plymouth
1	Panel Discussion: Inspired in Glass	80	Arts, Design	London

Table 4.12.6. Workshops organized as part of the IYOG.

performing a whole show which is preserving a vibrant audio history of the life and times of their glass industry.

Heritage events during the IYOG

Local history also underpinned a special exhibition celebrating the 100 year history of Pyrex in the North of England, not recorded on the above list. An art glass exhibition in Stourbridge opened in April of 2022 in a new, properly equipped museum following a long period of storage.

Several workshops (Table 4.12.6) were organized where people were able to gain hands-on experience of working with glass, either with the aim of creating objects or learning about their history e.g. Archaeology. In some cases, particular emphasis was made to focus activity on underprivileged groups that might otherwise not have the opportunity to participate, for example the activities in Leeds and South Yorkshire.

Finally, this group participated in discussions on the 7 glass wonders of the world (Chapter 7 of this volume). Many different objects, often with an architectural emphasis were put forward as worthy of international consideration. When time permits this group intends to use the accumulated information to make available more data on our local environment and in particular some amazing examples of glass artefacts.

Although the RO12 was not directly involved, Glass Technology Services, Glass Futures and many industrialists were extremely busy promoting IYOG sustainability goals. Figure 4.12.4 shows the Chair of GTS speaking on recycling issues at a meeting of politicians, industrialists and others that took place in the House of Lords in Spring 2022. Similarly, during the year Glass Futures in St Helens continued a very active program to develop carbon zero glass melting, for example by the use of hydrogen.

4.12.2. Report from Ireland 2022

Author: Róisín de Buitléar, Chair of the Glass Society of Ireland.

Structure of the organizing committee: The Glass Society of Ireland is a professional all-island, non-profit association, run by its members. The IYOG committee consisted of GSOI board and general members. The entire Island was involved, with contributions from Romania, Scotland, Greece and USA.

Summer Festival of Glass - Jun 17 - 21. Organized during the IYOG, the theme 'sustainability' was explored through events including site visits, talks, panel discussions, workshops, open studios, walking tours, an archive film screening and even wellness sessions. Over 4 days sustainability was explored through the lens of alternative energy sources, conservation, technology and recycling, while showcasing Ireland's rich glass heritage. Many events spotlighted the innovation revolution started as artists and educators play their part in championing sustainability and environmentalism in glass:

- Artist Celia Garland (USA) told us why now is the time to reckon with our impact on our environment and showed how she blends art and science to exploit glass's limitless recyclability.
- Artist Lisbeth Biger challenged us to join her celebration of recycled glass. The beautiful, marbled finish of her work proved that discarded bottles/ jars are no lesser choice but a viable alternative.
- Benedikt Peirotén (Studio Pei Pei, Germany) explained that glass recycling is not enough. Dramatic and invisible environmental issues start before production. He described how a glass created 'from the ashes' of renewably sourced gastronomic waste solves several problems at once.
- Educator Ioana Stelea (Romania) outlined how the National University of Arts in Bucharest is meeting the challenges of balancing the preservation of practices that are subject to uncertainty against sustainability in studio practice. Their education program goes beyond recyclables to the use of unconventional materials and tools for artistic research and creation. This includes the IYOG sponsored exhibition in Romania and Ireland "Bringing the Light".

Conservation featured as a broad theme. We were reminded that we are custodians of an incredible glass legacy, not least the Blaschka Collection held by the National Museum of Ireland. Paolo Viscardi, Senior Curator, gave us privileged insights into the materials and methods used to create these exquisite models of marine invertebrates made from 1864 to 1890 by a father and son team of Dresden-based lampworkers. Viscardi was joined by contemporary flame-workers Roger Parramore, Andrea Spencer and Emma Bourke to discuss what we can learn from the Blaschkas and the implications of the ongoing conservation of these delicate structures.

In a panel discussion chaired by Dr Nessa Roche practitioners in stained glass conservation, historians and architects deliberated on how best to care for stained glass in our custody so that it reaches future generations in optimal condition. Contemporary conservation practices, and how these are aided by cross-disciplinary dialogues, underpins the Dan Klein Conservation Project, the work of which was shared by Stefka Bargazova, British Museum and Sarah Rothwell, National Museums Scotland.

Walking tours in Dublin and Cork were popular; the latter traced stained glass in Ireland from the Medieval to the 20th century in Timoleague, taking in friary ruins, mosaics and Harry Clarke's legacy. The walk was led by historian, Donal Whooley, and stained glass blogger, Finola Finlay, who wove tales of lost chalices and riots, leaving us with the mystery of Ireland's missing medieval glass.

Dublin 8 was the backdrop to a walking tour led by Evan Connon, from a long line of stained-glass craftsmen.

The tour was packed with stained glass content as Connon opened up the area's history from the early days of the famous Hardman Co. and Earley & Company to his own current practice and extensive restoration work. We were invited to master artist, Pat Muldowney's studio nearby, to see a large-scale commission in progress, demonstrating how stained-glass windows are constructed.

Festival attendees own creative juices flowed with a rich offering of studio visits, gallery openings, demonstrations and workshops: reusing glass materials, casting with scrap glass, fused and stained glass, an introduction to glass painting and making outdoor flowers/ wreaths with recycled bottles.

ReView Exhibition and Film

ReView was curated as part of the GSOI's 'sustainability' theme. It consisted of an Exhibition, a Gathering in Hunting Brook Gardens, Blessington (Sep 10-11) and a documentary [1] of the same name. This film [2], shot and edited by Jenny Keogh is a legacy of the project and an artwork in its own right.

Article in Glass Ireland Publication
'Bringing the light' by Debbie Dawson
Report on the activities of the Glass Society of Ireland during GSOI goes to Leitrim
Events
Outreach projects

GSOI hosted four community-focused events on Nov 22-23 supported by Creative Ireland Leitrim and Leitrim Arts. They concentrated on new audiences, engaging with an existing membership and local artists on the Leitrim area. Two hands-on workshops, a walking tour of local stained glass and a social gathering were held. Two adopted the GSOI theme of *Climate Change* and two were held at The Dock Arts Center, Carrick on Shannon, at Glint Glass studios with local artist Colette Langan.

1. Make your own glass, Nov 22: 3.5h Class of 15, crafting a custom highball, snifter or pint glass. Each participant designed and made their own glass from waste bottles and jars. Decorative techniques such as engraving and collaging made glasses worthy of their favorite tipples. Participants discussed each other's projects and current interests, and shared experiences with the local community.
2. Stained glass panels made from waste was held on Nov 23. Class capacity 15. This class encompassed all aspects of stained glass making, from design and production, to mounting the finished panel. All glasses were produced by making flat glass from bottles jars and other waste glass objects. Teaching glass reuse was a central focus. Students concentrated on the idea of a landscape to create their panel. Techniques included: designing, selecting glasses, cutting glass and copper-foiling glass fragments. Fragments were soldered together to complete the panel. During the 3.5 hours class the participants discussed each other's projects and current interests, mingling and sharing experiences with the local community.
3. Stained glass walking tour held on Nov '22, Capacity 50. A walking tour of the stained glass in the town was led by GSOI chair Róisín de Buitléar. Carrick is full of character with a traditional Main Street of small houses with an imposing Catholic church midway - St Mary's hosts a series of beautifully painted windows by Mayer of Germany, dating from 1890- 1901 and several contemporary windows. GSOI member Patrick Muldowney's rejuvenation window glowed spectacularly, Korean artist Kim En Joong has two kiln formed windows in the adoration chapel and another large baptismal window by a contemporary artist made in the 70's is unknown.
   A few steps up the road is St George's Church, which has been beautifully restored. The windows are by Watson's of Youghal and are a complete set of windows true to the original construction: trailing vines, exquisitely painted borders and typography.

The accessibility of both these venues and the added bonus of being able to visit the choir gallery meant our tour could examine this painted work in close proximity. The tour ended at local stained glass specialist Colette Langan's studio where visitors could see the process in action.

The walk was attended by members, artists, local historians and church activists. The 1,5h walk was much enjoyed by the participants with lots of engagement and many questions posed at each venue. While researching for the walk Róisín discovered that much of the contemporary work was unrecorded nor acknowledged by the buildings' caretakers. She will report to each venue outlining the historical information gathered and the importance of the windows in each collection. This can be used for both historical art research and cultural tourism promotion in the future.

4. Grab Your Own Glass Event, an informal gathering of makers and enthusiasts in the warm environs of Mc Hugh's Pub Carrick, was hosted by GSOI as a complement to November's events. Members brought their own glass for discussion - ranging from 17th century wine glasses to contemporary martini glasses! This theme, used previously, is a great ice breaker. People gathered from Longford, Wicklow, Wexford, Galway, Dublin and Manorhamilton; valuable links and new friendships were forged. Snacks were provided by GSOI. Everyone really enjoyed the evening. A formula to be repeated. An article on this event will be published in Glass Ireland Publication 2023. A series of online talks on Irish Stained Glass from the 1930's to the present day were held on the second Tuesday of each month and given by Irish scholars, academics and practitioners including:

   – 120 years of Irish stained glass by David Carron.
   – Richard King's Stylistic Development from 1930-73 by Ruth Sheehy.
   – Medieval Stained Glass- The Original Social Media?
   – The Global Reach of Harry Clarke Studios by Paul Donnelly.
   – The Sacred and the Secular, the work of George Walsh by Finola Finlay.
   – Murphy-Devitt studios by Reiltin Murphy.

The Keep Well Glass Quilt [3] travelled to Glasgow to join the exhibition 'Stories - Whispers from the Past and the Present', open from Sep 15 - 22 and hosted by the Scottish Glass Society (SGS) [4] with the Contemporary Glass Society (CGS) [5]. Both then went to Wasps Creative Academy, Midmills Building, Inverness, for display from Oct 4 to 29. Aoife Soden [6], manager of the Keep Well Glass Quilt project and GSOI board member, gave the inaugural lecture for the exhibition, hosted by Healy Arts [7] on 14 Sep in The Trades House of Glasgow [8]. She presented 'The Keep Well Glass Quilt Project'.

'Both the SGS and CGS are grateful to the enthusiastic response to this theme by artists. Fifty artists submitted seventy pieces of work. The range of exhibits on display reflects the diversity and range of glass practice in the UK, in both contemporary and traditional techniques and processes. What you saw in the exhibition was a vibrant and diverse display of highly visual work all using glass as the primary artistic material. SGS members received a copy of the publication produced for the exhibition.'

As 2022 is the UN designated International Year of Glass, an international dimension was added to this exhibition by hosting the Glass Society of Ireland's Glass Quilt which incorporates 50 artists' work'.

1845: Memento Mori' by Paula Stokes | Country Life | National Museum of Ireland.

1845: Memento Mori [9] is a Famine Memorial dedicated to the Irish Potato



Figure 4.12.5. The Keep Well Glass Quilt, which journeyed around exhibitions in the RO12 region. Source: © IYOG archive.

Famine. Made by Seattle based Irish artist Paula Stokes, this installation of 1,845 handblown glass potatoes, took 15 years to complete. The project title references the year the potato blight came to Ireland, marking the beginning of a period of mass starvation, disease, and emigration. Over 1.5 million people died, and 1 million more emigrated to Australia, Canada and America.

Venues exhibiting in 2022: National Museum of Country life: Mayo Nov '21- Jul '22; Dublin Castle – Jul- Aug '22; Portumna Famine Museum Aug'22 – Oct '22. Full Color Catalogue. Purchased by the National Museum of Ireland 2022. Attendance 150,000.

Alison Lowry: (A) Dressing Our Hidden Truths at the National Museum of Ireland [10].

Museum of Decorative Arts and Industry. Collins Barracks, Benburb St, Dublin 7, D07 XKV4.

Colour catalogue; collection purchased by the National Museum of Ireland 2022. Attendance 250,000.

References

[1] https://www.glasssocietyofireland.ie/review/.

[2] https://www.youtube.com/watch?v=U2GkDDJ-jaU&feature=youtu.be.

[3] https://www.glasssocietyofireland.ie/the-glass-quilt/.
[4] https://scottishglasssociety.com/.
[5] https://cgs.org.uk/.
[6] https://www.aoifesodenglass.dk/.
[7] https://www.nattyglass.com/.
[8] https://www.tradeshouse.org.uk/.
[9] https://www.1845mementomori.com/.
[10] https://www.museum.ie/en-IE/Museums/Decorative-Arts-History/Exhibitions/Alison-Lowry-(A)Dressing-Our-Hidden-Truths.

4.13. Report from RO13 (Russia, Poland, Armenia, Kazakhstan, Belarus, Uzbekistan, Moldavia, Ukraine)

Author: Tatyana Tsyganova

4.13.1. Introduction

Russia was one of the countries that supported the initiative to hold the International Year of Glass. After the IYOG2022 was declared by the United Nations, the Russian Academy of Sciences created an Organizing Committee, which included the Chairman of the Mendeleev Russian Chemical Society, academician Aslan Tsivadze, the Chairman of the National Commission on Glass of the Russian Academy of Sciences, academician Vladimir Shevchenko and the Scientific Secretary of the National Commission on Glass of the Russian Academy of Sciences, Dr. Tatyana Tsyganova.

The Regional group led by Russia included representatives from: Russian Federation, Republic of Armenia, Republic of Belarus, Republic of Kazakhstan, Republic of Moldova, and Republic of Uzbekistan. Members of Regional group: Dr Tatyana Tsyganova (Russian Federation, Institute of Silicate Chemistry of Russian Academy of Sciences), Prof Nikolai Knyazyan (The Republic of Armenia, Institute of General and Inorganic Chemistry after M.G. Manvelyan of National Academy of Sciences of Republic of Armenia), Dr Ekaterina Trusova (Republic of Belarus, Belarusian State Technology University), Prof Tatiana Adyrbaeva (Republic of Kazakhstan, Auezov University), Prof Vasilii Sharagov (Republic of Moldova, Balti State University Alecu Russo), Prof Mastura Aripova (Republic of Uzbekistan, Tashkent chemical-technological institute). The following organizations participated in IYOG2022:

- Russian Federation - Russian Academy of Sciences, National Commission of Glass of Russian Academy of Sciences, Mendeleev Russian Chemical Society, The State Hermitage; Universities: St. Petersburg State University, Peter the Great St.Petersburg Polytechnic University, Lomonosov Moscow State University, Far Easten Federal University, Mendeleev University of Chemical Technology, South-Russian State Polytechnic University named after M.I. Platov, ITMO University, St.Petersburg State University of Civil Aviation, Samara University, Volgograd State Technical University, Belgorod Shukhov State Technological University; Institutes: The Federal State Unitary Enterprise "Central research Institute of Structural Materials "Promety" named by I.V.Gorynin National Research Center "Kurchatov Institute", Institute of Silicate Chemistry of Russian Academy of Sciences, Institute of Solid State Chemistry and Mechanochemistry of Siberian Branch of Russian Academy of Sciences, Institute of General and Inorganic Chemistry named after N.S. Kurnakov, Institute of Solid State Chemistry of Ural Branch of Russian Academy of Sciences, Federal Research Center Krasnoyarsk, Scientific Center of Siberian Branch of Russian Academy of Sciences, G.G.Devyatykh Institute of Chemistry of High-Purity Substances of Russian Academy of Sciences, Research Institute of Concrete and Reinforced Concrete named after A.A.Gvozdev, Institute of Metallurgy and Materials



Figure 4.13.1. Members of the organizing committee of RO13 from different countries.
Source: © IYOG archive.



Figure 4.13.2. The Opening Ceremony in Russia. The organizers: corresponding member of Russian Academy of Sciences Alexey Oryshchenko, and academician Aslan Tsivadze.
Source: © IYOG archive.

Science named after. A.A. Baykov of Russian Academy of Sciences; Organizations: International Industry Exhibition “Mir Stekla”, The Glass Industry Enterprises “STEKLOSOUZ”, JSC “NPO Vavilov State Optical Institute”, LLC “Lisma”.

- Republic of Armenia - Institutes: Institute of General and Inorganic Chemistry after M.G. Manvelyan of National Academy of Sciences of Republic of Armenia.
- Republic of Belarus - Universities: Belarusian State Technology University, Belarusian State University; Organizations: JSC “Grodno Glass Factory”.
- Republic of Kazakhstan - Universities: Auezov University; Organizations: Orda Glass Ltd.
- Republic of Moldova - Universities: Balti State University Alecu Russo.
- Republic of Uzbekistan - Institutes: Institute of General and Inorganic Chemistry of Academy of Sciences of The Republic of Uzbekistan, Tashkent Chemical-Technological Institute.

Within the framework of IYOG2022, events of various formats and scales were held, the plan of which was developed by the Organizing Committee of the IYOG in Russia under the leadership of academician Aslan Tsivadze. The IYOG in Russia opened with a grand Opening Ceremony, which took place in St. Petersburg on March 17, 2022 (https://iyog2022.ru/ or here [1]). More than 100 representatives of scientific organizations, universities, and academic

institutes from Moscow, St. Petersburg, Yekaterinburg, Nizhny Novgorod, Novosibirsk, Krasnoyarsk, and Vladivostok took part in the Opening Ceremony. The Opening Ceremony program included reports on current trends in the development of glass science and the glass industry, advanced developments for photonics, optics, electronics, nuclear waste disposal, as well as historical and cultural reviews. The result of this event was the publication of a Book of Reports in 2 languages (Russian and English).

Among the most significant events dedicated to the IYOG, the following should be mentioned:

4.13.2. Conferences and congresses

II-Republican scientific and practical International scientific and technical conference dedicated to the IYOG "Innovative developments and prospects for the development of chemical technology of silicate materials" (Jan 19-20, Institute of General and Inorganic Chemistry [2] of Academy of Sciences of The Republic of Uzbekistan, Republic of Uzbekistan); XV International Conference "Applied Optics-2022", State optical institute, Saint-Petersburg (Dec 15-16, Russian Federation; XVII Russian Conference [3] "High-pure substances. Obtaining, analysis, application". Within the framework of the conference, sections



Figure 4.13.3. The Closing Ceremony in Russia. The Chairman of the Mendeleev Russian Chemical Society, academician Aslan Tsivadze and the Chairman of the National Commission on Glass of the Russian Academy of Sciences, academician Vladimir Shevchenko.
Source: © IYOG archive.

"Materials for fiber optics" and "High-purity materials and light guides for the mid-IR range", "Optical materials" and the 10th School of Young Scientists "Especially pure glasses for fiber optics" dedicated to The International Year of Glass (Jun 7-9, G.G.Devyatykh (Institute of Chemistry of High-Purity Substances of Russian Academy of Sciences, Russian Federation); "Closing ceremony of IYOG2022 in Russia" [4] (Nov 22, Peter The Great St. Petersburg

Polytechnic University, Russian Federation); International conference "Innovative technologies for the production of glass, ceramics and binders 2022 - International Year of Glass" [5] (May 26-29, Tashkent Chemical-Technological Institute Republic of Uzbekistan).

4.13.3. Education activities

Plenary lecture "From glass beads to 'Tera-era' of glass" [6] within the framework of the Congress of Young Scientists by professor V.N.Nikonorov (Apr 4, ITMO University, Russian Federation; International Summer School "Green Chemistry"): Chemical technology of refractory non-metallic and silicate materials [7] (Jun 7-17, South Kazakhstan University named after M. Auezov, Shymkent, Republic of Kazakhstan); Lecture: "IYOG 2022: Glass Industry and Scientific Research of Glass in the Republic of Moldova" by professor V.A.Sharagov (Nov 17, Balti State University Alecu Russo, Republic of Moldova); Public lecture for teachers and students on the topic "Compositions, structure and performance properties of industrial glass products" by professor V.A.Sharagov (Nov 30, Balti State University Alecu Russo, Republic of Moldova); Scientific School-Conference with international participation for young scientists "Functional glasses and glassy materials: Synthesis. Structure. Properties" [8] (Oct 3-7, Institute of Silicate Chemistry RAS, Russian Federation).

4.13.4. Art activities

Exhibition "Masterpieces by Master Ennion. Antique glass-making of the Eastern Mediterranean I-IV centuries" (Dec 3, 2021 - Mar 13, State Hermitage, Russian Federation) and Exhibition "Spanish style. Glass and artistic textiles of the 16th-19th centuries in the collection of the Hermitage**"** [9] (Feb 18 - Sep 18, State Hermitage, Russian Federation); Photo exhibition "Through the Glass" [10] (Nov 18 - Dec 30, Belarusian State Technological University, Republic of Belarus).

4.13.5. Dissemination activities

"The Secret World of Glass" master class for pupils within the framework of the project "Become a BSTU student for one day!" (Mar 29 2022 , Belarusian State Technological University, Republic of Belarus); Festival of science and arts "MENDELEEV" for children's audience, which is dedicated to the IYOG (Jun 25 2022, Museum–estate of Dmitry Ivanovich Mendeleev, Boblovo, Russian Federation); Exhibitions of glassware and publications of scientific research on glass carried out in the Republic of Moldova (Nov 18), Balti State University Alecu Russo, Republic of Moldova); Russian Science Festival NAUKA 0+ [12] (Oct 8-9 2021 and Nov 16, 19), Institute of Silicate Chemistry RAS, Russian Federation); Presentation on the topic "International Year of Glass 2022: Theoretical and practical significance of scientific research on glass carried out in the Republic of Moldova" by Professor V.A.Sharagov (Dec 16, Republic of Moldova); Presentation on the topic "International Year of Glass 2022: glass production in the world and in the Republic of Moldova" by Professor V.A.Sharagov (Oct 7, Scientific conference with international participation "Traditions and innovations in scientific research", Republic of Moldova); the lectures "This wonderful World of Glass" by Doctor A.P.Sivko (Nov 23 - Mordovian Lyceum for gifted children) and on Sep 27 for first-year students of the chemical department of the Institute of Physics and Chemistry of the Mordovian State University named after N. P. Ogaryova, Russian Federation.

4.13.6. Industrial fairs

"MIR STEKLA-2022" [13]- 23rd international exhibition of glass products, technologies and equipment



Figure 4.13.4. Festival of science and arts "MENDELEEV" (Russian Federation).
Source: © IYOG archive.



Figure 4.13.5. "The Secret World of Glass", master class for pupils (Republic of Belarus).
Source: © IYOG archive.

for glass production and processing (Jun 6-9), Moscow, Russian Federation; International competition "Leader of the glass industry" organized by Association "StekloSouz" of Russia (Nov), Moscow, Russian Federation; International forum glass and modern technologies - XXI (Nov 17-18) [15], Association "StekloSouz", Moscow, Russian Federation).

A website for the IYOG in Russia and page on the website of the Institute of Silicate Chemistry of RAS were created to disseminate information about all the events of IYOG2022 taking place in Russia and other countries. Current information was also posted on the website of the Mendeleev Russian Chemical Society and on the information portal [16] of the Association "Steklosoyuz", which was also published in the weekly Information Bulletin of "Steklosoyuz".

In Russia more than 2,000 people and more than 20 organizations supported the initiative to hold the IYOG. As a result, new connections were established with colleagues from other countries and various organizations. The IYOG confirmed the need to develop research in the field of glass, to establish connections between specialists in various fields related to glass: science, industry, art, architecture and the construction industry.

References

[1] https://www.crism-prometey.ru/news/Steklo-XXI-veka-nauchnyy-vzglyad-v-politicheskom-kontekste.aspx.
[2] https://ionx.uz/.
[3] https://www.ihvv.orgkonferenciya.
[4] https://www.spbstu.ru/media/news/partnership/mezhdunarodnyy-god-stekla-oon-v-rossii-zavershilsya-v-politekhe/.
[5] http://konf.tcti.uz/.
[6] https://www.youtube.com/watch?v=F_uswBUb5Hk.
[7] https://xt.auezov.edu.kz/eng/home-en-gb/1060-international-summer-school-green-chemistry-2024.
[8] http://www.iscras.ru/?page_id=11163.
[9] https://www.hermitagemuseum.org/wps/portal/hermitage?lng=ru.
[10] https://bibl.belstu.by/fotovystavka-skvoz-steklo/.
[11] https://www.chemsoc.ru/.
[12] http://www.iscras.ru/?p=10353.
[13] https://www.mirstekla-expo.ru/.
[14] https://steklosouz.ru/mezhdunarodnyy_konkurs_lider_stekolnoy_otrasli_22.
[15] https://steklosouz.ru/news/mezhdun_forum_steklo_i_sovremennye_tehnologii___hhi_17_18_noyabrya_2022/?lang=en.
[16] https://steklosouz.ru/.

4.14. Report from RO14 (Hungary, Slovenia, Serbia, Romania, Slovak Republic, Czech Republic, Switzerland, Austria, Croatia)

Author: Aleş Helebrant

These Central European countries with their traditional glass industry, glass art, glass science and research, glass education both at secondary and university level began by supporting the endeavor of the international committee to declare 2022 as the International Year of Glass. There were nearly one hundred endorsers from academia, industry, associations and glass societies, museums, research and development centers. Examples are as follows.

4.14.1. Supporters

Associations and societies
Czech Glass Society; Slovak Glass Society; Light and Glass; Az Eveg Nemzetkozi/Hungarian Glass Art Society; the Association of the Symposium of Engraved Glass; the Scientific Society of Silicate Industry; Hungarian Glass Art Society; Slovak Glass Association; Association of the Glass and Ceramic Industry of the Czech Republic; Serbian Ceramic Society; Szilikatipari Tudomanyos Egyesulet; Bohus-Lugossy Foundation for Contemporary Glass Art.

Academia and R&D centers
Faculty of Chemical Technology, University of Chemistry and Technology; Czech Glass School Kamenický Šenov; Institute of Materials Engineering, University of Pannonia; University of Miskolc; "Ion Mincu" University of Architecture and Urbanism in Bucharest; University Politehnica of Bucharest; Vitro Centre Romont; Ústav archeologické památkové péče Praha, Most; UPR Koper Slovenia; University of Ljubljana; FunGlass (Alexander Dubček University Trenčín); Institute for Creative Entrepreneurship and Innovation (Paracin, Serbia).

Companies
Glass Service (GS); Stoelzle Glass Group; Maltha; Electro-Coord; Sklarna Harrachov; Rautis; Tungsram; Christian Froba; Stölzle-Oberglas Gmbh.

Museums
Museum of Glass and Jewelry, Jablonec n.N.; Museum Kamenický Šenov; Gritisch Glass; Museum of Decorative Arts and Design in Prague; Museum Brombach.

4.14.2. Activities during 2022

The activities of RO14 countries during the IYOG2022 continued through a broad range of actions. These involved exhibitions of both modern and traditional glass art, educational

activities for children and young people, scientific conferences and seminars, workshops for artists and the public.

The most important activities were announced on the central IYOG2022 web page [1] as upcoming events. During the IYOG2022, about 38 events per month were announced in RO14 countries on average. Some events and activities were also announced on the RO14 web page [2] in cooperation with the Association of the Glass and Ceramic Industry of the Czech Republic.)

There were also other websites at the national level. A very nice example was the web page [3] prepared in Hungary.

Examples of several categories of events are given below.

Exhibitions, Art

Exhibition HOT.HOT.HOT - Glass, Ceramics and Porcelain from A to Z [4]

Exhibition for the 30th anniversary Association of the Glass and Ceramic Industry of the Czech Republic. The exhibition (Apr 14 to Oct 2) introduced all members of Association from the raw materials suppliers through companies producing glass and ceramics to secondary glass and ceramic schools and specialized departments at universities.

Via Lucis. Stanislav Libenský and Jaroslava Brychtová for sacred spaces in Bohemia and Moravia [5] from Jan 1 to Jan 21, in Prague, Czech Republic.



Figure 4.14.1. HOT-HOT exhibitions.
Source: © IYOG archive.

Martin Janecký. Stargazers and other studio glass works [6], an exhibition from May 18 to Sep 11 in Prague, Czech Republic.

Pleiad of Glass 1946-2019. An exhibition [7] in Prague, Czech Republic from Jan 1, 2020 to Sep 11, 2023.

Just us Two - Miluše & René Roubíčkovi. An exhibition [8] from Jun 9 to Oct 30 in Jablonec and Nisou, Czech Republic.

International Symposium of Engraved Glass in Kamenický Šenov, May 30 - Jun 5. A symposium in Kamenický Šenov. the Czech Republic on Engraved Glass from May 30 to Jun 5.

Crystal Valley Week [9] from Aug 23 to 28, Festival of Arts and Design, Czech Republic, Liberec.

Czech pressed glass in the mirror, an exhibition [10] from Sept 15 to Oct 25



Figure 4.14.2. Glass feast in Kristianov, CZ, photo Ales Kosina, MSB.

in Serbia, Zrenjanin and a nice example of the international scale of IYOG2022.

Farben im Licht. Glasmalerei vom 13.-21. Jahrhundert. An exhibition [11] in Zürich, Switzerland from Feb 16 to Apr 3.

Glass Collections in Slovenia. A display in Slovenia, Ljubljana from Mar 1 to Dec 31 in the form of online visits to glass collections in Slovenian museums [12].

Die internationalen Glastage im Empire of Glass, exhibitions [13] in Weigelsdorf/Ebreichsdorf museums in Austria from Nov 11 to Nov 13.

GlasSpring. A contemporary glass art exhibition [14] in Budapest, Hungary from May 4 to May 25.

Hungarian Glass Art Past and Present - An Overview. A museum display [15] from Jul 30 to Sep 18 in, Győr, Hungary.

Education, Popularization

Creative Glass LAB [16] and Creative Glass Forum [17], educational seminars in Paracin and Belgrade, Serbia between Aug 1 to Nov 30.

Openglassstudio [18], Open Days in Payerne, Switzerland on Nov 5 and 6.

International Summer School on Glass Art 2022 edition [19], an educational event in Fribourg, Switzerland from Sep 12 to Sep 16.

Life cycle of glass in lighting technology

Plant visits from Sep 6 to 27 to the Electro-Coord lighting glass waste recycling factory. Exhibit “The Road and the Life Cycle of Glass in Lighting Technology”. Collect lighting glass waste selectively - demonstration of the glass life cycle in the lighting industry to show how glass recovered from lighting glass waste is used to make lamp parts and/or bulbs.

Vitrofestival - an educational festival [20] held in Romont, Switzerland from Apr 9 to 10.

Source: © IYOG archive.



Figure 4.14.3. New generation for glass science and technology.
Source: © IYOG archive.



Figure 4.14.4. Study glass with us.
Source: © IYOG archive.



Figure 4.14.5. Christmas creation, new glass designers, photo MSB.
Source: © IYOG archive.




speedwave



Figure 4.14.6a, b and c. Funglass School, Trençin.
Source: © IYOG archive.

Junior FunGlass school [21] held from Jul 11 to 15 in Trenčín, Slovakia.

Science Fair [22] (Veletrh vědy) in Prague, Czech Republic from Jun 2 to 4.

And Festival of Science [23] (Vědafest) on Jun 22. Two annual actions for popularization of science among children and young people. In 2022 there were glass-oriented stands.

Science, Conferences

Czech and Slovak Conference on Glass, Electric Melting of Glass [24], held in Prague, Czech Republic from Nov 9 to 11.

Inorganic Non-metallic Materials [25], an annual scientific conference for Czech and Slovak doctoral students in Prague on Feb 9 and 10.

Students' Scientific Conference [26]. An annual scientific conference for bachelor and master students, four sections oriented to inorganic non-metallic materials. from Feb 9 to10 in Prague, Czech Republic.

Although the 26th International Congress on Glass in Berlin (July 2022) was organized by German colleagues from DGG, it was of course the most important scientific event during the IYOG2022 and many scientists from RO14 countries actively joined this meeting connecting academia and industry.

Importance of the International Year of Glass 2022 for central and southeast Europe.

We hope that the IYOG2022 have helped us to explain to public the importance of glass in the past, present and future. Joining artist, historians, conservators, museum curators, scientists, technologists, and glass producers, IYOG2022 enabled to show in many activities throughout the RO14 region, not only the beauty of art glass but also the important role of glass as an advanced material.

References

[1] https://iyog2022.org/home/upcoming_events/.
[2] https://askpcr.cz/en/activities/year-of-glass-2022.
[3] https://iyog2022.hu/.
[4] https://askpcr.cz/aktivity/vystava-hot-hot-hot.
[5] https://www.upm.cz/via-lucis-stanislav-libensky-a-jaroslava-brychtova-for-sacred-spaces-in-bohemia-and-moravia/.
[6] https://www.upm.cz/martin-janecky-2/.
[7] https://www.upm.cz/pleiad-of-glass-1946-2019/.
[8] https://www.msb-jablonec.cz/vystavy/miluse-a-rene-roubickovi-jen-my-dva.
[9] https://crystalvalleyweek.cz/en.
[10] https://muzejzrenjanin.org.rs/.
[11] https://www.landesmuseum.ch/farben-im-licht.
[12] https://www.nms.si/en/exhibitions/online/11049-Along-the-Glass-Trail.
[13] https://empireofglass.at/home/.
[14] https://mome.hu/en/events/4th-glasspring-hungarian-contemporary-glass-art-exhibition.
[15] https://iyog2022.hu/en/events/hungarian-glass-art-in-past-and-present.
[16] https://www.youtube.com/watch?v=WYQyjjcLsjI.
[17] https://creativeglassserbia.com/un-iyog-2022/.
[18] https://www.openglassstudio.org/?lang=en.
[19] https://kunstgeschichte.philhist.unibas.ch/en/event/details/international-summer-school-on-glass-art/.
[20] https://vitrofestival.ch/#pll_switcher.
[21] https://www.funglass.eu/junior-funglass-school-2022-finished/.
[22] https://www.pvaexpo.cz/cs/akce/116.
[23] https://vedavyzkum.cz/akce/akce/vedafest-2022.
[24] https://czech-glass-society.cz/en/conference2022.
[25] https://sil.vscht.cz/.
[26] https://www.vscht.cz/.

4.15. Report from RO15 (Algeria, Angola, Egypt, Eritrea, Morocco, Nigeria, South Africa, Swaziland, Tanzania, Ghana)

Author: Lothar Böttcher

4.15.1. Regional committee

Raouf El-Mallawany (Coordinator of the Africa Regional Organization of the IYOG2022).

S.A. Umar (Federal University of Lafia, Nasarawa State, Nigeria).

Lothar Böttcher (Coordinator for Art, Museums, History & Archeology independent artist & curator, Pretoria, South Africa).

Caitlin Greenberg (Tshwane University of Technology, Glass Art & Design Department, Pretoria, South Africa).

Chas Prettejohn (Ngwenya Glass, Swaziland/Eswatini).

Martli Jansen van Rensburg (independent artist, Pretoria, South Africa).

4.15.2. Events organized during the IYOG2022

1. Fiolax Academy Live Symposium, Pioneering in Pharma Glass, Schott Glass, Jun 27, Egypt.
2. Glass Art and Technology Exhibitions, Sep 28-29, Nigeria.
3. International Glass Conference Oct 12-13, Abuja.
4. Glass Art, Museums, History and Archeology Exhibitions & Symposium, South Africa (Sep 3 to Oct 30).
5. Workshop "Materials for Sustainability", Academy of Scientific Research & Tech., Sep 7, 2023 Egypt.

Activity 2: Glass Art and Technology Exhibitions, Sep 28-29, 2022, Nigeria

Day 1, Wednesday, Sep 28-29, 2022	
08:00 – 09:45	Registration and Reception of Participants
09:45 – 10:00	Welcome Address by the Chairperson
10:00 10:30	Breakfast
10.30 11.30	Opening Ceremony and Keynote Addresses
11:30 13:30	Lecture on the Glass History in Nigeria
11:30 13:30	Glass Art Exhibitions
13:30 14:30	Lunch Break
14:30 16:30	Glass Art Exhibition continues
16:30 17:00	Closing of the first day's program
Day 2, Thursday, Sep 29, 2022	
07:30 09:00	Continental Breakfast
09:00 10:45	Lecture on the advancement of Glass Technology in Nigeria
10.45 13.30	Glass Technology Exhibitions
13.30 14.30	Lunch break
14:30 15.30	Closing Ceremony
16:00	Departures

Activity 1: Fiolax Academy Live Symposium, Pioneering In Pharma Glass, Schott Glass, Jun 27. JW-Marriott Hotel, Cairo, Egypt
The organizing committee was Dr. F. Steden, Senior Principal Expert and Sales, and David Weimann, Sales Manager, SCHOTT, Germany. Attendees were 27 chemists and engineers. Particular highlights and successful outcomes came from the screening of the ICG film "Glass is Supporting the Following UN Global Goals".



Figure 4.15.1. Fired up! Event poster.
Source: © IYOG archive.

Activity 3: International Glass Conference 12-13 October 2022, Abuja, Nigeria
Theme: Advances in Glass Science and Technology. Oct 12-13.

Venue: International Conference Hall, Abuja, Nigeria.

Day 1, Wednesday, Oct 12, 2022	
07:00 – 09:00	Registration and Reception of Participants
07:30 – 08:00	Continental Breakfast
09:45 10:00	Welcome Address by the Chairperson
10.00 10.30	Breakfast
10:30 11:30	Opening Ceremony and Keynote Addresses
11:30 13:30	Hybrid Presentation Session
13:30 14:30	Lunch Break
14:30 16:30	Physical Presentation Session
16:30 17:00	Closing of the first day's program
Day 2, Thursday, Oct 13, 2022	
07:30 08:00	Continental Breakfast
08:00 10:00	Keynote Addresses
10.00 10.45	Breakfast
10.45 13.30	Hybrid Presentation Session
13:30 14.30	Lunch break



Figure 4.15.2. 'Fired Up!' team (l to r): Chas Prettejohn (Ngwenya Glass, Eswatini), Caitlin Greenberg (TUT glass studio), Martli Jansen van Rensburg (artist), Lothar Böttcher (artist & curator).
Source: © IYOG archive.

Activity 4: Art, Museums, History & Archeology
Exhibitions

- Fired Up! at the Pretoria Art Museum, Pretoria, South Africa, Sep 3 to Oct 30 (curated by Lothar Böttcher). 16 Artists from South Africa, Eswatini (Swaziland) and Kenya participated. Access the Fired Up! catalogue here [1].
- Next Generation at the Viewing Room Art Gallery, Pretoria, South Africa, Sep 10 to Oct 20 (Curated by Caitlin Greenberg and Martli Jansen van Rensburg).
- Works from alumni and current students of the Tshwane University of Technology Glass & Design Department.

Symposium
Fired Up! Glass Symposium Oct 1 (Tshwane University of Technology, Pretoria, South Africa). Presenters: Amanda Esterhuysen (Origins Centre, WITS), Excavating socio-economic networks through glass, Alessandro Mayes (Ardagh Group, South Africa). Manufacturing container glass, Karlien Thomashoff (Thomashoff Architects), Glass in African Architecture, Chas Prettejohn (Ngwenya Glass, Eswatini),

Figure 4.15.3. Spring_Sibusiso Mhlanga working at the bench, TUT Glass Studio.
Source: © IYOG archive.





Figure 4.15.4. Glory hole at TUT Glass Studio.
Source: © IYOG archive.



Figure 4.15.5. James Magagula spinning large glass plate at the TUT Glass Studio (Fired Up! Symposium).
Source: © IYOG archive.



Figure 4.15.6. Bushveld Fire Vase_Guido van Besouw (Photos by Bernard Brand).



Figure 4.15.7. Wing Barbara Ewing (Photos by Bernard Brand).

Figure 4.15.8. Death be not proud by Stephen Mofokeng (Photos by Bernard Brand).



Sustainable glass and the circular economy. See the link [2] for a full video of the Symposium.

Fired Up! Glass Symposium and live demos took place in the TUT Glass Studio on Oct 1 (Tshwane University of Technology, Pretoria, South Africa), Figures 4.15.1a,b.

Activity 5 Workshop "Materials for Sustainability"
Academy of Scientific Research & Tech., Sep 7 2023, Cairo, Egypt.

The Conference was opened by Prof. Mahmoud Abdel-Gaffar (President of New & Advanced Materials Technology National Committee) and Prof. Dr. Mahmoud Sakr (President of Academy of Scientific Research & Technology). It had 3 sessions with twelve 25 minute talks.

Chairs: Prof. Mohammed M. Rashad (Dean of Advanced Materials Institute Central Metallurgical Research and Development Institute) Prof. Dr. Ahmed M. Hashem (Physical Chemistry Dep. National Research Centre).

Speakers: Prof. Hafez Shams (Eldin Ain Shams University) Climate change and its impact on the life system; Prof. Mahmoud Ahmed Abd EL-Ghaffar, (National Research Centre) New Trends in Multifunctional Eco-friendly Electrical Conducting Polymers: A Journey from Construction to Applications - Ambitious and Future Prospects; Prof. Nageh Allam (American University in Cairo) Alternatives to mining: Recycled efficient nanostructured catalysts for energy applications.

Chairpersons: Prof. Mohamed El-Sayed Gafar (National Institute of Standard) Prof. Dr. Mahmoud Sayed Abd El-Sadek (Galala University)

Prof. Ibrahim M. EL Sherbiny Zewail (City of Science and Technology) Smart Nanosystems: Promises for Advanced Biomedical Applications; Prof. Raouf El-Mallawany (Menoufia University) International Year of Glass; Prof. Ahmed M. Youssef (National Research Centre) Biodegradable Polymer Nanocomposites as Green and Sustainable Materials for Food Packaging Applications; Dr Mohamed Taha Mohamed (Nanogate Company) Nano technology: Opportunities & Commercialization.

Chairpersons: Prof. Mohamed Gad Bassyouni (Port-Said University) Dr Mehrez E. El-Naggar National Research Centre

Dr. Nour Attia (National Institute of Standard) Green Hydrogen as Future Fuel Economy: Commercialization Challenges; Dr Ramadan Geioushy (Central Metallurgical Research and Development Institute) Towards Mitigation Strategies for Climate Change via CO_2 Conversion into Fuels and Valuable Chemicals; Dr. Mohamed Elsayed (Abdelfattah Desert Research Center) Applications of nanotechnology in wastewater treatment and seawater desalination.

The organizing committee were the national committee of New and Advance Materials. About 150 researchers and faculty members attended (scientists and engineers). The Chair of the organizing committee wrote, '*Throughout the course of this workshop, we aim to explore the frontiers of sustainable materials, from cutting-edge research to real-world applications. The rich diversity of expertise present here today promises to foster insightful discussions and pave the way for collaborative initiatives that can make a tangible impact*'.

The screening of the ICG film "Glass is Supporting the Following UN Global Goals" was very successful.

General outcomes were:

1. Spotlight on the glass materials as smart and functional materials,
2. Created African cooperation especially between Konstantina Univ. (Algeria), Sudan Univ. of Sci. & Tech. (Sudan), Federal University Lafia, Nasarawa Sate (Nigeria), Yobe State University Damaturu (Nigeria), National Agency for Science and Engineering Infrastructure, Abuja (Nigeria), Ramat Polytechnic Maiduguri, Maiduguri, Borno State (Nigeria), Faculty of Science, Gharyan University (Libya),
3. Opened new directions of research, a long-term benefit.

References

[1] https://lc.cx/v18l4L.
[2] https://lc.cx/oaiUrq.
[3] https://lc.cx/U4KquQ.

4.16. Report from RO16 (Australia, Malaysia, New Zealand, Singapore, Indonesia, the Philippines, Thailand, and the Oceania region)

Author: Bronwyn Hughes

Immediately following the United Nations General Assembly confirmation that 2022 would be the International Year of Glass, an interim Steering Group was established under the guidance of ICG Council representatives from Australia, Patrick Gavaghan and Dr Bronwyn Hughes (GLAAS Inc) and New Zealand's Brett Francis (NZ Window and Glass Association). They aimed to set up a workable network that could include representatives from member countries. Ultimately, all countries participated apart from Indonesia and the islands of Oceania. From December 2021, the group met as RO16, and Australia, Malaysia, New Zealand, the Philippines, Singapore and Thailand attended regular monthly meetings via Zoom until December 2022. RO16 functioned as a clearing-house, a forum for reporting progress in each country, and two-way conduit to and from the Executive and ICG Council.

Its aims were clear:

- To share plans and activities and to provide a 'sounding board' for ideas.
- To identify opportunities, collaborate and/or offer assistance to each other and across countries.
- To provide feedback and disseminate information to participating organizations, the broader community and the RO16 committee;
- To raise public awareness, knowledge and understanding of glass as a sustainable material for the twenty-first century.

Unlike many ROs elsewhere that were run through trade or professional associations, RO16 was managed through the not-for-profit organization GLAAS Inc, a volunteer body with no specific funding or secretariat to run the IYOG. It was supported by a team of extraordinary volunteers, including an honorary minute secretary for all RO16 meetings, and by a small donation that ensured unlimited Zoom connectivity.

RO16 was represented on the IYOG Executive Council (Patrick Gavaghan), International Art/Museums (Dr Bronwyn Hughes) and Outreach Groups (Dr Bronwyn Hughes and Nadine Keegan). RO16 contributed to the worldwide project to map lighthouses designed and made by Chance Bros of Birmingham UK. See: https://chanceht.org/.

RO16 Working Groups were established to look at specific interests –Art, Museums, Art History and Archaeology (AWG), convened by Peter Nolan (Ausglass) and Education (EWG) guided by Brett Francis (NZW&GA)– with enthusiastic participation from people from across member countries. As will be seen in the following list, many activities combined aspects of both art and education.

Chair	Dr Bronwyn Hughes OAM	President GLAAS Inc, ICG Member
ExCo Rep	Patrick Gavaghan	National Project Manager, GLAAS
Australia Rep	Donna Kennedy	Director GLASS Inc
New Zealand	Brett Francis	NZ Window & Glass Association
Thailand	Surasak Wannaparhun	Thai Glass Industries (TGI)
Malaysia	Le Kern Lim Jesmond Khor Brian Gan	Safety Glass Association of Malaysia SGPAM SGPAM
Singapore	Sara Ang Adrian Tan	Synergraphic Design P/L MMI Asia
The Philippines	Rommel Dino	Glass Manufacturers Association of the Philippines (GMAPI)
Minute Secretary	Annette Dougheney	

Table 4.16.1. The RO16 Committee.

While Singapore, Thailand and Malaysia veered towards trade shows and industry events, including Glasstech Asia and Fenestration Asia, Thailand and the Philippines worked hard to deliver educational programs at primary, secondary and tertiary levels. Australia and New Zealand focused on the art and exhibition sectors, although not to the exclusion of other options. Australia's and New Zealand's strong and vibrant art glass movement, well-suited to the lower population numbers and distribution, showed to advantage.

A number of events and activities in Australia and the Philippines were significantly assisted by the distributions of sponsorship 'seed funding' through Round 1 and Round 2 of the IYOG Executive Committee program; each is identified by an asterisk*. Although the seed funding represented only a small part of the costs associated with overall projects, these funds were instrumental in securing additional grants, enhancing or value-adding to the activity and, in some cases, vital to ensuring that the projects were able to proceed. All recipients of these funds appreciated this significant support.

Events ranged from grand extravaganzas to small school workshops, but all played a part in spreading important messages about glass as a material from the past that has an important place in the future. The following list of events represents only a fraction of more than 200 activities and events that emerged over the IYOG2022, however it does provide a snapshot of the innovation, diversity, imagination and sheer effort that member countries, organization and individuals contributed to this amazingly successful International Year of Glass.

4.16.1. Major Industry Initiatives

*"Glass is Best", a joint partnership project of Glass Manufacturers Association of the Philippines (GMAPI), Basic Environmental Systems & Technologies Inc (BEST) and target Local Government Unit (LGU), which implemented a city-wide used glass container recycling and recovery program in exchange for environment points (EP) —'Trash to Cashback'— supporting household segregation of glass for recovery and recycling direct to the glass manufacturers. Launched as a pilot program in June 2022 in Quezon City, it soon expanded to four additional cities and continues to promote the circular economy on a large scale and to instill the values of environmental sustainability. Several similar programs are being rolled out in the Philippines during 2023.

*BRIDGES was one of the innovative educational programs organized by the Glass Manufacturers Association of the Philippines (GMAPI) together with three significantly underprivileged public schools. It aimed to encourage schoolchildren to return household glass containers to their school for recycling and to improve their skills in computer literacy by providing computer set units to participating schools. The children learned about segregating household waste, the circular economy and the value of glass as a sustainability packaging material. A total 6.47 tonnes of used glass was recycled from the partner school sites.

4.16.2. Exhibitions

Of the hundreds of exhibitions that were staged across RO16 in 2022.

*Hanging by a Thread was an international initiative to highlight the plight of Afghan women by creating sections of mosaic, 'woven' together as 'scarves', using colors and patterns traditionally worn by these women before their suppression by the Taliban. In Australia and New Zealand, the response was superb, with the results mounted on transportable boards (thanks to IYOG seed-funding) and exhibited in locations across the countries. Plans are underway to bring all panels to Glassworks, Canberra for a grand exhibition [1] in 2024.



Figure 4.16.1. 'Hanging by a Thread' glass mosaic in support of Afghan Women.
Source: © IYOG archive.



Figure 4.16.2. The wall of cartoons, at Hamilton Gallery, LUMINOUS: John Orval stained glass artist August-November 2022.
Source: © IYOG archive.

*LUMINOUS: John Orval stained glass artist showcased the life and art of Dutch-Australian glass artist John Orval at the Hamilton Gallery, Australia who contributed to the cultural life of the district for 17 years. Visitor numbers trebled during the show, which was extended by almost a month to accommodate interested patrons. Public programs including curator talks, children's workshops and a bus tour were all fully booked. The exhibition has been short-listed for Victorian Galleries award to be announced in October 2023. Seed-funding by IYOG significantly assisted the making of two short documentaries that accompanied the exhibition.

*Cuadro Anexo de Vidrio was a digital Glass Arts painting competition and exhibition organized by Glass Manufacturers Association of the Philippines (GMAPI) and the University of Santo Tomas (UTS) College of Fine Arts on the theme, *Glass Recycling and Environmental Sustainability*. Winners were selected by an international panel of judges and awards presented at the IYOG 2022 Philippines National Conference, November 2022.

The Vicki Torr International Year of Glass Prize for contemporary artists, organized by Ausglass, was a development from this long-standing and prestigious award in recognition of the late Vicki Torr.



Figure 4.16.3. Anne Mary Gayle Marbella -Winner, the Cuadro Anexo de Vidrio, The Philippines.
Source: © IYOG archive.



Figure 4.16.4. Annette Blair - Winner, Vicki Torr IYOG 2022.
Source: © IYOG archive.

The Maritime Museum of Townsville staged an IYOG2022 exhibition of lighthouse history, lenses and information to accompany its two lighthouses on site.

New Zealand Society of Artists in Glass (NZSAG) at Wanganui and Glass Art in New Zealand (GAINZ) at Auckland ran successful exhibitions, during the IYOG despite significant interruptions due to the pandemic.

GLAAS Inc ran a series of highly-regarded exhibitions at the Australian Centre for Glass Design, Prahran throughout 2022 including, *Glass Evolution* that presented the latest student graduate works to a public audience, *Diversity*, which showed a range of different practices in glass art; *Another Green World* showcasing the work of Nadine Keegan (who went on be awarded an International Specialized Skills Fellowship to study in Europe); and partnered with a heritage property, *Villa Alba*, Glaas@ Villa Alba to exhibit contemporary glass in this historic setting.





Figure 4.16.5a and b. Two exhibits from wide-ranging show, Focus on Glass for IYOG2022: Lindsay Butler, 'Sun Coral' and Keith Grinter 'The Underside'.
Source: © IYOG archive.



Figure 4.16.6. Part of the lighthouse installation, IYOG2022, Maritime Museum of Townsville.
Source: © IYOG archive.



Figure 4.16.7. Nadine Keegan, 'Another Green World', Australian Centre for Glass Design, Prahran.
Source: © IYOG archive.

4.16.3. Webinars

*Mappy's Arts Painting on Glass was organized by Glass Manufacturers Association of the Philippines (GMAPI) and co-sponsored by member companies. This innovative online series of eight webinars, introduced painting on glass to more than 200 elementary school children at eight different schools. The students reused and repurposed glass containers into useable and beautiful objects by learning glass painting skills and, more importantly, about glass as a recyclable material. Selected pieces were part of the Glass Arts Roadshow Exhibit, augmented with additional glass exhibits and staged at various venues throughout the IYOG.

*"Glass is Cool (iskul)", an online Glass Container Manufacturing Process appreciation webinar was designed to promote the value of glass as an environmentally sustainable packaging material to college engineering students at key universities in the Philippines. The first session outstripped all expectations with 500 students in attendance; a total of almost 1000 students attended overall. An additional session for 25 schools across the Philippines drew 175 participants. In 2023, the Philippines Society of Mechanical Engineers is continuing "Glass is Cool (iskul)" taking it to schools and universities in the province of Cavite.



Figure 4.16.8. Painting on Glass Workshop, C J Learning Center, Cardona, The Philippines.
Source: © IYOG archive.

4.16.4. Lectures and Conferences

IYOG2022 Philippines National Conference, November 2022 was the culmination of a full and successful year showcasing glass in so many ways. It featured noted speakers from the glass recycling industry, the Glass Arts Roadshow Exhibit and awards mentioned elsewhere in this report.

Inaugural K12 Educators' Forum Event at MS&T Conference 2022 invited GMAPI to this important educational initiative held at Pittsburgh, Pennsylvania USA.



Figure 4.16.9. Screen shot of RO#16 presenters from The Philippines, Thailand and New Zealand on Education in the online conference GLASS: Vision Reflection Imagination.
Source: © IYOG archive.

The online conference [2] *GLASS: vision, reflection and imagination* was the initiative of GLAAS Inc and the Australian Institute of Art History at the University of Melbourne. It aimed to showcase the diversity of glass to a broad international audience and to break down the silos between academic disciplines. Subjects included education in the RO16 region, Venetian glass beads, Chance Bros and lighthouse development, First Nations glass artists, collections and exhibitions.

The Fine Arts Department of Silpakorn University, Thailand, developed a series of on-line lecture sessions and demonstrations involving academics from the region and the USA that aimed to build rapport with tertiary institutions in SE Asia.

GLAAS Inc hosted the Annual William Montgomery Lecture, held each year on the anniversary of the leading Melbourne stained-glass artist William Montgomery's birth, 8 November 1850. Academic and writer, Dr Beverley Sherry presented the online lecture, *Hidden Treasures in Australian Architecture* to an international audience.

4.16.5. Trade Fairs

Glasstech Asia & Fenestration Asia 2022 was held for the first time after several years hiatus during the pandemic. Popularly known as the Glass Hub of South-East Asia, the Marina Bay Sands Expo and Convention Centre, Singapore hosted the event in October 2022. It brought together international sectors of glass manufacturers, processors, glass machinery and accessors. Plans are well underway for the 2023 event.

Glass: Sustainability with Recycling was a joint event by Safety Glass Processors Association of Malaysia (SGPAM), Malaysia Glass Association (MGA) and Glass Manufacturers of Malaysia (GMAM) in October 2022. Highlight of the event was the presentation by PolyGlass Fibre Co on recycled glass and an open forum on glass industry issues followed by a wide-ranging network of various suppliers and fabricators in the building industries.

Archidex 2022 is an annual event and, in 2022, specifically celebrated the IYOG at the Kuala Lumpar Convention Centre, Malaysia. This multi-platform brings together glass industry professionals with world-class architects, influential speakers and exhibitors. The guest of honor was Professor Ar Sarly Adre Sarkam, President of the Malaysian Institute of Architects.

4.16.6. Festivals

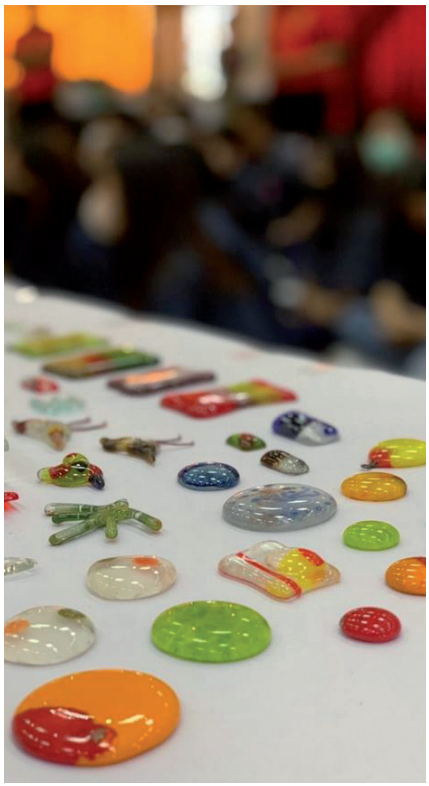
After two years of Covid, it was with some trepidation that the Drysdale Annual Festival of Gass resumed in 2022 for its 13th year. Exhibitions, demonstrations, talks and workshops were attended by hundreds of visitors in a modified format that plans a return to full strength in future.

4.16.7. Workshops

Students at the small Menzies College (near Invercargill, New Zealand), in collaboration with Escape Glass designed and created four glass panels for installation in the school library as an on-going contribution and reminder of the IYOG. It had engendered interest from parents who now attend evening classes in kiln-forming glass.

Silpakorn University, Bangkok, Thailand ran student workshops for secondary school students to focus on the use of recycled glass, *Glass to Art*.

Through connections made through the Art Working Group, Silpakorn University, Bangkok, Thailand, organized two Australian stained-glass experts to lead week-long workshops for university students in glass painting and conservation. The success of this venture led to a further invitation to return to consult on the conservation and restoration of the historic Railway Pavilion Ayatthaya, Thailand and to prepare a condition report in collaboration with Thai conservators. This is an exciting on-going and promising international initiative that has positive implications for Thailand's stained glass and the potential for study in Australia by Thai students.



Local government (City of Knox) sponsored workshops for primary school students at heritage-listed Millers Homestead, Boronia, using recycled glass in art, with environmental and



Figure 4.16.10. Glass to Art, secondary school kiln-formed, recycled glass workshops, Fine Arts Department, Silpakorn University, Bangkok.
Source: © IYOG archive.



Figure 4.16.11. Interior of Royal Railway Pavilion Ayatthaya during preparation of a condition report prior to stained glass conservation.
Source: © IYOG archive.





Figure 4.16.12. Some of the results of primary school mosaic workshop at Millers Homestead, Boronia.
Source: © IYOG archive.

sustainability themes. Future activities with a focus on glass are planned for primary and secondary students, and potential lecture series and senior workshops.

4.16.8. Seven Glass Wonders of the World

This project raised awareness of glass with audiences well beyond the glass industry and glass arts. From the diversity of nominations from across the region a short list of five resulted:

1. Temple of One Million Bottles. Si, Khun Han District, Si Sa Ket 33150, Thailand.
2. Ceiling of the Great Hall, National Gallery of Victoria. St Kilda Road, Melbourne, Australia.
3. SMYPC-Cebu Glass Plant's SMC Eco Park Amber Cullet Marker. Umapad, Mandaue City, Cebu, the Philippines.
4. The Fresnel lens for lighthouses. World-wide locations.
5. Our Story, Past, Present and Future. Temple Beth Israel, 76-82 Alma Road, St Kilda Australia.

RO16 was delighted that the Fresnel Lens which had worldwide implications



Figure 4.16.13. The Temple of One Million Bottles, Si, Khun Han District, Si Sa Ket 33150, Thailand.
Source: © IYOG archive.

for safety at sea, settlement and trade was included in the final shortlist.

4.16.9. And in addition…

A contest to showcase glass excellence, *The Emerald Glass Excellence Award (TEGEA), the Glass Manufacturers Association of the Philippines (GMAPI), together with participating schools, entities, and communities was remarkable with the prestigious award given to the musically-gifted, internationally acclaimed grade school Cardona Youth Musical Ensemble [3] from CJ Learning Centre who re-purposed recycled glass containers into musical instruments. The award was presented during the IYOG 2022 Philippines National Conference, November 2022.

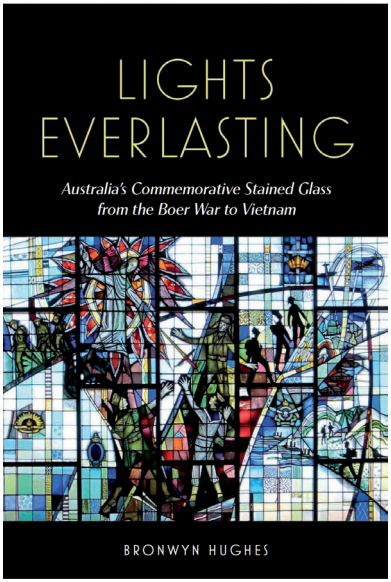


Figure 4.16.14a. Cover of Bronwyn Hughes book, Lights Everlasting, Australian Scholarly Publishing, 2023.
Source: © IYOG archive.



Figure 4.16.14b. *Cardona Youth Ensemble playing their recycled glass musical instruments*
Australian secondary school students were introduced to glass during Australian Science Week (13-21 August 2022) with a theme of *Glass: more than meets the eye*, providing excellent teaching resources [4].
Source: © IYOG archive.

Australian secondary school students were introduced to glass during Australian Science Week (13-21 August 2022) with a theme of Glass: more than meets the eye, providing excellent teaching resources [4].

4.16.10. … Now on to the Age of Glass

Many of the IYOG 2022 activities are continuing to build new relationships, new initiatives and new audiences with an understanding of the importance of recycling glass as part of the circular economy, and its value as an art form for the future. Webinars, publications, trade shows and exhibitions are among a wealth of glass-related activities currently underway.

GMAPI continues its focus on promoting the value of glass recyclability to industry and the university sector through the project, Planet Bloom: the Green Revolution, and through publication of articles, The Circular Advantage: glass bottle recycling as a key strategy for sustainable development, SMC Kaunlaran publication, April-June 2023, and the SMC Sustainability Report: 'Ready for Tomorrow'.

A major publication, *Lights Everlasting: Australia's commemorative*





Figure 4.16.15a and b. Gayle Sylveira and one of her exhibits, 'Color of Time: Our Culture in Glass, Australian Centre for Glass Design, Prahran.
Source: © IYOG archive.

stained glass from the Boer War to Vietnam was published by Australian Scholarly Publishing, Melbourne, in May 2023, the first Australian book to document this rich source of stained-glass history.

And on the same subject, a half-hour documentary, *Let the Light Shine*, is currently in production and will be completed by the end of 2023. Support by IYOG through a small seed fund was instrumental in securing significant financial backing through the Australian Federal Government, Department of Veterans' Affairs.

GLAAS Inc successfully introduced glass Workshops for First Nations Artists in 2022 and has received local government funding to extend the program in 2023. A first exhibition of three First Nations artists [5] was held earlier this year and its success ensured that more will follow.

The Australian Centre for Glass Design in Melbourne is presenting exhibitions throughout the year and featuring a Glass Artist of the Month. Participants range from students and recent graduates to well-known artists with decades of experience.

Apart from the wide range of successful events and activities taken across the region in 2022 and 2023, the most important outcome for the future of glass has been the forging of new connections across countries, between organizations and individuals that came about entirely through the IYOG2022. Most encouraging is the enthusiasm to maintain the relationships that have been built during the IYOG and to extend and expand these new beginnings into solid alliances and on-going collaborations —locally, nationally and internationally— as we all embrace the Age of Glass.

References

[1] https://www.abc.net.au/news/2023-03-08/global-afghan-mosaic-project-hanging-by-a-thread-in-launceston/102068616.

[2] https://glassvisionreflectionimagination.com/.

[3] https://www.youtube.com/watch?v=mTpB5FA3wsk.

[4] https://www.scienceweek.net.au/wp-content/uploads/2022/03/science-week_glass_teacher_resource_book-2022.pdf.

[5] https://www.glaasinc.com.au/first-nations-program.

4.17. Report from RO17 (India, Iran, Pakistan)

Author: Vinit Kapur

The TEAM MEMBERS met monthly. They were:

Mr. Sitendu Mandal, Chief Scientist and Head Specialty Glass Division (SGD), (India).

Dr. Atiar Rahman Molla, Principal Scientist, CGCRI, (India).

Mr. Vinit Kapur, All India Glass Manufacturers Federation (AIGMF) & IYOG RO Coordinator (India).

Mr. Saeed Keshavarz Motamedi, Consultant (Iran).

Regular reports were circulated to the Iran and Pakistan desks at MEA, the Indian mission in Iran and the Iranian mission in India who reported to PRC countries.

4.17.1. Introduction

2022 was special for the glass fraternity as we celebrated together the UN IYOG. AIGMF acknowledges the kind support of the ICG, IYOG Council, Education Dept. of GNCTD, Glass Worldwide, SGT, Delhi Technological University, Central Glass and Ceramic Research Institute, glass manufacturers/suppliers and all participants; we delivered over 30 events for Youth and Adults in all walks of life.



Figure 4.17.1. Photographs from Glass in our lives contest
Source: © IYOG archive.

Reports of our pilot projects 'Green as Glass', 'Glass in our Lives' and 'Glass Protects' are available in: Kanch (Glass), Glass News, Glass Worldwide/AIGMF, Library of Indian Articles.
The 13 chapters of the IYOG book 'Welcome to the Glass Age' were reproduced in 4 parts in Kanch (Glass).

Activities from RO17 and other regions were also covered in Glass News, Kanch and Glass News and Kanch (Glass) displaying IYOG logos. They were distributed worldwide with soft versions on AIGMF's website at www.aigmf.com. Glass News was distributed to selected PAN-India schools/colleges

informing them of IYOG activities and inviting them to organize events.

The number of young participants was encouraging and generated new ideas on Environmental and Health issues, to better society and industry. Our 2022(3) and (4) issues carried stories on these projects which involved schools, colleges, ICG, SGT (UK) and Glass Worldwide (UK).

4.17.2. Partners and activities

Our heartfelt thanks go to: a) AGI Glaspac, La Opala RG Ltd., Cello Inds. Pvt. Ltd., Shri Sitaram Glass Works, Kwality Glass Works, Adarsh Kanch Udyog Pvt. Ltd., HNG who supplied glass articles to give to students/ Members/Govt./select stakeholders at Glasstec; b) our 90 AIGMF Member companies, especially Schott Glass (India) Pvt. Ltd. for funds and c) architectural glass panels (Asahi India Glass Ltd., Gold Plus Glass Industry Ltd., Gujarat Guardian Ltd and Şişecam Flat Glass (I) Pvt Ltd) for interesting glass projects. Members assisted with international speakers, audience/participants, knowledge/event partners, expert/jury members, sponsors, technical articles/ papers, research/studies, advertisements, etc., AND any collaborations that made Glass more visible.

4.17.3. Activities in IRAN

A photo contest on "Glass in our Lives" for kids and youth; IYOG2022 advertised in local events and exhibitions in the country; publishing content in social media highlighting the importance of glass as the best packaging material; the IYOG2022 advertised at the National Dragon Boat Championship; Dragon Boat Team advertised IYOG2022 by wearing smart jerseys at the Championship organized by the local Canoe Federation in the south of the country; the team, one of 24 participating won Gold Medals; a similar activity was repeated a few months later.

4.17.4. COVERAGE in AIGMF publications

Six issues of the quarterly journal Kanch (Glass) and Glass News were published during the period of this report, distributed free of charge to all members of AIGMF, selected non- members and important stakeholders. E-issues of Kanch were circulated to 15,000+ contacts worldwide including Government departments, Ministries & Educational Institutes.

Oct-Dec 2021 issue
The following important IYOG articles were published:



Figure 4.17.2. IRAN Dragon Boat Team advertised IYOG2022.
Source: © IYOG archive.



- IYOG calendar glass bottle 2022 presented to Aloft hotel New Delhi.
- Release of AIGMF 2022 print calendar on the theme 'Glass in our Lives'.
- Proud users of IYOG 2022 calendar glass bottle - a glimpse (Part 1).
- Creating a United Nations International Year of Glass.
- Indian Glass Science: Current Status and Future Prospects.
- Glasses for Healthcare.
- Glass History and the Arrival of the Glass Age.
- Proud Users of IYOG 2022 calendar glass bottle - a glimpse (Part 2- women's special).
- CGCRI's inaugural IYOG 2022 event.
- IYOG 2022 March monthly lecture series.
- IYOG 2022 advertised Iran Dragon Boat Premier League, organized by Iran Canoe Federation, at Tehran Stadium Lake in March 2022.

Apr-June 2022 issue
AIGMF delegation met Additional DGFT Mr. Anil Agarwal to discuss RoDTEP scheme, and presented IYOG calendar bottle at Udyog Bhawan, New Delhi on June 3.

Affordable and Clean Energy provided by Glass.

Glass in Information and Communication Technologies (ICT) and Photonics.

Reflections on Reflection: Glass in Architecture.

July-Sept 2022 issue
Youth and Industry get-together to celebrate IYOG2022.

Youth says Adopt Green as 'Glass'.

Sustainable Glass Production with Carbon Reduction.

Sustainable Glass in a Circular Economy.

Social, Cultural and Environmental Sustainability within the International Art Glass Movement

Oct-Dec 2022 issue
Meeting with President of Society of Glass Technology.

AIGMF/CGCRI meeting with Prof. Manoj Choudhary.

Glass Industry Meets at Guwahati to conclude IYOG celebrations in India.

SGT President held workshops with School & University students.

Jan-Mar 2023 issue
AIGMF meeting with research students from Free University, Brussels

COVERAGE on AIGMF website [1]

A new link [2] was created to the complete book 'Welcome to the Glass Age' edited by Prof. Alicia Durán and Prof. John M. Parker of the IYOG Organizing Committee aimed at Celebrating the United Nations IYOG2022. A link to the IYOG logo will remain on the AIGMF homepage till 2025.

4.17.5. Touring Exhibition on 'Glass in our Lives' (Sep 10, 2021)

Chief Guest Dr. Reinhard Conradt, Vice President and President Elect of the ICG unveiled a touring exhibition on 'Glass in our Lives' at the virtual 2021 AGM of the AIGMF.

To commemorate International Youth Day, the AIGMF invited online entries from the age group between 7-24 years to participate in the '1st Photography Contest on the theme "Glass in our Lives".

A kickstart event to mark the first IYOG2022 activities in India.

A distinguished Jury of Members representing a cross section of glass sectors and regions decided the top 3 photographs out of approx. 7,000 entries received from educational institutes and Youth across India: Mr. Sanjay Somany, Former President AIGMF and CMD HNG Inds. Ltd.; Mr. Sanjay Ganjoo, Former President AIGMF and COO Asahi India Glass Ltd.; Dr. Suman Kumari Mishra, FNASc, Director CSIR-Central Glass and Ceramic Research Institute and Adjunct Prof. AcSIR and Ex-Dean Eng. Sc. AcSIR; Prof. Manoj Choudhary, Former President International Commission on Glass, Adjunct Prof. Materials Science & Engineering, The Ohio State University and President, MKC Innovations, LLC (USA); Dr. Arun K.

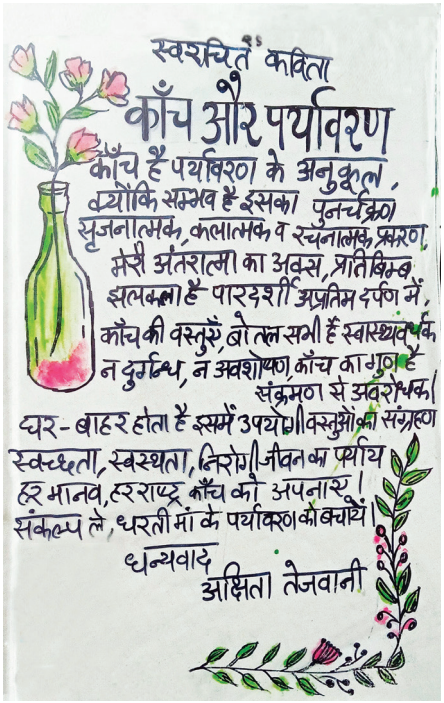




Figure 4.17.3. a) Prize winning contest for AIGMF Calendar 2023 and b) Calendar 2023 launch event.
Source: © IYOG archive.

Varshneya, Emeritus Professor (Glass Science) Alfred University and President Saxon Glass Technologies, Inc. (USA); Mr. Dave Fordham, Publisher Glass Worldwide (UK).

Dr. Suman Kumari Mishra, Director, Council of Scientific & Industrial Research - Central Glass & Ceramic Research Institute (CSIR-CGCRI), Kolkata congratulated the winning students.

1st Prize (Rs. 20,000): S. Christy Laura aged 15 years, Sri Akilandeswari Vidyalaya, (Trichy) Tamil Nadu

2nd Prize (Rs. 10,000): Medhansh Singhla aged 8 years, Delhi Public School (Vasant Vihar) New Delhi

3rd Prize (Rs. 5,000): Brijesh Jethva aged 22 years from (Junagadh) Gujarat

As a token of appreciation, a lucky 500 entries were given a specially designed empty Glass Bottle made from recycled glass (manufactured by Hindustan National Glass & Industries Ltd., under its CSR initiative), carrying logos of the IYOG2022 and Swachh Bharat Abhiyaan (Clean India Campaign).

145 Industry Associations
45 Central Universities
300 State Universities
30 Chief Ministers of all States in India
30 Hotels in National Capital Delhi
80 Colleges in National Capital Delhi
145 Foreign Missions in India
225 Federation of Safety Glass Members + Processors
550 Members of Parliament (Lower House)
40 Chief Secretaries and Lieutenant Governors of all States in India
31 Education Secretaries of all States in India
250 Members of Parliament (Upper House)
220 Municipal Corporations of all States in India
31 Education Secretaries of all States in India
250 Members of Parliament (Upper House)
220 Municipal Corporations of all States in India
115 Secretaries to the Govt of India
60 Media
250 AIGMF Members
300 Schools (top 10) of all States in India
60 Schools (top) in National Capital Delhi
50 CSIR-Central Glass & Ceramic Research Institute
100 UPGMS (Glass Cluster)
90 Consulate General offices in India
300 1st Poem and Essay contest
550 Others

4000 calendar glass bottles were made to promote glass and distributed as follows.

A Press Release and drawings by school children on '*Glass in our Lives*' were published in the July-Sept issue of Kanch and on the AIGMF website.

4.17.6. Calendar Glass Bottle 2022 ahead of IYOG2022 (Sept 10, 2021)

In the virtual Executive Committee and Annual General Meetings of the AIGMF held on Sep 10, 2021 the President and Office Bearers released the Calendar Glass Bottle 2022 carrying the logo of IYOG2022. The bottle had been specially designed by AGI glaspac as main partner for all IYOG events held in India.

Some MPs approached the AIGMF for additional copies. Distribution to International destinations was kept on hold owing to non-availability of an economic courier in COVID era.

Originally it was planned to distribute around 300 bottles to all Indian Missions overseas, International Glass Associations, ICG, select glass companies and stakeholders BUT the cost per consignment was between €30-50 against only €2-3 for domestic destination.

4.17.7. IYoG Calendar Glass Bottle 2022 presented to ALOFT Hotel New Delhi (Dec 23, 2021)

The IYoG Calendar Glass Bottle 2022 was presented to Mr. Pranav Bharadwaj Director Sales at ALOFT New Delhi on Dec 23, 2021 to promote green packaging. The story and selected photos were published in Kanch and on the AIGMF website.

4.17.8. AIGMF 2022 Print Calendar on the theme 'Glass in our lives'

President Mr. Bharat Somany, Office Bearers and Former Presidents released the AIGMF 2022 calendar on 'Glass in our Lives' at the promotion meeting held at ALOFT New Delhi in Dec 21, 2021.

As part of an educative process, 535 wall versions of the calendars were distributed to AIGMF Members/ Regional Associations and Stakeholders. The entire dispatch was completed by Dec 16, 2021; and 95% were delivered by Dec 22, 2021 for effective use and glass promotion. Soft versions of both calendar glass bottles and a print version of the wall calendars were posted on the home page of the AIGMF website.



Figure 4.17.4. Visitors at Exhibition of Artwork Photography by PAN India school children, Feb 23.
Source: © IYOG archive.

Members were invited to adopt this calendar by affixing their address and logo with the AIGMF logo; other content remaining the same. It was announced that the AIGMF's official printer could, if addresses were provided, even arrange their dispatch by courier at a cost to be agreed directly.

4.17.9. Artwork exhibition and Photography by PAN India School

The Glass Promotion Committee met in February at the AIGMF. In the gallery outside, artwork from the touring exhibitions 'Glass in our Lives/Glass Protects' and 'Adopt a Glass Bottle' was unveiled by Office Bearers of New Delhi House and AIGMF; they will be displayed until Dec 2024. Mr. Vikram Mittal, Treasurer of New Delhi House and Managing Director of Mittal Teas hailed this cause, saying that it is not only educational but a humble step towards the CSR objectives of educating societies on the sustainability of glass packaging and building material and is in tune with Hon. Prime Minister's vision of Swachh Bharat Abhiyaan (Clean India Campaign).

Educational Institutions were invited to be a part of IYOG2022; they could adopt a week or a day to celebrate it by organizing activities e.g. Touring Exhibitions, Debates or Essay Writing on 'Glass as an eco-friendly material', Quizzes, Drawing competitions, etc. The AIGMF Secretariat could provide speakers and publicize initiatives in Kanch and Glass News for worldwide coverage.

Glass calendar bottles as mementos for 2022 (made by AGI glaspac) as well as print calendars on 'Glass in our Lives' carrying logos of IYOG 2022 were freely distributed to all participants.

4.17.10. 1st Poem / Essay Writing Contest-'Green as Glass' (August 12, 2022)

Online entries were invited from the age group between 7-24; over 2,000 entries were received from educational institutes and youth across India.

Former Presidents- Mr. Sanjay Somany & CMD Hindustan National Glass & Industries Ltd.; and Mr. S C Bansal., CMD Adarsh Kanch Udyog Pvt. Ltd., were jury members who selected the top 3 entries:



Figure 4.17.5. SGT President holds IYOG workshops with school & university students, Nov 30, 2022.
Source: © IYOG archive.

- 1st Prize (Rs. 25,000) to Akshita Tejwani aged 14 years, Maharani Gayatri Devi Girls School, Jaipur
- 2nd Prize (Rs. 15,000) to R. Shruthi aged 15 years, Jawahar Vidyalaya Senior Secondary School, Chennai
- 3rd Prize (Rs. 10,000) to Kanishk Sharma aged 16 years, Ajanta Public School, Gurugram (Haryana)

The event story and selected photographs were published on the AIGMF website and in Kanch.

4.17.11. Green Hydrogen Economy: Options for Indian Glass Manufacturers (Sept 3, 2022)

As part of IYOG2022 celebrations, the Glass Manufacturers held their AGM in Hotel Lemon Tree, Aerocity, DELHI. NTPC's Mr. DMR Panda, Head of Hydrogen Group and Planning Head of Renewable Business gave a presentation on Green Hydrogen Economy: Options for Indian Glass Manufacturers.

Mr. Panda highlighted that "*the Indian glass manufacturing industry can position itself as a low cost, zero-carbon green hydrogen manufacturing hub which can help to achieve India's Net Zero target. As always, the Indian glass manufacturing industry lead by examples, it can be one of the early movers in the green hydrogen space and set an example for all MSMEs/hard-to-abate sectors*".

Approximately 80 senior industry members were present.

The program was an excellent opportunity for AIGMF to honor India's Youth who participated from schools and colleges across India in its annual contest for Youth: 1st Poem / Essay Writing Contest on 'Green as Glass' coinciding with the International Youth Day on August 12, 2022. The event story was published on AIGMF website and Kanch where photos are available too.

4.17.12. IYOG Celebrations continue: SGT President workshops with school and university students

At the invitation of AIGMF, Dr. Arun Varshneya, President of Society of Glass Technology, UK and Member of the IYOG2022 Council held interactive sessions with students at St. Thomas School and Delhi Technological University on Nov 30. Around 300 students from 9th to 11th standards participated. The topic chosen by Prof. Varshneya was Stronger Glass Products and an Overview on IYOG.

A tribute was paid by the Eco-club Students/Teachers/Prof. Varshneya/ AIGMF to Mahatma Gandhi who once walked in the St. Thomas school grounds holding glass bottles with the Swachh Bharat Abhiyaan (clean India campaign) logo, adopted from Gandhi's spectacles by the Indian Govt.

Prof. Varshneya made the session very interesting using simple experiments which the students responded to enthusiastically. Mr. Purvish Shah, Office Bearer of AIGMF and Director, Gopal Glass Works Ltd, Ahmedabad, overviewed the Indian Glass Industry. Mr. Vinit Kapur, Secretary AIGMF highlighted the importance of academic and CSR linkages for Environmental and Health reasons.

'*Students were very happy to discover the magical world of glass. They learnt many facts and were eager to know the properties and types of glass and career prospects. We deeply thank Dr. Arun Varshneya, Mr. Purvish Shah and Mr. Vinit Kapur for helping students understand that glass can transform our future and help us build a sustainable tomorrow. Thank you to the entire IYOG team for an engaging experience "Glistening Glass for a Greener Tomorrow"*, St. Thomas' Girls Sr. Sec. School, Mandir Marg, New Delhi.

Prof. Varshneya is also President of Saxon Glass Technologies as well as Professor of Glass Science & Engineering, Emeritus, at Alfred University, New York, USA.

Prof. A.S. Rao, Head, Department of Applied Physics, Delhi Technological University said that "*A Technical Talk by Prof. Arun Varshneya was organized by the Department of Applied Physics in association with The All India Glass Manufacturers' Federation on Nov 30, 2022. Prof. Varshneya interacted with our students showcasing the growing importance of glass and its popularity in packaging and building material. He has covered the topics from fundamentals to advances in glass science and technology. Discussions were carried on the further technical cooperation and research collaborations in Glass Science and Technology with the support of AIGMF. Thanks to Prof. Varshneya, Mr. Purvish Shah and Mr. Vinit Kapur for their presence at DTU. We received overwhelming responses from the students. The Dean (Academic-PG) Prof. Rinku Sharma, and more than 80 Faculty Members and Research Scholars participated to make the event a grand success.*"

Mr. Vinit Kapur talked on the most recent Indian IYoG activities involving Youth. He was in an upbeat mood to work more closely with young minds. He said that "*students have not only shown commitment and willingness but have also contributed significantly to relevant topics related to Health and Environment; glass and its usage in our daily lives.*" The students, Teachers and Professors were all given Mementos - glass bottles with the IYOG logo specially made by AGI glaspac and HNG from the recycled glass. Photos are available on the AIGMF website and in Kanch.

4.17.13. Release of AIGMF 2023 Print Calendar on the theme 'Green as Glass' (Dec 10, 2022)

President Mr. Sanjay Agarwal (online), Mr. Dave Fordham, Glass Worldwide; Dr. K Annapurna, Chief Scientist CGCRI; Treasurer Mr. Purvish Shah; Vice President Mr. Hargun Bhambani; Secretary Mr. Vinit Kapur and Mr. Aman Gupta, host of the AIGMF Meeting at Guwahati released AIGMF's 2023 print calendar on 'Green as Glass' at their 1st Hybrid meeting on Dec 10 at the Radisson Blu Hotel, Guwahati.

Wall and Desk versions of the calendars were distributed to AIGMF

Members/Governmental Officers/ Regional Associations and Stakeholders/ Administrators/CMs/Trade Chambers/ Education Secretaries/All FOSG Members/Firozabad/CGCRI contacts etc. The story was published on the AIGMF website and in Kanch with selected photos.

4.17.14. The Glass Industry met at Guwahati to conclude IYOG celebrations in India (Dec 9-11, 2022)

The first ever AIGMF's Executive Committee meeting with a hybrid meeting was organized at Guwahati, Assam on Dec 10, hosted by North East Sillimanite Refractories, an Affiliate Member of The All India Glass Manufacturers Federation (AIGMF).

The event saw technical presentations by the Competition Commission of India, Government of India; SEFPRO/SEPR India; a concluding IYOG2022 lecture by CGCRI, and release of AIGMF's 2023 calendar: 'Green as Glass'.

In a session moderated by Mr. Dave Fordham of Glass Worldwide (Honorary AIGMF member), Mr. Umesh Kumar IPS, State Resource Person, Competition Commission of India, Government of India talked on "Competition Law for Trade Associations and Enterprises" and Mr. Cyril Linnot and Mr. Suraj Kumar of SEFPRO/SEPR India discussed the application of self-flow monolithics to prolong the life of glass melting furnaces in hot and cold repairs.

Mr. Umesh Kumar and Mr. Tanuj Goswami overviewed the Competition Act, its objectives and functions. Inquiry, Investigation, Coverage, Powers of the Commission were highlighted by citing suitable cases. The Presentation was appreciated by 50 members comprising glass manufacturers, affiliate members of AIGMF, special invitees.

Finally, Dr. K. Annapurna, Chief Scientist, Glass Division CSIR-Central Glass & Ceramic Research Institute, summarized IYOG activities in India. Commemorative IYOG glass bottles, specially made by AGI glaspac and HNG from recycled glass were also awarded.

A highlight was the release of the AIGMF 2023 calendar on the theme 'Green as Glass', centered on IYOG celebrations and featuring the 2022 winners of the AIGMF's annual contest for youth: the first-ever poem/essay writing contest on 'Green as Glass', coinciding with International Youth Day. The AIGMF had invited online entries from the 7-24 age group for the 1st Poem/Essay Writing Contest on 'Green as Glass'. The 3 top winners received cash prizes and their poems and essays were converted into the 2023 Calendar. As the National Apex Body of the Glass Industry, the AIGMF undertakes socially responsible steps as a voluntary service to society, thereby bringing increased awareness of Glass as a safe and 100% recyclable packaging material.

Delegates also learned of opportunities for investment in the north-east region, including subsidies offered by the Government of Assam and the advantages of the area's natural gas, limestone, dolomite, sillimanite, mullite and corundum.

Mr. Tanuj Samaddar (who lives in Assam), 2020 winner of the AIGMF's 'Drawing Competition 3.0' on the theme 'Glass Protects', addressed attendees in Guwahati and enthused about glass as "the only 100% recyclable packaging and building material."

NES hosted 2 dinner receptions on Dec 9 and 10 where a local cultural evening program showcased the indigenous Bihu folk dance, an important part of Assamese culture. NES organized an accompanying tour to the holy city and delegates visited the Kamakhya Temple.

Most of the glass manufacturers present had been using NES products; they expressed their full satisfaction on the quality, service and performance of the products, commented Mr. Aman Gupta, Managing Partner of North East Sillimanite. NES, located in Guwahati, is successfully utilizing local resources and providing world class bonded refractories and monolithics to the container, float, solar, sheet, figured and opal glass sectors in India and abroad with products such as high alumina



Figure 4.18.1. Homepage of RO18 in Italian Language.
Source: © IYOG archive.

(42%–99% AL_2O_3) and basic refractories including 88%–98% magnesia, magnesia-zircon, magnesia-zirconia-alumina and special refractories zircon and zircon-mullite.

The event was published on the AIGMF website and in Kanch; selected photos are on both platforms.

References

[1] https://www.aigmf.com/.
[2] https://aigmf.com/glass-age.php.

4.18. Report from RO18 (Italy)

Author: Gabrielle Peron

4.18.1. Committee

Regional Organization RO18 Italy was designated by IYOG2022 with the aim to represent the Italian glass community. It was led by 6 members with a comprehensive set of knowledge and competences in: history, art, industry, design, and education.

- Gabriele Peron Stevanato: Group and ICG Steering committee member (coordinator).
- Teresa Medici: ICOM Glass International Committee for Museums and Collections of Glass.
- Marina Uboldi: Comitato nazionale italiano AIHV.
- Vincenzo Sglavo: University of Trento.
- Fabrizio Cattaneo: Vitrum and Gimav.
- Umberto De Lorenzo: Vitrum and Gimav.

4.18.2. Activities

A dedicated website was created.

RO18 promoted 23 events branded with IOYG2022 logo engaging thousands of attendees and glass lovers.

One of the most impressive events has been the Italian Glass Weeks, Italy's first festival dedicated to industrial and artistic glass among the city of Milano and Venice as a result of the union of the Milan Glass Week, organized by VITRUM, and the Venice Glass Week, organized by its Organizational Committee.

The event (Milan, 10th-18th September 2022 - Venice 17th- 25th September 2022) was designed specifically for the 2022 *"UN International Year of Glass"* and featured exhibitions, workshops, art installations, shows, activities for children and families as well as guided tours, cultural seminars, workshops and much more in order to highlight the internationally recognized excellence of Italy in the field of glass.

The Festival drew more than 450,000 visitors to 300+ events in more than 200 different locations, allowing people to cultivate a new awareness of glass and its importance, and a growing interest in an industry that, although

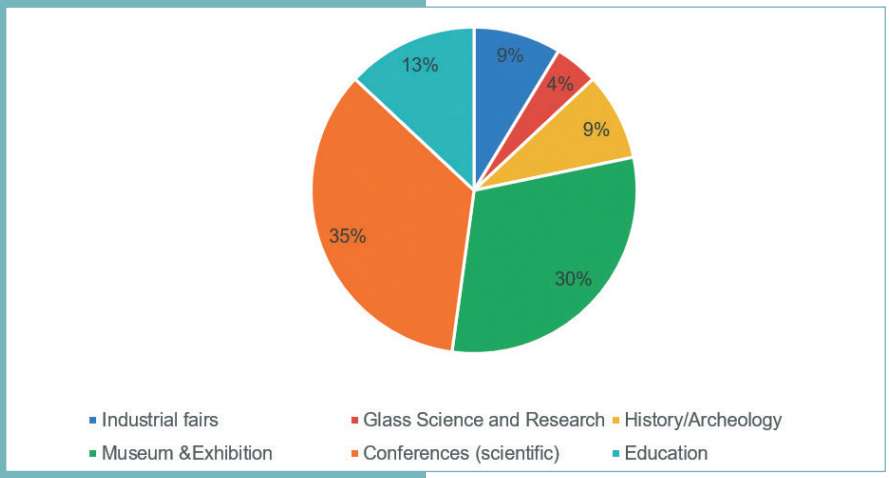


Figure 4.18.2. Distribution of events organized in Italy during IYOG2022 by type.
Source: © IYOG archive.

very present in our daily lives, often goes unnoticed – *"a bit like glass itself: transparent. It's there but you don't see it"* as remarked by VITRUM President Dino Zandonella Necca.

After such an enormous success, VITRUM, major sponsor of the UN International Year of Glass 2022 and founder of the Community of Glass Associations that put the basis of a year dedicated to glass, took advantage of this wave of positive attention and interest to connect people more intimately with our world, sharing the effort of the whole international glass community to drive society into the "Age of Glass". Consequently, thanks to VITRUM 2023 and Vision Milan Glass Week, Italy hosted from 4th to 10th September two major events focused on glass. VITRUM 2023, as international trade show,



Figure 4.18.3. Terrazza Sant Ambrogio-Milano.
Source: © IYOG archive.

provided space for 218 of the leading glass companies from 29 countries and for more than 10,000 daily B2B meetings between specialized industry professionals, perfect for an event that traditionally makes quality and consolidating relationships its strength.

From the other side, Milan Glass Week focused on glass and its applications by involving 190,000 visitors over the 7 days of the event in some of the most exciting venues in Milan, the quintessential Glass Capital, through 86 activities organized,





Figure 4.18.4. Italian Glass Week, Milano.
Source: © IYOG archive.

including 7 museums in Milan, approx. 300 appointments —all sold out— and 32 guided tours that engaged more than 600 participants. And let's not forget the creative workshops for kids, in which 120 children between the ages of 5 and 10 years participated.

4.18.3. Sustainability and next steps

Sustainability and technological innovation were the two key drivers of both VITRUM 2023 and the Milan Glass Week, as observed highlighted during the Convention of Glass Associations, the annual meeting of the Community of Glass Associations, hosted during the trade show days, thus giving prominence to a material that can be recycled an infinite number of times and that can act as the driver of a solid circular economy and of innovation with an infinite number of applications.

As "Home of Associations", VITRUM was fully engaged with the UN IYOG 2022 inheritance. As a strong international community, it provided inside the VITRUM 2023 exhibiting pavilion a space called VITRUM Boulevard dedicated to the international



Figure 4.18.5. Vitrum 2023.
Source: © IYOG archive.



Figure 4.18.6. Italian Glass Week-event with children Milano.
Source: © IYOG archive.

glass network, a tangible path from the past, through the present, and towards the future of an international community that supports VITRUM and had played a major role in reaching the goal of an international year dedicated to glass.

VITRUM's efforts in majorly involving society in the "Age of Glass" will steadily continue in 2024 thanks to new projects that will soon be announced and to the enlargement of the Community of Glass Associations.

4.18.4. Conferences in Italy

The XXI National Study Days, held on 28 and 29 May in Genoa on the theme of Glass in the Middle Ages, were organized in collaboration with Prof. Fabrizio Benente (professor of Christian and Medieval Archaeology and Pro-Rector for the Third Mission of the University of Genoa) and with the Palazzo Ducale Foundation, directed by Serena Bertolucci. The success and scientific value of the initiative were well highlighted by the number of scholars who participated, including professors and doctoral students from 25 different universities, of which 7 were foreign, the officials of 7 Superintendencies and the curators of 4 museums, and who presented 20 oral reports and 20 posters on various topics giving research insights related to the conference topic.

During the Genoa Days, Maria Grazia Diani presented the Proceedings of the XX National Study Days of Ravenna - '*Interdisciplinarity in the study of glass*'. The editorial team consisted of Marina Uboldi, Simone Lerma and Mariangela Vandini. The volume had 382 pages, printed in black and white, with a sixteenth of the pages having color images:

- XXI National Glass Days [1], Italian National Committee AIHV, Glass in the Middle Ages, Genoa, 28-29 May 2022.
- Civic Archaeological Museum of Milan, autumn conferences from 10 to 29 November (see poster).
- Venice, Study days on Venetian glass - 2022 edition "Cross-influence Between two Glassmaking traditions: Venice and Islam".

Veneto Institute of Sciences, Letters and Arts, Venice, 19-21 September 2022.

Medieval Byzantine and Islamic glass played a significant role in the development of Venetian glass, which picked up the legacy of luxury glassmaking from the Middle Eastern territories. Despite the fall of Constantinople under Ottoman rule (1453), Venice continued to benefit from very dense and almost exclusive commercial and political relationships, through which, for almost five centuries, a large quantity of Murano glass still arrived as a purchase or diplomatic gift, to the court of the Sultans. Enamelled and gilded vases as well as glassware engraved with diamond point and filigree are recorded on diplomatic papers.

The Study Days on Venetian Glass 2022 [2]were dedicated to the relationship between Venice and Islam in the production of glass products, organized by the Veneto Institute of Sciences, Letters and Arts, in collaboration with the Italian National Committee AIHV, LAMA - Analysis Laboratory Ancient Materials of the Iuav University, Glass Museum-Foundation of Civic Museums of Venice.

Venice, PEARLS 2.0 Conference, the pearl collections of Italian museums, from 23 to 24 September 2022 Times: 10.00-12.00 - 15.00-18.00 Palazzo Mocenigo Museum Curated by Augusto Panini and Chiara Squarcina.

After the success of the previous year, Palazzo Mocenigo once again hosted a two-day conference [3] dedicated to glass beads, investigating multiple aspects of their fascinating production. In this edition, specifically, scholars and curators of important museum institutions will present to the public the collections of pearls in Italian public collections, mainly in the archaeological field. Museums are in fact custodians of masterpieces that are in many cases unpublished, but which can contribute significantly to the knowledge of this specific field of study.

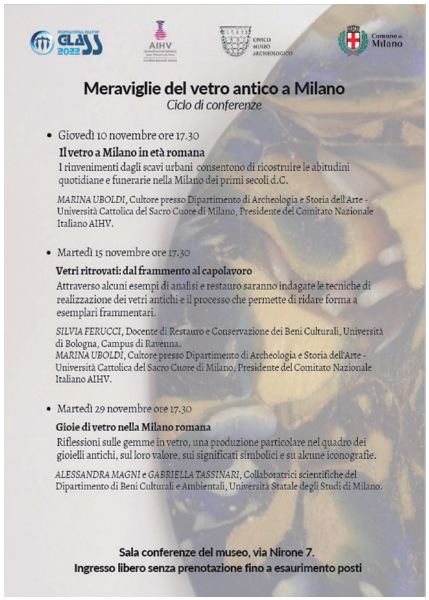


Figure 4.18.7. Brochure of a series of conferences held in Milano topic Wonderful Ancient Glasses.
Source: © IYOG archive.



Figure 4.18.8. Visits to Museums called The Streets of Glass during Milan Glass week.
Source: © IYOG archive.



Figure 4.18.9. Glass lectures organized by University of Trento.
Source: © IYOG archive.

- In Milan with the Sforzesco Castle, with the patronage of ICOM Glass, the photographic exhibition [4] "Milan of glass: from ancient to contemporary" curated by Maria Grazia Diani, Fiorella Mattio, Cristina Tonini and Marina Uboldi was held in the courtyard of the Rocchetta, and the series of visits to the museums called "The streets of glass", which involved eleven different exhibition realities (Milan Glass Week).

4.18.5. Exhibitions in Italy

- Exhibition The rooms of wonders. The painted glasses of Dady Orsi, Wolfsoniana, Via Serra Gropallo, 4, Genova Nervi, 25 November 2022-26 March 2023, curated by Mariateresa Chirico and Matteo Fochessati.
- Exhibition Rosanna Toso: Woman. Glass. Design, Palazzo Broletto, Sala B, Via Paratici 21, Pavia, 21 April -12 June 2022.
- "Bernardini-Fatti" Museum of ancient stained glass and headquarters of the Merletto Di Sansepolcro association, Sansepolcroo (AR): exhibition paper, fire, glass - designer and master glassmaker; glass fusing workshops Glass stories: the world around; exhibition, Journey through gesture and tradition.
- Show Glass! Jewelry in Italy between the 19th and 20th centuries, Museo del Bijou, Casalmaggiore (CR), 23 April to 18 October 2022, curated by Bianca Cappello and Augusto Panini.
- Events of the Altarese Glass Art Museum [5], AVA 2022-Altare Vetro Arte; AGF 2022 – Altare Glass Fest; AVD 2022 - Altare Vetro Design; Christmas Under Glass 2022, Museum of Altare glass art, Altare (SV), 23 April-31 December 2022.

Among the numerous scientific events organized at the academic level to celebrate the Year of Glass, two are worth to be mentioned: "The thousand lives of glass" and the "Glass lectures in Trento".

"The thousand lives of glass" or, in Italian, "*Le mille vite del vetro*" was a one-day workshop organized by the Italy Chapter of the American Ceramic Society, held at the Ca' Foscari university

of Venice on May 22, 2022. Twelve oral lectures were given by Italian senior scientists from academia and industry and twenty posters were presented by young researchers, post-doc and PhD students. The workshop was an opportunity to take stock of research activities in Italy and promote new collaborations.

The "Glass lectures in Trento" was a series of on-line lectures organized within the course of Glass Engineering held by Prof. Vincenzo M. Sglavo for the Master in Materials Engineering at the Department of Industrial Engineering of the University of Trento. The event was organized in collaboration with the National Research Council (CNR). Fifteen worldwide renowned scientists from academia, research centres and industry were invited to give a one-hour lecture on several topics regarding the glass science and technology on Wednesday afternoons from March to May 2022. The lectures were attended by students and young researchers from all parts of the world and some of them even reached 300 attendants.



Figure 4.18.10. Glass lecture organized in cooperation with Italian National Research Council - CNR.
Source: © IYOG archive.

References

[1] https://www.storiadelvetro.it/wp-content/uploads/2022/05/2022_AIHV_pieghevole3ante_03.pdf.
[2] https://www.istitutoveneto.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/1883.
[3] https://mocenigo.visitmuve.it/it/eventi/archivio-eventi/perle-2-0-le-collezioni-di-perle-dei-musei-italiani/2022/09/19852/le-collezioni-di-perle-dei-musei-italiani/.
[4] https://www.milanocastello.it/it/content/italian-glass-weeks-al-castello.
[5] https://www.museodelvetro org/?page_id=2214.

John Parker, Alicia Durán and Matthieu Hubert

5. Education

This chapter focusses on events with an educational emphasis that were organized during the International Year of Glass 2022. It provides statistical data such as the geographical distribution of activities, their main thrust, and the target audience. Specifically, an Outreach Committee with 30 members was set up to coordinate many of these activities. Lists of useful material which has been generated for educators and others involved in Outreach are presented, together with information on the longer-term legacy generated by these activities. We have included a section on glass history here —understanding our past can help clarify our present and anticipate our future.

5.1. Introduction

As explained in Chapter 1, organizers of events under the UN International Year of Glass (IYOG2022) banner recorded them in an online database. 800+ individual activities were reported. The database records provided a short description of what was planned, how many participants were anticipated, venues and timings. While the statistics are undoubtedly incomplete and have categories whose boundaries are not sharply defined, they do give an invaluable flavor of what happened, and particularly how much IYOG activity had an EDUCATIONAL content. So, of the 800 events recorded, a hundred were registered as primarily educational. Table1 lists the distribution by country and shows the universal nature of educational activity. Also, several

>10 Events	6-10 Events	2-5 Events	1 Event
Brazil (13), Italy (12), Philippines (12)	Germany (8), Spain (6), Turkey (6)	United Kingdom (5), United States (5), India (4), New Zealand (4), Russia (3), Hungary (3), Uruguay (3), Argentina (2), Belarus (2), Croatia (2)	Australia, Bulgaria, Czechia, Finland, Ireland, Jordan, Lebanon, Moldova, Poland, Portugal, Romania, Slovakia

Table 5.1. Distribution of the recorded educational events by country. Number of events in brackets.
Source: © IYOG.

cross-border activities are highlighted in the subsequent text.

Each activity was also categorized by type: 30 Workshops/Seminars, 14 Lectures; 14 Museum exhibitions; 13 Conferences; 8 Open days, 8 Online events; 6 Publications; 4 Arts; 3 Citizen Science; 2 Festivals and 2 Competitions. A list of these events is presented as an Appendix to this chapter (5.7).

Although many events were organized as local activities, the power of the internet was harnessed to stream several worldwide. The widespread use of streaming (along *glass* optical fibers) had grown rapidly during the COVID epidemic and has given the opportunity for international audiences for individual lectures/seminars/conferences as well as potentially opening-up competitions and similar activities to a wider range of participants. The Stevens Stained Glass Prize in the UK was a good example. Another wonderful, ongoing event was the Glass Science & Art Webinar Series organized over a 3-month period as part of an Ibero-American Year of Glass; it targeted an audience of students, practitioners and the wider public and involved glass scientists presenting alongside glass artists in a series of talks. The success of such events has meant that many have since continued. And, for those that existed pre-2022, audience numbers often increased; we hope these trends are maintained.

5.2. Primary and Secondary Education

Of course, the concept of what education is and the target audiences vary. We are all familiar with formal educational systems that involve: PRIMARY and SECONDAY SCHOOLS for young children and teenagers, TERTIARY EDUCATION with a more academic focus for a graduate level output, or APPRENTICESHIPS that offer training for those who already have a clear focus for their futures. We must not exclude ADULT EDUCATION, important to develop the skills base and levels of interest in the pool of potential employees, whilst other shorter activities can help to inform customers, the wider public, job seekers and younger people considering possible careers.

Children typically find working hot glass exciting. And positive experiences gained as a child can influence later life choices such as career —even attitudes to materials selection and recycling.





Figure 5.1a, b. FunGlass school in Trençin, Slovakia.
Source: © IYOG archive.

A junior FunGlass school in Slovakia was given an IYOG grant to promote and bring material science to children aged from 6 to 10. They became junior scientists experiencing lectures and a laboratory environment. The primary goal was to provoke their imaginations, creativity, and observation skills. Children were divided into small groups tutored by a researcher, who assisted them in accomplishing their tasks. The theoretical part was covered by short interactive lectures cross-linked with the experimental laboratory tasks. Each day started with a short introduction, where the scientific background and experiments are explained appropriately to their age.

The first issue for any event organizer is safeguarding the participants; this is particularly so if youngsters are present and if hot glass is involved in a demonstration. For example, one cost-effective solution seen in the UK was to blow hot glass 'into' a dustbin —metal dustbins provide a safe space in a zone that the child cannot access, while retaining visibility for the glowing hot glass sphere. Even better was that it gave children the opportunity to blow glass themselves.

2022 was a time of steeply rising prices, so ENERGY COSTS for demonstrations were particularly important. A neat development in the UK was the design of a range of highly



Figure 5.2. Bottle returns project in the Philippines.
Source: © IYOG archive.



Figure 5.3. Art-painting-Philippines.
Source: © IYOG archive.

energy efficient furnaces, firstly mini-furnaces, then micro- and finally nano-furnaces; these melted successively smaller quantities of glass but always enough for a useful demonstration. In South Africa recycled cooking oil was used for fuel.

In the Philippines, one scheme, partly funded by IYOG grants, was entitled: *Bottle Returns Incentive for Deprived Grade & Elementary Schools* - BRIDGES for short, an apt acronym for the relationships formed. The proceeds from this bottle returns scheme were used to purchase computers for school use, in an environment where previously teachers had been limited to drawing images of a computer mouse, a keyboard on a backboard and so on. The same organization also encouraged a Glass Bottle Painting competition and for older children 'Poster design' on a 'green' theme, using computer graphics packages.

A similar approach was adopted in India by the All India Glass Manufacturers Association (AIGMF) and also was very successful. They attracted thousands of illustrated essays on glass as a sustainable material by offering prizes for the best submissions, with the additional carrot of publication for the best work. Now they publish an annual calendar for customers using images from the best submissions.

Of course, secondary school children demand more of a challenge. Another prize given to secondary school children in the Philippines was the '*The Emerald Glass Excellence Award*', specifically awarded to the Cardona Youth Musical Ensemble in 2022. Using only recycled glass repurposed into musical instruments, they created an inspirational Youth Orchestra.



Neither as **Magnificent** as **glass,**
Nor as **Green** as **grass.**
As **vivid** as **light bars,**
As **glittering** as **night stars.**
Able to **Reflect own self,**
As **magical** as an **elf.**
Restricting houses from **heat gain,**
Protecting us even in **heavy rain.**
From **Shielding** the plants in a **Green house,**
To decorating an **Embroidered blouse.**
Thanks to the **rear mirror,**
For excluding our roads from **wear and tear.**
Thanks to the **memories lens captured,**
Revisiting them is what **an eye desired.**

Sparsh Tejwani

Figure 5.4. 'Glass protects' contest and 'Green as Glass' Calendar 2023. India.
Source: © IYOG archive.



The International Year of Glass began with an Opening Ceremony using the facilities of the UN in Geneva. For this event, the organizing committee created a 226-page book, *Welcome to the Glass Age* [1], where a deliberate decision was made to target the intelligent teenager i.e. the older child at secondary school. The text has individually written chapters based around the role of glass in supporting the UN 2030 Humanitarian Goals and incorporated numerous stunning images. It has also been translated into Spanish and we hope that other translations will follow. Both texts are available for free download through links on the IYOG web site.



Figure 5.5. 'Welcome to the Glass Age' book cover.
Source: CSIC, and A. Durán and J. M. Parker.

Ch 1. Creating a UN International Year of Glass	J. M. Parker, A. Durán & L. D. Pye
Ch 2. Glass History and the Arrival of the Glass Age	J. Mauro & J. M. Parker
Ch 3. Glass for Good Health and Well-being	J. R. Jones & D. S. Brauer
Ch 4. Affordable and Clean Energy provided by Glass	H. Jain & Peng Shou
Ch 5. Optical Fibres and ICT Technologies	G. Rhigini, S. Tanabe & J. Ballato
Ch 6. Glass in Architecture	S. Camacho
Ch 7. Sustainable Glass Production & Carbon Reduction	E. Muijsenberg
Ch 8. Sustainable Glass in a Circular Economy	M. Delle Selve & K. Davis
Ch 9. Glass Art	J. Kelly
Ch 10. Museums and Society	T. Medici
Ch 11. Education! Education! Education!	A. Candida & J. M. Parker
Ch 12. Equality in the Glass World	A. Durán
Ch 13. Glass Beyond Glass	L. Wondraczek

Table 5.2. A list of the book chapters in the text 'The Age of Glass'.

The value of this well-designed educational text was widely appreciated. In the Philippines they arranged two special ceremonies celebrating the receipt of free hard copies for their library. It could not have been produced without the generous support provided by a) the glass industry who provided funding, numerous images and valuable information, b) the Spanish Research Council CSIC, who financed the book for its DIVULGACIÓN series, and c) the editorial La Catarata, who performed admirably the task of typesetting and publication. The volume is available for free download on the Worldwide Web in English [2]; Table 5.2 lists the chapters of the book.

Other articles published elsewhere are listed in Chapter 9; several were written with education in mind.

The activities in the Philippines have continued into 2023: Glass-is Cool (Iskul) is a Glass Container Manufacturing Process appreciation webinar/seminar for Engineering students to promote Glass as a Sustainable packaging material for a Circular Economy. It combines the Junior Philippine Society of Mechanical Engineers (JPSME) in partnership with the Philippine Society of Mechanical Engineers (PSME) Chapter for the very first Regional Student Summit for Mechanical Engineers.

In the UK the Glass Sellers Livery Company has continued to supply microscopes to primary schools in poorer areas with printed suggestions on their application; while not specifically an IYOG activity, the aims embodied in this activity have been circulated.

Another activity that was created specifically for the IYOG in Japan was the production of colorful posters illustrating glass, its properties and many applications; these posters are available for download in

different languages. More information is available in Chapter 4.10.6.

A video is a format popular with the younger generation and is easily viewed on a mobile phone. Recordings of the events in the UN buildings in Geneva and New York are available and include presentations by many International Experts. Over 7000 individual viewers watched the Geneva conference live for example and many more have accessed the recordings since. Of considerable appeal and to advertise the start of the International Year of Glass, A video on Glass Applications [3] has been produced and is a valuable tool for introducing 'Glass' to students thinking of studying this area, perhaps as part of a wider education in Materials. This has already achieved over 8000 views on YouTube. Turkey (Chapter 4.4.3) and others have also produced various teaching videos. For the final debriefing Session at the UN building in New York a video examining issues such as Equality and Education was generated, and recently this has been reformatted into stand-alone material [4]. Staff in a Brazilian University have been working hard to create material in the form of Manga style Comics (Chapter 4.1.7).

In Spain, CSIC along with ECOVIDRIO (integrated system for recycling of glass containers) and ANFEVI (Association of glass containers producers) organized two travelling exhibitions with 20-24 posters. The first focused on glass containers and recycling, *Glass: present and circular future* and is available in English [5] and Spanish [6]. The second, *the Age of Glass*, goes through the different chapters of the book '*Welcome to the Glass Age*' in English [7] and Spanish [8]. Both exhibitions include didactic materials and toured Spain to great acclaim during 2022 and 2023; they are reserved up to summer 2024. Further information is available in Chapter 4.8.

5.3. Tertiary Education

All the events reported on the central database and the Appendix came with an estimate of the numbers anticipated as participants. Under the events categorized as Educational some 45,500 participants were expected in total. The age distribution for this group is not known but in addition almost 32,000 participants were expected for various conferences arranged around the world. Many of these attendees would have fallen in the Tertiary Education group. For several of the IYOG conferences organized, special provision was made to attract a younger audience by offering significant financial support for attendance. Demand for places required a selection process and the selectors were expected to ensure a balanced distribution between the sexes and nationalities (Chapter 3.2).

Apart from the generation of teaching materials, there has been considerable interest in Teaching Methods. The ICG have been running for many years Summer and Winter Schools for Students just embarking on research degrees, both in Europe and China. We were able to restart the European (Montpellier) school as a live events post COVID for the first time in 2022. A particular feature is to replace numerous formal lectures by less rigid, more interactive approaches in the form of a) small group tutorials and b) student-led projects. The latter groups present talks on an allocated topic to the whole class after some 10 hours of intense preparation.

The friendships formed during these schools have also proved valuable in providing mutual long-term support, as those involved move on in their careers. Such an approach also encourages team working, vital for those employed in industry. As an alternative approach, in 2023 the ICG summer school adopted another structure, that of a formal debate between 2 groups either supporting or arguing against a particular proposition. For the future, some of these group approaches could and perhaps should be transferred to online exercises. In the USA Albright College together with an international group is developing a new slant to teaching at secondary school level based on student-led learning and this is

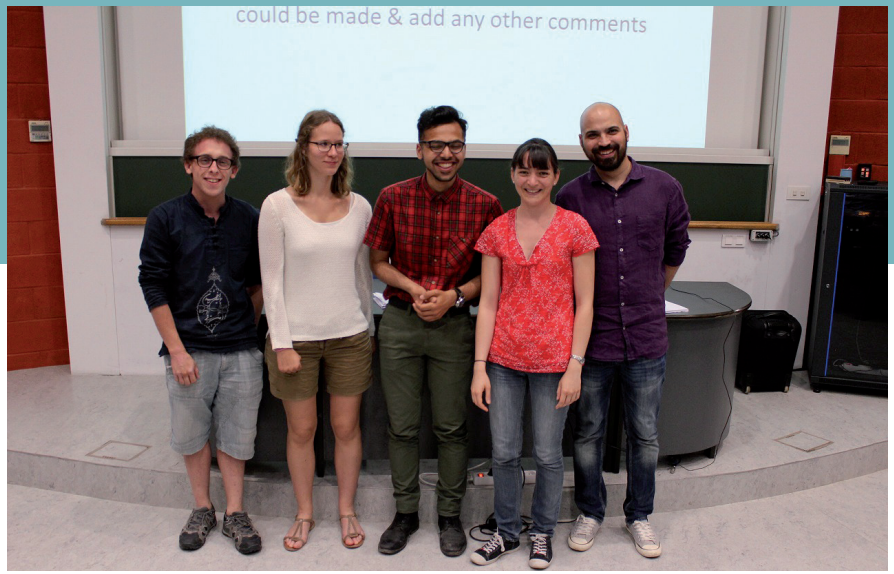


Figure 5.6. A group ready to present their project report at a Montpellier ICG School.
Source: © IYOG archive.

described in more detail under the Outreach Committee report later in this chapter.

Of course, it is always useful to support teaching with rewards for exceptional effort. For the future, the possibility of opening prize competitions to a wider audience is another potential legacy from the IYOG. Indeed, an Indian competition on sustainability for secondary school children was already open to applicants outside of India during 2022.

Many art events organized within IYOG involved the work of students at the Tertiary level. These presented an opportunity for conversations between these students, their teachers, the public, and sometimes involving well known personalities in the glass world. One example was at the Chelsea Flower Show Garden which attracted 140,000 visitors and TV interest; they hosted a Glass Garden partly funded by an IYOG grant. The same group have since contributed to a visitor attraction just outside of London which focuses on gardens designed with climate change in mind. The Glass Biennale in Stourbridge was attended by some 10,000 visitors and specifically welcomed several international Glass Artists to put on masterclasses and excite the public with their skills.

Similar approaches were adopted throughout the world, for example, at Gardens in Germany. In Australia & New Zealand there was a group project to create a beautiful glass mosaic that embodied and recorded a multitude of patterns designed by Afghan Women. The Glass Weeks in Italy illustrated both the artistic and technical output of the Glass Industry, attracted millions of visitors who were exposed to many wonders of the glass world.

5.4. Teaching and Research

Those teaching at any level but particularly at the Tertiary level and in Adult Education have an additional responsibility beyond that of teaching, namely generating, gathering, recording, analyzing, and systematizing new information. One reason for this is to aid understanding but perhaps even more important is the creation of an atmosphere in which fresh concepts can be developed, supporting the development of new processes and products.

Funding of IYOG was insufficient to support major research projects but did fund a few smaller projects such as helping to catalogue museum collections.

In the UK, IYOG also appeared embedded in quiz questions in the Guardian Newspaper and on the University Challenge Quiz on ITV. A more unusual exhibition title was BRAINS IN A DISH in Barnsley UK. This was a Glass Model of the Brain using LEDs to illustrate the way it works. It was created by a Glass Artist working with a Scientist and was displayed in an Art Gallery specifically to be a talking point for those affect by or interested in the disease: Alzheimer's. The creators also toured local schools giving talks to young people to generate interest in the subject particularly as a long-term career.

A novel slant on Youth and Education was embedded in the Engraved Glass War Memorial created by Alison Kinnaird in Scotland and exhibited throughout 2022. It showed young soldiers prepared to fight but with a reminder in one panel that within each combatant has been a young child carrying unique expectations of their future. From a different slant, it was also a reminder that WAR is the enemy of sustainability, both of our environment but even life itself.

5.5. IYOG Grant awards for specific activities

23 Grants specified their main interest as Education. These were in Jordan (2), New Zealand (2), Norway (2), Philippines (6), RSA (1), Serbia (2), Slovenia (1), South Africa (2), South Korea (1), Spain (3) and Thailand (1) and totaled € 45,501 in value.

The following countries also received grants for Conferences: Germany (5), Hungary (1), Indonesia (1), Ireland (2), Romania (1), Italy (1), Japan (1) and Thailand (1). Grants worth a total of € 31,790 were awarded to this group. One important use of grants was to support student attendance at key scientific Conferences. This approach was particularly a feature of the main IYOG events held in Berlin and in Japan, the International ICG Congress in Berlin and Closing Ceremonies. 25 students were supported over these two venues. 45 Artists from 6 countries exhibited 77 contemporary works of art in the public Parks of the City of Munster and incorporated the 'European Heritage Day'. In Venice, IYOG supported the demonstration of glass making skills to both visitors and locals live in boats travelling along the canals and around islands in the lagoon.

International cross-border collaborations

A few applications involved cross-border working. For example, Eire and Romania worked together to run a series of online Masterclasses based at the Irish Sculpture Factory. The aim was to encourage better student engagement and cross-cultural learning. A German-Czech program took the form of a Summer Academy for Glass and Art at Bild-Werk Frauenau, with an artistic workshop on 'Glass and art as a medium of German-Czech relations. To revitalize glass art in Jordan following wars in neighboring countries, they took on a Canadian glass expert originally from Thailand for two weeks who gave his time to train people in the art of flame-working.

5.6. Appreciating our history and preserving technology

In a wider context, many often argue that the value of historical knowledge lies in an understanding of why the world is at it is and an appreciation of where it may be heading. Indeed. G K Chesterton wrote: *Education is simply the soul of a society as it passes from one generation to the next!* John Ruskin (1819 to 1900) wrote '*Education, it is a painful, continual and difficult work to be done by kindness, by watching, by warning, by precept, and praise, but above all by example*', a quotation on display in Stourbridge where the 2022 Glass Biennale took place in the UK, in a college run by the Ruskin Trust. History was not neglected as a theme within the IYOG.

Stories have been written and films created around the subject of *Preserving technology.* There are many reports of

glass making technologies that have been lost by earlier generations because a glass maker has died too early and failed to pass on information to the next generation to their detriment. We live in an age where modern developments are replacing old skills to the extent that UNESCO have agreed in 2023 to include knowledge, craft and skills of handmade glass production within the Representative List of the Intangible Cultural Heritage of Humanity. This followed a similar declaration in Spain in 2021.

An IYOG project in Serbia, entitled 'Digital Glass Serbia' examined ways of recording digitally details of old glass items brought in by members of the public with their associated glass making techniques. Another IYOG project in Amman, looked to re-instate old stained glass making techniques, following the aftermath of damaging wars in the area. In Germany an IYOG grant was given to support students involved in archaeology and restoration.

Another IYOG grant was given for an Art Museum Exposition in Pretoria which created an exposition on the Origins of Glass Making in South Africa and Kenya. A similar event in Indonesia focused on glass bead-making a central feature of their heritage. It led to their first Glass Art Festival. In Rotherham, near Sheffield there is Glasshouse cone whose construction can be dated to 1740. Recent investigations have suggested this may well be the oldest such structure in the world. It is proving to be a matter of local civic pride with considerable value as a venue for local school visits when its background can be explained. Interest was generated simply by illuminating the exterior using modern controlled laser light sources while on the inside modern glass blowers used it for demonstrations to a wide audience. The interior can also be used as a space for remembering its history through music, dance and the spoken work, a project again supported by IYOG.

Another totally different yet similar area that IYOG supported was the Malatosca-Surroca iniative in Spain. Attempts are being made to record its history, for example by interviewing witnesses and recovering tools and cullet. The aim is to develop artistic glass workshops using low-emission, efficient electric furnaces.

An important and novel approach linked to this broad issue has been encouraged within the IYOG community by the Twinning of Towns, particularly those in the Spanish Speaking world, because of a shared Glass History. Allied to this has also been a growing development of a musical tradition to record Glass History in Music/Song. The IYOG2022 program included some such events.

5.6.1. International Network of Towns Twinned by Glass

The Spanish network 'Towns Twinned by Glass', is an alliance to honor their relationship with this material (see Chapter 4.8.2). An initiative promoted by Ecovidrio, ANFEVI, ANAREVI and CSIC to commemorate the International Year of Glass declared by the UN in 2022. The initiative aims to pay tribute to the material 'glass' and to those municipalities that have been linked to it historically, as well as to emphasize its sustainable qualities and promote the selective collection of containers through green bins. The alliance, that reached 55 cities throughout Spain, is formalized by the delivery of a key made by hand from recycled glass. Berazategui, in Buenos Aires province, Argentina, recognized as Capital of Glass by the Senate of Argentina, joined the Spanish network in April 2023 opening the International Network of Towns Twinned by Glass (INTTG). At least 3 candidates will join in the next months.

The 'Towns Twinned by Glass' initiative, a symbolic alliance to recognize the material glass and those towns that have been linked to it historically and to emphasize its sustainable and circular qualities. The objective of the initiative is to spread and support the commemoration of 2022 as the International Year

of Glass, declared by the UN, and to commit municipalities to promote the selective collection of glass containers through green bins in a context marked by the need to encourage the transition to a circular model. The INTTG continue now promoting the glass and all its applications particularly emphasizing the infinite lives of this material. It is especially noteworthy for its circular and sustainable characteristics, which make it 100% recyclable.

A key was delivered to the Mayor of La Granja on 17th May 2022 and another to the Mayor of Berazategui, Argentina in April 2023.

The sister communities involved in Twinning typically have:

- An artisan and artistic tradition: towns maintained by the manufacture of glass by artisans or with a fabric of artists and manufacturers specialized in this material,
- An economic and industrial tradition,



Figure 5.7a, b. The mayor of La Granja de San Ildefonso receives the keys of the towns at the Technological Museum of the Royal Glass Factory of La Granja, May 2022, b) Alicia Durán, Chair of the IYOG, delivering a glass key to the mayor of Berazategui, April 2023.
Source: © IYOG archive.

- An infrastructure for the recycling of glass packaging waste and/or industry for its manufacture,
- Historical links, municipalities that share a past linked to the manufacture of pre-industrial glass and/or have sites from Phoenician and Roman times which demonstrate the use of this material,
- Are committed to the cultural promotion of glass material.

Those countries interested in promoting the INTTG must handle the project by connecting with the towns/cities that are natural candidates because of one or some previous requirements. To formalize this 'twinning', the promoters of the initiative deliver a key made by hand from recycled glass. It is a unique size of 24 cm made by the master glassmakers of the Royal Factory of Crystals of La Granja (FCNV). FCNV will facilitate the model of the key to be fabricated in each interested country with the name of the town engraved. The nomination as Towns Twinned by Glass implies a commitment from the municipality to promote the use of glass in all its applications, to disseminate its applications and circular behavior and to increase and promote the recycling of glass containers and also of other glass uses to ensure the infinite lives of glass. The IYOG website will gather TTG new members promoting the network of towns committed to celebrate the Age of Glass, trying to propose and share activities all around the joined countries.

5.6.2. Encouraging Sustainability

Many activities during 2022 concerned living sustainably. Particular projects are listed below:

- In Bucharest, Romania, students artists were encouraged to use recycled materials,
- The journey of glass in lighting technology was presented to the public in Hungary from the points of view of environmental protection and sustainability,
- Editing a set of video tutorials on using recycled glass for sculptural artwork,
- At a pop-up exhibition in Norway, artists' talks to the public included furnace renovation,
- A glass trash to cashback container recycling/recovery scheme in the Philippines,
- Recovering contaminated sands from industries in South Africa, for use in glass making using analytical facilities in the Netherlands.

5.7. Informing career choices; recruiting the 'best' students

Another Educational Theme within IYOG was equality of opportunity for all, including for example within the academic community. Glass ceilings are evident in the proportion of female academics who attend conferences as invited speakers and in the lists of grant awardees from Government Science Councils. A friendly protest recently occurred at a glass conference in France. A similar issue within the Art Community is a longstanding believe that female artists cannot blow glass, a view challenged by the demonstrations of Maria Bang-Espersen, International Glass prize winner in Belgium 2012. At the Opening Ceremony of IYOG in Geneva there were 10 female speakers and almost 50% of the authors of the book 'The Age of Glass' were female. More than half the attendees at the Opening Ceremony were female.

To encourage an interest in Glass from female students, an IYOG grant was awarded to support a short course in Germany given by female lecturers to a class of female Secondary School students.

In recognizing the role of glass in so many aspects of our live, a group of Glass Experts have come up with a list of the 7 Glass Wonders of the World. More detail is available in Chapter 7. A related study that was started in Australia was to create a map on the Use of Fresnel Lenses in lighthouses; it was initiated by family members of the company that originally manufactured

Figure 5.8. Comics on glass by Adriana Iwata.
Source: © IYOG archive.



these vital products, which remain in use around the world, long after they were made. This project is in progress.

5.8. Report from the Outreach Committee

Written by Mathieu Hubert, Corning, USA (Committee Chair)

To support the promotion of glass in all its wonders, from art to science and manufacturing, an "Outreach Committee" was created for IYOG2022. Regional Organizations were each encouraged to nominate candidates. The Committee constituted over 30 members, including students, artists, scientists from industry and academia, as well as educators from across the world. Many of the activities mentioned in the general observations above are repeated as examples in what follows.

The Outreach group met monthly to present and discuss local outreach activities in their respective ROs. During these meetings, members shared their own experience, challenges, and tips on how they put a spotlight on glass. These regular updates were leveraged to provide guidance and feedback to the other members on how to organize these activities, as well as to give ideas or share material that could be used to communicate with different audiences.

As for the different events organized throughout the International Year of Glass, the discussions held among the Outreach Committee highlighted that outreach is essential at different levels. On the one hand, it is essential within the glass communities themselves– scientific and artistic. Creating and maintaining strong connections between artists and scientists benefits the entire glass community, and many of the events organized in the framework of the IYOG2022 were a wonderful occasion to create more ties. As part of these efforts, an artist portrait of the last winner of the Netflix Show 'Blown Away', John Moran, was conducted by Outreach committee members. His message resonated throughout the efforts of the group, emphasizing "*One of the most important things about glass is the community*".

On the other hand, outreach outside of the "regular' glass community to

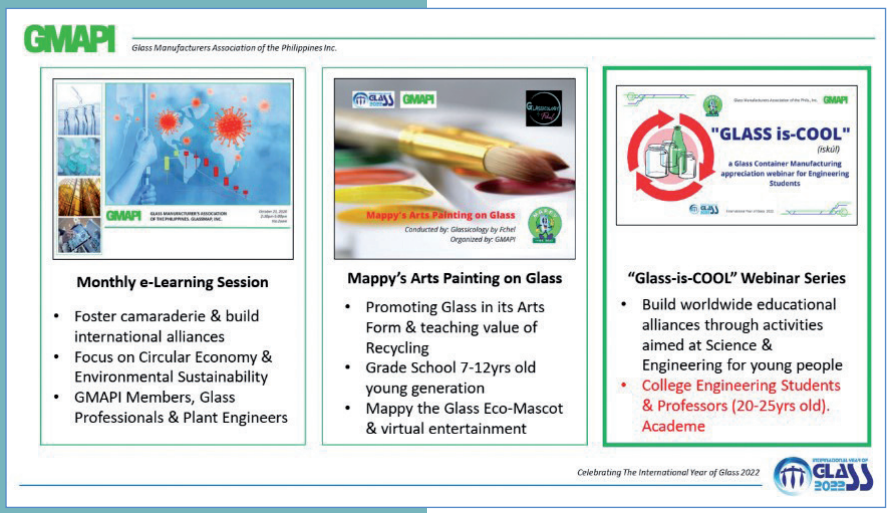


Figure 5.9. GMAPI activities Philippines.
Source: © IYOG archive.

increase awareness on the material and all it has to offer, especially in the framework of the UN Goals towards Sustainable Development, is essential. Glass is a wonderful, versatile material, and a future made of glass requires a strong pipeline of future glass actors, in all the fields related to glass and at all levels. Reaching out to the younger generations, whose awareness on Glass as a material and on all that glass has to offer may be limited at school, was highlighted as a key challenge. Several initiatives specifically aimed at this goal were presented by the various group members and invited guests. The following paragraphs present a few of these initiatives. Rather than a comprehensive review, these highlight some of the successful ways glass has been showcased and hopefully provide tools and inspiration for future activities.

Bringing awareness on material available to everyone for outreach was a key goal, and some wonderful material such as a series of Comics on Glass was a strong example. Initially developed in Portuguese, and now available in English, these comics created by Adriana Iwata introduce in a very didactic, and easily accessible way, various aspects of glass (4 issues on: Glass World; Glass Recycling; Optical Fiber; and Bioactive glasses). These comics are available for free online [9] and have been used for outreach in many countries (illustration courtesy of Karina Lupetti).

In addition, a calendar based on these comics was especially created for the IYOG2022 and distributed to schools in Brazil and at conferences across the world, as an outreach tool. Other examples of outreach activities on glass in Brazil (including theatre plays, concerts, series of lectures/podcasts on art and science) were also presented; a summary is available on the Outreach pages of the IYOG2022 website [10].

Another strong source of inspiration for outreach activities shared during these meetings came from the Philippines (RO16), where the Glass Manufacturers Association of the Philippines (GMAPI) organized many different activities, that were excellent examples of how to showcase glass and the glass industry, and which engaged

the younger generations. Specific emphasis was placed on education in glass recycling and circularity, key themes of the United Nations Sustainable Development Goals.

Activities included e-learning sessions, Painting on Glass events for 7-12 year students to bring awareness on recycling, and a "Glass-is-cool" webinar series aimed at engaging college students and Professors (images courtesy of Rommel Dino).

In Poland, a series of events were organized by AGH (University of Science and Technology, Krakow) to engage a wide audience, covering art and science, including workshops on "Glass miracles" for the junior generation, glass fusing workshops to promote artistic engagements, and Science meetings/ lectures on glass (illustrations courtesy of Iwona Grelowska).

In the US, the organization of the yearly GOMD meeting in Baltimore was used as the perfect occasion to organize an outreach event targeted at local high schools. Volunteer scientists and artists invited 30 students from 3 local public high schools to a local studio, in which they had an occasion to experience an artistic and technical glass blowing demonstration, followed by a career panel where they received direct feedback on what the glass world is and what working with glass means. This format was particularly appreciated by the students (illustrations courtesy of Irene Peterson).

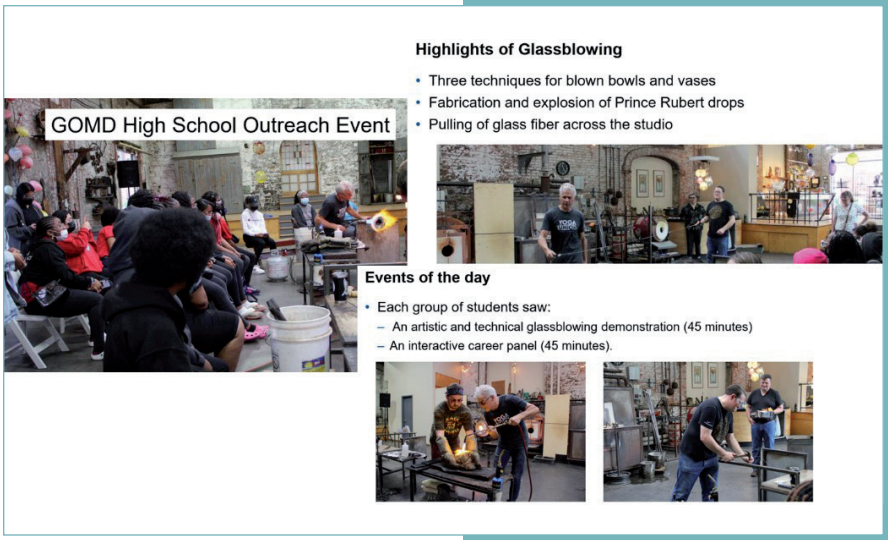


Figure 5.10. GOMD High School Outreach event.
Source: © IYOG archive.

The examples above only represent a snapshot of all the outreach activities that occurred during IYOG 2022. All these activities had one thing in common: they relied on the extraordinary dedication and commitment of volunteers, all passionate about glass and all it has to offer, and their desire to see an awareness of glass grow and our community expand, sustained for the next generations.

Beyond the motivation and energy of educators and volunteers, providing them with the right tools is also critical. As pointed out earlier, reaching out to the younger generations is particularly important to achieve these goals. To support this mission, a special



Figure 5.11. Albright K-12 Forum.
Source: © IYOG archive.

"International Year of Glass: K-12 Educator Forum" was organized in Albright College, Reading PA (USA). Supported in part by IYOG grants, the forum gathered 12 US and 6 international educators (including 2 members of the Outreach Committee). Across the 8-day Forum, this initiative identified a US based cohort of glass science professionals and K-12 educators as forward-thinkers and leaders ultimately to form a Strategic K-12 Glass Science Education Council that could:

- Determine current practice, need and operational strategies in domestic and international K-12 education, specific to Glass Science and Innovation/Personalized Education

As a follow-up and to promote these efforts on the longer term, the Forum proposed the following strategic initiatives:

- Creation of a five-year strategic action plan for the Strategic K-12 Glass Science Education Council (*NB K-12 defines the age group*),
- Identification of how, through strategic partnerships with professional local organizations (International Commission on Glass, American Ceramic Society/Ceramic

and Glass Industry Foundation, and others), such strategies can be multiplied and extended,
- Defining how the inaugural Education Forum (consisting of a set of speakers and workshop activities) can be continued and sustained beyond 2022.

By connecting K-12 educators with the community of glass science professionals, students have the unique opportunity to learn about a specialized field that they might not otherwise encounter in their regular curriculum. This exposure has already shown to pique students' interest in science and technology, potentially inspiring them to explore careers in these fields. This is evident in the source materials and on-going work done by collaborators on this project.

5.9. Summary

The overall philosophy of these many activities was to inspire every age group in every community that Glass is amazing in what it contributes to Society and in particular to emphasize how it contributes to UN aspirations on Recycling & Sustainability, encouraging us all to live SUSTAINABILITY with the target audience being as on a lifeboat – children first!

Much effort was spent on teaching good practice, and good practice in teaching. Participants and organizers' aimed at stimulating imagination, dreaming dreams; fostering research; preserving history for stability of society; maintaining and extending a toolkit of techniques; and how glass with education offers a starting point for new directions.

5.10. Appendix: Educational Activities listed on IYOG web site

Schools

- Albright, USA
- ICG School Montpellier, FRANCE
- School Introduction to Glass Science and Technology, Buenos Aires, ARGENTINA,
- Hybrid school Glass and related materials. Fundaments and Applications, Montevideo, URUGUAY

Seminars

- Youth Leadership Encounter 2022 with the theme 'Climate Justice'; INTERNATIONAL
- HVG-Seminar: Coloring and Refining, GERMANY, Offenbach am Main
- HVG-Seminar: Hydrogen as Fuel, GERMANY, Offenbach am Main
- The glass in ceramic tiles; ITALY, Modena
- Kiln it - Glass Festival; IRELAND, Cork City
- Recycled glass, online workshops; NEW ZEALAND, Whanganui
- Make wall panels from recycled glass; NEW ZEALAND, Wyndham
- Glass well, a historical recovery for future; SPAIN, Sant Joan de les Abadesses
- Concept to Creation with Bob Leatherbarrow; UK, Bristol
- Creative Glass LAB, Serbia, Paracin; SERBIA, Belgrade
- Zujaj - stained glass project with International Community School; JORDAN, Amman
- Glass and Light Engineering; POLAND, Bialystok
- Glass-is-COOL 2nd Session; Coalescence 2022, PHILIPPINES, Manila
- Art Glass workshops conducted by international artist Silvia Levenson; SPAIN, Barcelona
- Casting Workshop with Balázs Sipos in Almadi Art; HUNGARY, Balatonalmádi
- Open Cast with clay; NEW ZEALAND, Auckland
- HVG-Seminar: Formgebung, GERMANY, Offenbach am Main
- Glass Women 2; URUGUAY, Montevideo
- HVG-Seminar: Environmental protection; GERMANY, Offenbach am Main

- The world of glass and glazing, SPAIN, Barcelona, Catalonia
- 4th Session Glass-is-COOL (iskul) with PUP- Taguig Branch, PHILIPPINES, Taguig
- Kiln Casting with Derya Geylani Vuruşan; TURKEY, Istanbul
- Awaken the Beast: Sculpting Animals in Hot Glass with Grant Garmezy; TURKEY, Istanbul
- Course on glass and cold cutting and women's work with glass; URUGUAY, Montevideo
- New Techniques in Turkish Glass Series - Janusz Pozniak; TURKEY, Istanbul
- "First Step to the Business World Program"; TURKEY, Istanbul, Sabancı Univ.
- Glass Lectures in Trento; ITALY, Trento
- EDUCAVIDRO; BRAZIL, Sao Paulo
- Webinar on 3D printed glass; INDIA, Calicut
- Glass for Pharmaceuticals: Innovation and Sustainability, ITALY, Venice

Books published (see Chapter 9 for additional items)

- Vidro Plano para Edificações - "Float Glass - Designing Buildings", BRAZIL, São Paulo
- Bringing glass back to the primary science classroom, UNITED KINGDOM, Bristol
- Reflection on Reflections, BRAZIL, Sao Paulo

Museum exhibitions and Festivals

- Vetro: a window on a story, ITALY, Piazzale Giacomini, 2 Cividate Camuno)
- The Glassy Affair, INDIA, Indore
- Minimuseu do Vidro: Onde a química e os vidros se encontram, BRAZIL, São Carlos
- Historical and contemporary Glassmaking in Walachia, CZECH REPUBLIC, Valašské Meziříčí
- Bringing the Light, ROMANIA, Bucharest
- Multidisciplinary Glass, FINLAND, Nuutajärvi
- The Presence, SERBIA, Zaječar
- 70 Years of the Glass Design Department, HUNGARY Budapest
- Magic of Glass - Glass Objects from the Ethnological Collection of the National Museum Kraljevo, SERBIA, Kraljevo
- VITRUM - Glass in the History of Lisbon, PORTUGAL, Lisboa
- Exposición temporaria: Muestra de Alumnos de los Talleres y la Escuela Municipal del Vidrio, ARGENTINA, Berazategui
- Glass through the Ages Children's Program, LEBANON, Beirut
- Exhibition "GLASSES FROM THE RENAISSANCE TO THE NINETEENTH CENTURY". The Cappagli Serretti donation for the Civic Museums of Ancient Art in Bologna", curated by Mark Gregory D'Apuzzo, Massimo Medica and Mauro Stuttgart, ITALY, Museo Civico Medievale, ITALY, Via Manzoni 4, 40121, Bologna
- Heritage Days - Glass Blowing History in West Virginia, UNITED STATES, Wardensville,
- Vitrofestival, SWITZERLAND, Romont
- A series of 3 public exhibitions in South Korea by 60 Artists from 5 countries with live demonstrations.

Online Activities

- 3rd Session Glass is-Cool: Web. Chem, PHILIPPINES, Bataan Philippines
- Mappy's Arts Painting on Glass Session with Pasong Santol & Pasong Buaya Elementary School, Imus Cavite, PHILIPPINES, Cavite
- Glass-is-COOL Webinar "ChEn Talks: Coalescence 2022", PHILIPPINES, Manila
- Glass-is-COOL Webinar Series, PHILIPPINES, Manila
- Mappy's Arts Painting on Glass, PHILIPPINES, Manila
- Vidrio en España: El gran olvidado. De la Formación a la

Profesionalización, SPAIN, Collado Villalba
- Webinar on research with glass microspheres, INDIA, Calicut

Individual Lectures

- Features of the Structure and Properties of Inorganic Glasses, MOLDOVA, Balti
- Vidros - Um mundo de possibilidades, BRAZIL, Aparecida de Goiânia/GO
- Glass from Phoenicians to the present day, unavoidable and diverse, CROATIA, Zagreb
- Glass: the Eyes of Physics, BRAZIL, São Carlos
- Curso Introducción a la Ciencia y Tecnología de los Vidrios, ARGENTINA, Buenos Aires
- Curso Híbrido Materiales Vítreos y relacionados; Fundamentos y Aplicaciones, URUGUAY, Montevideo
- Dialogo sul Gioiello Contemporaneo in Vetro, ITALY, Accademia di Belle Arti di Venezia - Aula Magna Fondamenta Zattere allo Spirito Santo, 423 - 30123 Venezia
- Reflecting on Glass, INDIA, Mumbai
- Glass in the chemical world, BRAZIL, Ribeirão Preto
- This wonderful World of Glass, RUSSIA, Saransk (Twice)

Open Days

- Mostra Cultural ETEC Presidente Vargas, BRAZIL, Mogi das Cruzes
- CONFERENCE to celebrate IYoG and OPEN DAY in O-I San Gemini glass factory, ITALY, San Gemini
- Life cycle of glass in lighting technology, HUNGARY, Mezőkovácsháza
- Kingswood High School Science Open Night, AUSTRALIA, Kingswood NSW
- The International Day of Light, BRAZIL, Araraquara
- Master Class “The secret world of glass”, BELARUS, Minsk
- The Ceremonial Opening of the School of Artistic Design of Glass “Golden Stained Glass” (Svečano Otvorenje Učilišta za Umjetničko Oblikovanje Stakla “Zlatni Vitraj”), CROATIA, Poreč
- Journée portes ouvertes, SWITZERLAND, Monthey

Other Educational Activities

- Glass -is Cool 2 (Iskul), PHILIPPINES, Bicol, Calabarzon & Mimaropa Clusters
- Short-term professional development course “Functional glass and ceramics: approaches to synthesis”, BELARUS, Minsk
- GGF Skilled Pathways, UNITED KINGDOM, Nationwide
- Il vetro nelle piastrelle ceramiche/ The glass in ceramic tiles, ITALY, Modena
- Glass Comes Alive: Celebrating Interdisciplinary Approaches to Glass, UNITED STATES, Pullman.
- Glass Art Activities at the Escola Massana. Art and Design Centre, SPAIN, Barcelona
- Traditional Glass Blowing Demonstration, UNITED KINGDOM, Rotherham
- Steam Project by Aleko Konstantinov Primary School in Dimitrovgrad, BULGARIA, Dimitrovgrad
- Science and Art of Glass, BRAZIL, São Carlos
- Caithness International Science Festival 2022, UNITED KINGDOM, Wick
- IYoG - Alfred University Summer Institute in Glass Science for Junior High School Students, UNITED STATES, Alfred, NY
- IYOG Picture and Video Contest among Students, GERMANY, Düsseldorf and others
- Glorious Glass Demo Competition, UNITED STATES, Baltimore
- Community Glass Fusing Classes, New Zealand, Wyndham
- Project BRIDGES, PHILIPPINES, Manila
- Şişecam HQ and R&D Center Field Trip, TÜRKIYE, İstanbul (Twice)

- Junior FunGlass school, SLOVAKIA, Trenčín
- XXV SEMAQ - The International Year of Glass: Transpiring The Chemistry, BRAZIL, São Carlos
- FA V Glasgeschichte und Glasgestaltung, GERMANY, Rostock

References

[1] Welcome to the Glass Age. Celebrating The UN International Year of Glass, 2022, published by CSIC.
[2] https://saco.csic.es/index.php/s/kNgckQJ9ZMLQicR.
[3] https://saco.csic.es/index.php/s/b5yNjKi5NcHs7i6.
[4] https://drive.google.com/file/d/120ub80FWpEoIHRV-4hQjJrQsdKE_9ij8/view.
[5] https://vidriocircular.es/en/home_en/.
[6] https://vidriocircular.es/.
[7] http://www.edaddelvidrio.es/en/home/.
[8] http://www.edaddelvidrio.es/.
[9] https://tirinhasdevidro.wordpress.com/2021/03/16/tirinha-19/.
[10] https://www.iyog2022.org/home/young_person-s_committee/.

Teresa Medici

6. Glass in art and museums: Promoting a tangible and intangible heritage for the well-being of communities

6.1. Glass is an important part of the world's cultural heritage

Among the United Nations's 17 Sustainable Development Goals (SDGs) and their 169 targets, culture is only directly mentioned in target SDG 11.4.1, which aims to strengthen efforts to protect and safeguard cultural and natural heritage. Nonetheless, cultural knowledge and institutions have the potential to promote sustainable development across numerous areas. Culture and art are crucial for achieving all goals, with a particular relevance to ensuring healthy living and promoting well-being (SDG 3), enabling inclusive and equitable quality education as well as lifelong learning opportunities (SDG 4), creating inclusive, safe, resilient, and sustainable human settlements and cities (SDG 11), and guaranteeing social inclusion (SDG 16). Cultural services are spaces that promote information, knowledge, experiences, arts, creativity, and a historical perspective towards the future. They can create opportunities to develop a more sustainable society, resilient cities, promote dialogue, equality, equity, and wellbeing.

Resting on these premises, the IYOG2022 offered a unique chance to utilize glass heritage as an efficient tool in our pursuit of sustainable development. It was instrumental in providing support and amplifying the voices of associations, institutions, and individuals who share this objective. It acted as a trigger for fresh glass experiences that involved cultural entities and communities.

To encourage the IYOG Regional Organizations to develop and share



Figure 6.1. Glass panel in pâte de verre. Kimiake Higuchi.
Source: © IYOG archive.



information about glass museums, art, archaeology and history, a working group was formed. The group consisted of representatives from most ROs, the Association Internationale pour l'Histoire du Verre, and ICOM Glass, the International Committee for Museum and Collection of Glass of the International Council of Museums. The MAA&H Group conducted monthly online meetings between February and December 2022. Its participants were:

- Teresa Medici, Chair (RO18 and ICOM Glass)
- Anna Cristoforetti, Secretary (RO8 and ICOM Glass)

Members:

- Karina Omuro Lupetti (RO01: Brazil)
- Francine Giese, Sabine Gysin, Verena Wasmuth (RO02: Germany, Liechtenstein)
- Kun Wang, Zhang Chong (RO03: China)
- Scott Slessor (RO04: Turkey, Greece, Cyprus, Malta, Jordan, Saudi Arabia, Lebanon, United Arab Emirates, Bahrein)
- María Eugenia Diaz de Vivar (RO05: Argentina, Uruguay, Chile, Bolivia, Perú)
- Ruth Moreno (RO06: Costa Rica, México, Guatemala, República Dominicana, Venezuela, Colombia, Ecuador)
- Kathy Jordan, Laurence Sibrack (RO07: USA, Canada)
- Teresa Palomar (RO08: Spain, Portugal, Andorra)
- Aurelier Garbier (RO09: France, Belgium)
- Hiroyuki Inoue (RO10: Japan, Korea)
- Yuanzheng Yue (RO11: Denmark, Finland, Norway, Sweden, Netherlands, Luxemburg)
- John Parker, Jessamy Kelly, Sarah Rothwell, Gina O'Kelly (RO12: UK, Ireland)
- Elena Anisimova (RO13, Russia, Poland, Latvia, Estonia, Kazakhstan)

Numerous museums, studios and glass artists worldwide collaborated with their respective communities, resulting in countless activities.

Of all cultural institutions, museums serve a pivotal role in preserving humanity's heritage for enjoyment and learning. Museums are critical centers for disseminating knowledge and hands-on education on glass artworks. Here, glass art intersects with science, archaeology, history, and social sciences. Glass museums are frequently established in areas with a historical focus on glass production. As the glass industry has declined in these regions, many glassworks have been transformed into community-based cultural centers. These museums aim to promote knowledge, experiences, and creativity, contributing to a more inclusive society.

The IYOG2022 official activities database documented over 250 museum events globally, amounting to more than 20,000 days in total, which equates to almost 60 years. Anticipated visitor numbers for all events totaled 1.4 million, rendering it impossible to highlight all individual occurrences. Therefore, only a select few projects are referenced in notes as examples supporting relevant considerations. Additional details regarding these and other events are available in Chapter 4 of this book and on the dedicated websites. I am indebted to several colleagues who authored reports or shared their personal selections of events: Francine Giese, Sabine Gysin, and Dedo von Krosigk (RO02); María Eugenia Diaz de Vivar (RO05); Manoj Choudhary (RO07); Teresa Palomar (RO08); Yuanzheng Yue (RO11); John Parker, Jessamy Kelly, and Sarah Rothwell (RO12); Elena Anisimova (RO13); Sylvia Fünfschilling (RO14); Lothar Böttcher, Raouf El-Mallawany (RO15); Bronwyn Hughes (RO16) and Marina Uboldi (RO18).

Several museums hosted exhibitions showcasing ancient and contemporary glass, and conferences adopting a multifaceted approach on an unprecedented scale. The primary shared objective was to demonstrate the



Figure 6.2. VERARTE exhibition at the Palace of Nations, Geneva.
Source: © IYOG archive.



Figure 6.3. AltareVetroDesign. Glass design exhibition at the Altare Glass Museum, Italy.
Source: © IYOG archive.

diversity of approaches to working with glass, including art, design, science, and industry, throughout the year. The topics covered ranged from archaeology and architecture to education, history, industry, recycling, and sustainability. Social issues, inclusion, and environmental concerns were leading themes in glass-focused cultural and artistic events held across the world.

Glass art and museums were prominent from the very first IYOG events in February 2022, held at the Palace of Nations in Geneva, Switzerland, for the IYOG Opening Ceremony. Kimiake Higuchi, a Japanese artist, explored the potentials of *pâte de verre* for creating art, inspired by observing nature. The Swiss Glass Forum Verarte organized a presentation of Swiss glass artists. In addition, the Musée Ariana, the Swiss Museum of Ceramics and Glass, offered a guided tour of the exhibition of glass artist Hubert Crevoisier.

Taking this line of thought further, international and national conferences and meetings, held in universities and museums or even on the Internet, brought together key players in the fields of glass heritage, industry, academia, art, and science. Such events often featured a mix of presentations on the latest

developments in glass science and technology along with sessions dedicated to glass art and heritage. Attendees with diverse backgrounds presented their current research projects. For example:

- At the *26th International Congress on Glass* [1], hosted in Berlin, Germany, by the *Deutsche Glastechnische Gesellschaft* in their centenary year. Part of the program was a symposium dedicated to culture, heritage, and education.
- At the conference "*Passion for Knowledge / The Magic of Glass*" [2] organized by the Italian Society for Physics in Bologna, Italy, talks covered glass from archaeology to photonics.
- Speakers from artists, academics and industry discussed the theme *"Glass and its Future in an African Context"*, a symposium at the Tshwane University of Technology (TUT), South Africa, the only tertiary institution in sub-Saharan Africa offering training in glass [3] as a creative medium. Attendees enjoyed live glass blowing demos at the TUT Glass Studio.
- The *International Year of Glass Symposium* [4], at Aalborg University, Denmark, exhibited a diverse program that addressed glass science, technology, applications, building glasses, art glasses and glass history, featuring contributions from glass research, public institutions, and industry.
- The conference *Working with Glass in Belgium* [5], a collaboration between the Royal Institute for Cultural Heritage, the Art & History Museum in Brussels, and the Glass Museum of Charleroi - Le Bois du Cazier, convened representatives from the museum, heritage, industry, academic, artistic, and scientific fields related to glass. This meeting provided participants with the chance to showcase their respective institutions or projects. It was a unique opportunity to share knowledge and ideas regarding the glass industry.
- The international conference "*Glaskunst im Museum: Kontextualisierung, Inszenierung and Storytelling/Glass art in the museum: contextualisation, staging and storytelling*" [6] took place at Frauenfeld, Switzerland, co-organized by Vitrocentre and the Thurgau Historical Museum. The conference shed historical light on panes, windows and stained glass from art, politics, church, and everyday life. It was attended by specialists from Switzerland, Germany, and Italy.

Remarkably, in certain countries the event motivated the establishment of National Glass Days, which gathered

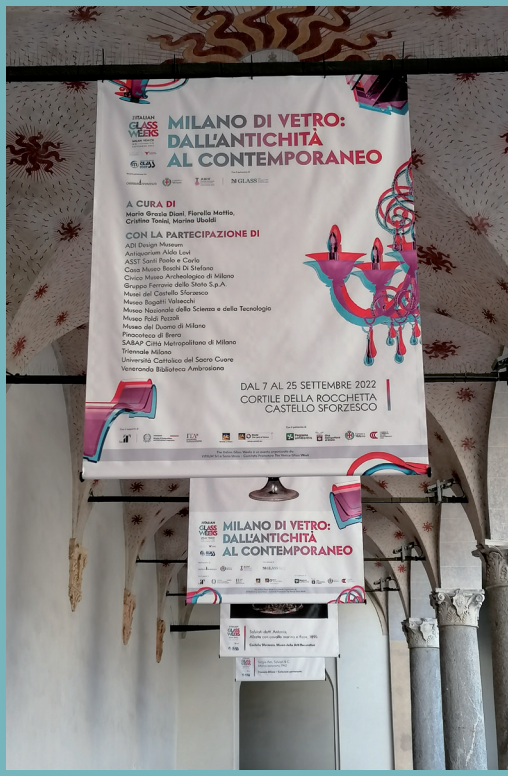


Figure 6.4. Milan of glass: from antiquity to the contemporary photographic exhibition in Milano, Italy.
Source: © IYOG archive.



Figure 6.5a. Library of colors. Fornace Orsoni, Italian Glass Week Venice.
Source: © IYOG archive.

distinguished members from distinct fields within the local glass community.

- A *National Day of Glass Conference* [7] was held in Washington, D.C., to kick off North American-based celebrations, "Art and Glass in Society" being the subject of one of the panels.
- In Italy, two festivals dedicated to the promotion and enhancement of Italian glass - *The Vision Milan Glass Week* [8], a project by VITRUM (the international trade show specialized in machinery, equipment and systems for flat and hollow glass), and *The Venice Glass Week*, organized by a Committee promoted by the Venice Municipality -joined forces to present the major new initiative *The Italian Glass Weeks* [9], including events dedicated to both industrial and artistic glass. The 21st *Italian National Study Days* [10] were held in Genoa, on the theme of *Glass in the Middle Ages*.

The potential of glass as a creative and innovative medium in art, art history, architecture, archaeology, and the sciences has been explored.

- Conference '*GLASS: Vision, Reflection, Imagination*' [11]. The conference focused on RO16 countries, encompassing Southeast Asia, Australia and New Zealand, and the Pacific. The conference included both historical and contemporary perspectives and cross-disciplinary approaches were encouraged.
- The hybrid-format *Craft Scotland Conference 2022 - The Power of Glass* [12], held at the Edinburgh College of Art and the National Museums Scotland (UK), was developed with the desire to not only celebrate the contemporary artistic achievements of glass, but also to highlight and draw attention to a selection of glass artists, makers, and designers who were addressing the challenges of our age by utilizing the visceral nature of the medium to explore narratives related to the subjects of equality, diversity, and inclusion, as well as sustainability and climate awareness. Speakers included artists, designers, and educators.

Exhibitions have celebrated the meeting point of art and science through glass and the integration of glass art and



Figure 6.5b. Exhibition Venini Light 1921-1985, Italian Glass Week Venice.
Source: © IYOG archive.



Figure 6.6. Craft Scotland Conference 2022 - The Power of Glass, Edinburgh College of Art and the National Museums Scotland (UK). Image by Neil Hanna.

new technologies has opened opportunities to address sensitive topics, such as climate change and environmental issues.

- *Charlie Murphy: Brains in a Dish – Creative Responses to Cutting-edge Dementia Research*, Cooper Gallery and The Glass Works Digital Space, Barnsley, UK.
- *To see a world in a grain of Sand* [13], Chrysler Museum of Art, Norfolk, Virginia, US.

6.2. Glass networks: a tool for inclusion and education

The various events sparked lively discussions and fostered numerous new collaborations and friendships. The resulting unprecedented historical partnership between various glass communities, both locally and internationally, made IYOG2022 an exceptional networking opportunity.

According to María Eugenia Diaz de Vivar, from RO05, the International Year of Glass 2022 marked a significant milestone for that region: "*It gathered and mobilized a vibrant community of glass artists —a feat that seemed unattainable before. We aimed to demonstrate to the society the myriad of creative expressions and practical applications that glass offers, and we accomplished this through over 150 events held in the region, including museum openings, congresses, conferences, exhibitions, demonstrations, festivals, and more. The IYOG2022 was a period of unity and celebration of diversity within the realm of glass art. This newly formed network has become a lasting legacy of our commitment to the world of glass*".

In coincidence with the IYOG, a multinational nomination [14] for the inscription of the Knowledge, craft and skills of handmade glass production on the UNESCO Intangible Heritage List was signed by Finland, France, Spain, the Czech Republic, Hungary and Germany. The application was successful, and a positive decision was reached at the eighteenth session of the Intergovernmental Committee for the Safeguarding of the Intangible Cultural

Heritage held in Kasane, Republic of Botswana in December 2023. The Evaluation Body's draft decisions for the Committee's consideration enhance the advantages of an international and interdisciplinary network: "*Inscription would demonstrate how transnational cooperation positively impacts visibility and awareness of intangible cultural heritage, and how collaboration in international networks of specialized museums, educational institutions, collectors and experts benefits visibility. Inscription would also underscore the diversity of this element and emphasize its role in sustaining livelihoods in the submitting States".* The Evaluation Body's also "*commends the State Parties for promoting the active role of museums in safeguarding the element".*

Glass heritage proved to be a powerful tool for increasing inclusion and participation of citizens of all ages and backgrounds, from history to the latest technology. Through the ages, glass has played a role in almost every aspect of human life. Because people are familiar with the material properties of glass, it has an outstanding potential to connect with people in a highly accessible and approachable way.

To maintain relevance in a fast-changing world, cultural institutions ought to involve communities in their operations and devise methods of engagement.

Project FIRE [15] is a glassblowing and trauma-recovery program created by Firebird Community Arts', an arts nonprofit based in Chicago, Illinois (US), that works to empower and connect people through the healing practices of glassblowing and ceramics. The program is designed to help youth injured by gun violence between the ages of 14-21 offering healing through glassblowing, employment, mentoring, and trauma psychoeducation.

Glass exhibitions and festivals provided an opportunity for citizens to appreciate world-class glass art and observe glass artists in action:

- *Condensing Light & Overflowing Color* [16] - 2022, Qingdao International Glass Medium Art Exhibition, Qingdao Municipal Art Museum, China
- *Collector. Lanna's Glass Collection* [17], The Museum of Decorative Arts, Prague, Czech Republic. The collection of glass at the Museum of Decorative Arts in Prague is rightly regarded as one of the best of its kind around the world, detailing the historical development of the art of glassmaking. It owes much to its initiator, the eminent industrialist, construction entrepreneur, collector, patron of the arts, and generous benefactor Baron Vojtěch Lanna (1836-1909), who established and built up this unique set of items from the 1880s onwards. The comprehensive collection presents the development of glassmaking art from Antiquity to the 19th century.
- *Vitrofestival* [18], Vitromusée and Vitrocentre in Romont (CH), with the exhibitions of Simon Berger and the association Verarte. Together with the Centro Studi del Vetro of the Fondazione Giorgio Cini in Venice (Italy) they realized the exhibition "Seguso Vetri d' Arte: Répertoire artistique"; contemporary reverse painting by Silvia Gertsch was shown in the exhibition: "Lumière et contre-jour".
- *The Coburg Prize for Contemporary Glass* [19] exhibition ran in Coburg (D) and provided in its 5th edition an overview of current trends and developments in contemporary glass art. Around 400 artists from all over the world participated in the competition, tackling social issues and concern about the environment.
- At the *Römerfest*, a festival dedicated to Roman life located at the *Augusta Raurica* archaeological site near Basel (CH), "Les Infondues", two French glassblowers, constructed their



Figure 6.7. Glass maker with blow pipe blowing a glass balloon for traditional flat glass production, Germany.
Source: © Glashütte Lamberts. Image included in the UNESCO application.



oven and demonstrated glassblowing techniques. Additionally, nearby, archaeologists communicated their scientific research, showcasing original glass fragments from the Roman era to the public. Demonstrations on how to make beads were also performed.

- The *1st biennial glass art exhibition in IberoAmerica/Primera Bienal Internacional de Arte en Vidrio* [20] was held at the Museo Municipal de Cartago (Costa Rica).
- The *International Festival of Glass* [21] (UK) hosted the *British Glass Biennale* and the *International Bead Biennale* at Stourbridge (UK).
- *Lasiaika - The Glass Age - Exhibition of New Glass Art* [22] exhibited New Finnish glass by 33 contemporary artists and makers at the Nuutajärvi Gallery Cooperative NuGO, Finland.

Online exhibitions and events have encouraged new interactions and partnerships, inspiring collaboration between experts from diverse fields, including artists, historians, archaeologists, museum professionals, scientists, glassworkers, and companies. This collaborative forum fostered the exchange of ideas and facilitated the dissemination and transmission of knowledge, striving to ensure that it is

Figure 6.8. Les Infondues at Augusta Raurica, Switzerland.
Source: © IYOG archive.



preserved for future generations of glassblowers.

- *Objectos con vidrio/Art Glass Objects* [23], a Spanish-speaking platform on glass art created by María Eugenia Díaz de Vivar in Argentina, disseminates online the work of artisans, artists, curators, architects, collectors, and educators,
- The website *"May the glass be with you"* [24], managed by the Spanish artist David Hierro, aims to collect, and show, 365 videos of artists working with glass,
- *Along the glass trail* [25], a virtual exhibition hosted by the Narodni Muzej Slovenije, Ljubljana (Slovenia), shows a selection of the glass collections from Slovene museums, spanning a wide chronology, from the Iron Age to the third millennium,
- Blog "*Glass in Agriculture/Agriculture in Glass*" [26], promoted by AIMA, International Association of Agricultural Museums, explores the ancient and sometime surprising relations between this material and rural life,
- *Les Routes du verre* [27]/*The Glass Routes: Digital atlas of techniques, know-how and glass arts* [28]. The website offers a unique travel experience through France, allowing visitors to explore the fascinating world of glassmaking. From workshops to factories, from artisanal to industrial processes, from high fashion to scientific instruments, from galleries to museums, and from training centers to places of initiation, glassmakers reveal the unexpected richness and diversity of their professions and creative achievements,
- Glasakademin, an organization for Swedish glass artists, had a project together with The Glass Factory about the "*Silent Knowledge within Glass Manufacturing*" [29]. The purpose of the project was to preserve and develop the intangible heritage of manual glass manufacturing by documentation and knowledge-transfer. Several movies and illustrations were produced and published online,
- In December 2022, as part of the International Year of Glass, a

collaborative project between Australian stained-glass artists and the 3rd Regional Office of Fine Arts Department, Ayutthaya, Thailand, started, with the aim of conservation at the Royal Railway Pavilion at Bang Pa-In. Commissioned in 1896 by King Rama V, the substantial building in neo-Renaissance style is decorated with suites of stained-glass. The work will end in the 2024, and is a remarkable outcome, directly attributable to the IYOG2022: it has created not only the long-term viability of an important public museum, but a significant collaboration between conservation professionals in Australia and Thailand.



Figure 6.9a. Noel Orval with co-curators, Dr Alison Inglis and Dr Bronwyn Hughes. LUMINOUS: John Orval, stained glass artist, Hamilton Gallery August-November 2022, Australia.
Source: © IYOG archive.

Promoting gender equality and empowering women and girls was achieved by highlighting the role of female artists and scientists in conferences and exhibitions. Participants networked, gained knowledge, and created new projects, enhancing their careers.

The conference *Congreso Iberoamericano* "*Mujeres en el Vidrio, Artistas y Científicas*" [30], MAVA - Museo de Arte Contemporáneo en Vidrio de Alcorcón (Spain) brought together more than 100 women from Ibero-America (see chapter 4, RO05 and RO08).

Several initiatives aimed at developing glass art students, including various opportunities for them to express themselves in a secure and inclusive setting. Young people received targeted learning experiences and were given the chance to showcase their pieces.

The town of Rheinbach (D) awarded the *11th International Glass Art Prize - Young Talent Promotion Prize.* Glass schools from Germany, Czech Republic, Poland, and Finland took part, contributing to shaping cooperation in the spirit of the European concept [31].

Educational programs focused on glass have been established to benefit underprivileged groups, and community art initiatives have also been arranged.



Figure 6.9b. John Orval, Ganymede, 1972, commissioned for Alan Eustace, loaned from Beleura House and Garden, Mornington, Australia.
Source: © IYOG archive.

SAS Glass [32], a Canadian glass studio supporting NGOs and artists in locations where glass art is undeveloped or non-existent, worked with students from the International Community School in Amman, Jordan. It also fostered the creation of the *ZUJAJ Collective's workshop* [33], providing training, materials and tools local artists didn't have access to. The Mohammad and Mahera Abu Ghazaleh Foundation for Art and Culture (MMAG) offered the collective a free space at their headquarters in Amman to use as a workshop.

The international community mosaic project *Hanging by a Thread exhibitions: Mosaics for Afghan women* [34] brought attention to the world about the social and economic conditions of Afghan women and girls after the takeover of the Taliban. Over 1000 participants from 45 countries

have created a mosaic of 10 x 25 cm to be assembled as mosaic scarves. Participating artists drew inspiration from Afghan motifs embroidered on traditional dresses and made their own interpretation. These small art segments are assembled into a collective artwork. Scarf installations artworks was exhibited in several countries worldwide. The project is promoted by Mosaic for Afghan women worldwide [35], in Australia in conjunction with MAANZ - Mosaic Association of Australia and New Zealand [36] (see chapter 4. RO16).

The history of relationships and knowledge sharing among countries and even continents were investigated.

- Exhibition "*From Bohemia to Buenos Aires*" [37]: Museo del Ladrillo, La Plata (Argentina). The artist Osvaldo Pontecorvo is the only heir in Argentina of the Czech glass carving technique.
- Exhibition "*Luminous: John Orval, Stained Glass Artist*" [38], Hamilton Gallery, Hamilton VIC (Australia) was a major retrospective of the work by Modernist émigré artist John Orval. This exhibition coincided with the 60th anniversary of his first exhibition at the gallery in 1962, believed to be the first solo show of a stained-glass artist ever held in Australasia.
- The exhibition titled "*Fired Up! - Celebrating Southern African Glass Art*" [39] showcased glass art and design in a myriad of creative interpretations at the Pretoria Art Museum, City of Tshwane (South Africa). This seminal show presented historical aspects of glass art and design, and its uses within a southern African context. In collaboration with the WITS Origins Centre, the exhibit revealed how glass beads were used as currency in extensive continental trade routes which were produced in the first furnaces at the tip of Africa. The exhibition also chronicled the story of pioneers and torchbearers in the local hand-made glass industry such as Ngwenya Glass from Eswatini and the Tshwane University of Technology's Department of Fine and Studio Arts. Live demos of glass making and conversations with the artists formed part of the opening festivities. This exhibition also featured a display of contemporary glass artworks by trailblazers who have, and still are shaping the Southern African creative-glass industry.

The State Hermitage Museum in St. Petersburg, Russia held two exhibitions. The first focused on "*Master Ennion: Ancient Glass of the Eastern Mediterranean, First to Fourth Centuries*" [40], and displayed five beautiful vessels made by the renowned glassmaker Ennion, who lived in Sidon (Sayda, today Lebanon) during the first century AD. Along with these exquisite objects, more glass artefacts from the State Hermitage's and Shlomo Mousaieff's collections were showcased. The glass products made in the Eastern Mediterranean workshops reveal the great variety of forms as well as the skills of the glassmakers who worked in this region. The second, "*Spanish Style. Sixteenth- to Nineteenth Century Glass and Textiles in the Hermitage Collection*" was displayed at the Winter Palace. It introduced visitors to some notable examples of the flamboyant Spanish national style and outlined the evolution of the Hermitage's collections of Spanish glass and textiles.

To celebrate the end of the International Year of Glass, a captivating artwork named *WildFire*, created by Natalie Tyler using bronze and glass, was displayed outside the UN Visitor's Centre in New York (US). This work signifies the influence of climate change on the environment.

A Spotify Playlist dedicated to glass and music in celebration of IYOG2022 was compiled by RO11 Members. A QR-code takes you to the playlist.





Figure 6.10. "Fired Up! - Celebrating Southern African Glass Art", Pretoria Art Museum, City of Tshwane (South Africa). a) Opening, b) A piece of cake, Lothar Böttcher, c) Umphakatsi (Royal Kraal) James Magagula (Eswatini).
Source: © IYOG archive.

Several websites were established, some of which are still managed and serve as repositories for events, providing evidence of the interdisciplinary approach taken. They are listed below.

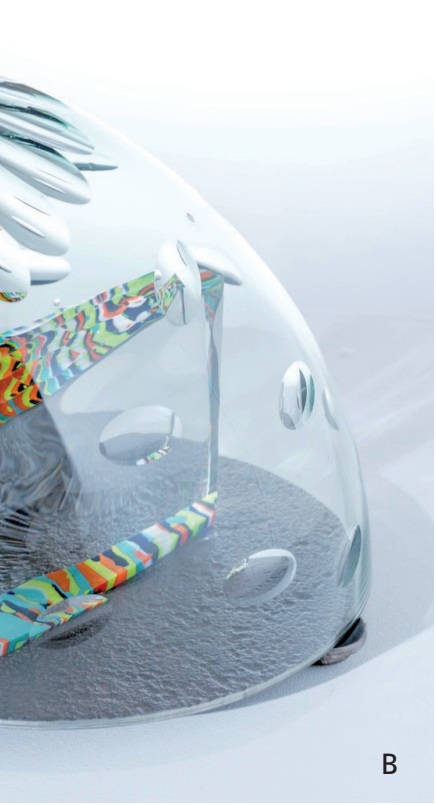
- https://www.anneeduverre2022.fr/ (France)
- https://ceramics.org/iyog/ (US and Canada)
- https://secv.es/iyog/ (Spain)
- https://iyog2022.jp/ (Japan)
- https://iyog2022.ru/ (Russia)
- https://vitrumlife.it/IYOG2022%20/ (Italy)
- https://objetosconvidrio.com/ (in Spanish)

Shattered Glass is a project that gathers and combine glass art and heritage, with museums, international cooperation and networking, developed at the Archaeological Museum of the AUB of Beirut

6.3. Glass Reconstructive Collaboration after the 2020 Beirut Port Explosion

Nadine Panayot Curator, Archaeological Museum, American University of Beirut

In the wake of the devastating 2020 port explosion in Lebanon, one of history's most potent non-nuclear blasts, the



B



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'*Shattered Glass of Beirut*' initiative unfolded as a response to the calamity. Centered around the American University of Beirut (AUB) Archaeological Museum (AM) founded in 1868 and housing artifacts from ancient South West Asia, the project's objective was the recovery, conservation, and restoration of 72 glass vessels shattered in the explosion.

Notably, collaborations with international partners, prominently the Institut National du Patrimoine (INP), France, the British Museum (BM), and Stephen Koob, retiree Chief Conservator from the Corning Museum of Glass (CMOG) transformed the initiative into a multifaceted effort, including recovery operations, intricate puzzle-work, 3D imaging, scientific analyses, and an international workshop. The damaged display case held 74 glass vessels from the Classical and Islamic periods, forming the focal point of this initiative.

Recovery: The first mission involved immediate efforts to seal the damaged room, with a specialist from INP, the AM team. and volunteers sorting and packing fragments for future reconstruction.

Puzzle-Work and Restoration: A second mission, led by glass conservator Claire Cuyaubère (INP), involved intricate



Figure 6.11. WildFire, by Natalie Tyler, displayed outside the UN Visitor's Centre in New York (US).
Source: © IYOG archive.



Figure 6.12. Fragmented archaeological glass is intermingled with glass originating from both the display case and the windows.
Source: © AUB Archaeological Museum.



Figure 6.13. The Archaeological Museum team, volunteers, and Claire Cuyaubère (INP) collecting and sorting glass fragments.
Source: © AUB Archaeological Museum.

puzzle-work and restoration, resulting in the reconstruction of 12 vessels.

Stephen Koob, Chief Conservator Emeritus at the Corning Museum of Glass, collaborated with the AM in Beirut to restore six glass vessels in January 2022. During the restoration, Cuyaubère and Koob conducted a hands-on course on glass degradation, contributing to educational initiatives in archaeology led by Panayot at AUB.

3D Imaging: A collaboration with AUB's Faculty of Engineering produced 3D reconstructions, enhancing the study of damaged glass vessels.

Scientific Analyses: Collaborations with AUB's Department of Physics and the Cyprus Institute provided insights into the manufacturing, origin, and usage of the glass through non-invasive techniques. Further collaboration conducted detailed scientific studies at the BM and UCL, revealing insights into glass composition, production and surface decoration.

International Workshop: The AM hosted a workshop exploring various aspects of glass study, conservation, and digital reconstruction.

Archaeological Museum/British Museum Collaboration: The BM, unable to



Figure 6.14. Stephen Koob and Claire Cuyaubère engaged in the restoration of damaged glass vessels.
Source: © AUB Archaeological Museum.

dispatch a rescue team, provided support by hosting the restoration process in London, emphasizing conservation, training, scientific analysis, and exhibition.

Exhibitions: The restored vessels were showcased in the exhibition "Shattered Glass of Beirut" at the BM's Asahi Shimbun Displays, emphasizing the symbolic value of solidarity and resilience.

The exhibit "Shattered and Restored" at the AM, unveiled in early 2023, showcases 26 reconstructed glass vessels. The display creatively recontextualizes the restored vessels,





Figures 6.15a, b. Initial endeavors in creating 3D reconstructions of the fractured glass vessels.
Source: © AUB Archaeological Museum.



Figure 6.16. Plate fragments reassembled prior to restoration at the BM.
Source: © AUB Archaeological Museum.

symbolizing the resilience of Lebanese cultural heritage and the commitment to safeguarding it amidst challenging circumstances.

6.4. Conclusion

Beyond academic and scientific significance, the Shattered Glass of Beirut initiative symbolizes the resilience of humanity and the solidarity among cultural institutions in times of crisis. The collaboration between the AM and BM exemplifies the role of museums as global citizens in the international heritage community, reinforcing their purpose and impact beyond physical collections and walls.

In this commemorative closure, let us remember that we not only bid farewell to a year celebrating glass but



Figure 6.17. The exhibition "Shattered Glass of Beirut" on display at the Asahi Shimbun Display gallery in the British Museum from August 15 to October 23, 2022.
Source: © AUB Archaeological Museum.



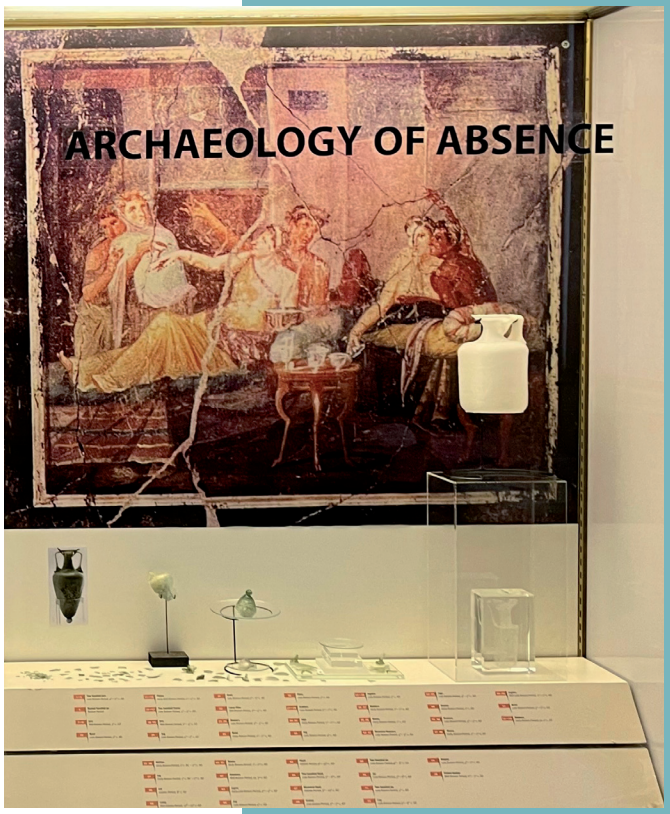


Figure 6.18. The Archaeological Museum at AUB now features a new showcase in its original location. On the left side, restored vessels are presented in a design by Mohamad Kanaan. On the right side, there is an exhibit titled "Archaeology of Absence", designed by Panayot.
Source: © AUB Archaeological Museum.

also mark the advent of a new era: The Glass Age.

This period, symbolized by the global recognition of the significance of glass in our history, present, and future, challenges us to embrace its versatility, innovation, and its role as a catalyst for human progress. Looking forward, let us move towards a horizon where the glass becomes more than a material; it becomes the thread that links pasts, presents, and futures, for generations to come. May the Glass Age witness the integration and flourishing of this legacy in the ongoing narrative of humanity.

References

[1] https://icglass.org/latest-news/26th-international-congress-on-glass/.
[2] https://www.sif.it/corsi/passionforknowledge2022.
[3] https://cgs.org.uk/news/a-window-into-contemporary-glass-in-southern-africa/.
[4] https://www.bio.aau.dk/aau-hosts-united-nations-symposium-on-everything-glass-n21704.
[5] https://www.kikirpa.be/en/events/glass-in-the-spotlight.
[6] https://historisches-museum.tg.ch/angebote/veranstaltungskalender/detailseite-events.html/7787/event/31499/eventdate/44026.
[7] https://historisches-museum.tg.ch/angebote/veranstaltungskalender/detailseite-events.html/7787/event/31499/eventdate/44026.
[8] https://vitrumlife.it/es/milanglassweek/archivio-glass-week/.
[9] https://theitalianglassweeks.com/en/.
[10] https://www.storiadelvetro.it/wp-content/uploads/2022/05/2022_AIHV_pieghevole3ante_03.pdf.
[11] https://glassvisionreflectionimagination.com/.
[12] https://www.craftscotland.org/about/projects/craft-scotland-conference-power-glass-2022.
[13] https://chrysler.org/exhibition/to-see-a-world-in-a-grain-of-sand/.
[14] https://ich.unesco.org/en/18com.
[15] https://www.firebirdcommunityarts.org/what-we-do/project-fire.
[16] https://www.youtube.com/watch?v=VpxRZNckX2A.
[17] https://www.upm.cz/collector-lannas-glass-collection/.
[18] https://vitrofestival.perron2.ch/en/vitrofestival-2022.html.
[19] https://www.coburger-glaspreis.de/en/home/.
[20] https://objetosconvidrio.com/primera-bienal-internacional-del-vidrio-en-iberoamerica/.
[21] https://objetosconvidrio.com/primera-bienal-internacional-del-vidrio-en-iberoamerica/.
[22] https://www.kirstitaiviola.com/2022/05/26/lasiaika-exhibition-in-nuutajarvi/.
[23] https://objetosconvidrio.com/categor%C3%ADa/2022-iyog/.
[24] https://www.maytheglassbewithyou.com/.
[25] https://www.nms.si/en/exhibitions/online/11049-Along-the-Glass-Trail.
[26] https://www.agriculturalmuseums.org/2022/10/09/agriculture-the-international-year-of-glass-2022/.
[27] https://routesduverre.fr/.
[28] https://www.anneeduverre2022.fr/routes-du-verre/.
[29] https://www.glasakademin.se/ansokan-till-riksantikvarieambetet.
[30] https://objetosconvidrio.com/congreso-iberoamericano-mujeres-en-el-vidrio-artistas-y-cientificas/.
[31] https://glaskunstpreis-rheinbach.de/.
[32] https://sasglass.ca/.
[33] https://sasglass.ca/IYOG.php.
[34] https://mosaicandglass.com/2022/11/hanging-by-a-thread-mosaics-for-afghan-women/.
[35] https://www.facebook.com/mosaicforafghanwomen/.
[36] https://maanz.org/.
[37] https://objetosconvidrio.com/inauguracion-de-la-muestra-de-bohemia-a-buenos-aires-del-artista-osvaldo-pontecorvo-en-el-museo-del-ladrillo-la-plata/.
[38] https://www.hamiltongallery.org/events/john-orval/.
[39] https://lotharbottcher.com/2022/09/fired-up-celebrating-southern-african-glass-art/.
[40] https://www.hermitagemuseum.org/wps/portal/hermitage/what-s-on/exhibitions-archive/.

Teresa Palomar and Lothar Böttcher

7. Glass wonders

The '*7 Glass Wonders*' was an activity developed by the Museums, Art, Archaeology and History Group (MAA&H) during and for the IYOG2022, whose result was announced at the closing ceremony in Tokyo on Dec 9, 2022. It was coordinated by Teresa Palomar, researcher from VICARTE (Portugal) and ICV-CSIC (Spain), and Lothar Böttcher, artist and curator (South Africa).

This project was to select seven objects, buildings or places in the world where glass is the protagonist and plays a fundamental role. With this goal, each proposal was assessed according to its originality, innovative character and historical, cultural and industrial importance.

Glass professionals from different areas such as arts, architecture, science and industry formed the prestigious international jury. After weeks of deliberation, the jury agreed that the 7 Glass Wonders were:

7.1. Glass from the Tomb of Tutankhamun, currently at the Egyptian Museum, Cairo and, from 2023 also at the Grand Egyptian Museum, Gizeh (Egypt)

The Middle East is the origin of glass making. More than 3,500 years ago, practitioners in modern Turkey, Iraq, Egypt and other places succeeded in producing outstanding, colorful glass objects and vessels. Only in Egypt, however, in the tombs of the Pharaohs,



Figure 7.1. Some examples of the glass from the Tomb of Tutankhamun, the Egyptian Museum, Cairo, and the Grand Egyptian Museum, Gizeh, Egypt.
Source: Ch. Eckmann, Römisch-Germanisches Zentralmuseum, Mainz.

did these items survive without any wear. Some look as bright as if they had been made yesterday. This is particularly true for the finds from the tomb of Tutankhamun, which was discovered in 1922, more than 3,300 years after his death. The treasure of glass artefacts from the tomb is exceptionally exquisite, ranging from thousands of elaborate glass inlays, that not only adorn more than 150 pieces of jewelry but also the king's throne, weapons and even chariots, to full-scale head rests made entirely of glass. The blue stripes on the mummy's mask also consist of glass —some more than 50 cm long— and demonstrate a superb level of glass technology even at this early stage of its history.

7.2. Lycurgus Cup, The British Museum, London

This cup displays a miraculous color effect. Under normal lighting, the glass appears jade green, but when lit from behind, it turns ruby red. Scientists have discovered that this phenomenon is due to gold and silver nanoparticles in the glass. While ancient Romans certainly had no concept of nanotechnology, they were able to use its effects in ways that could not be replicated for millennia. As amazing as its color, is its relief cutting. Three-dimensional figures of King Lycurgus, the God Dionysos and others have been carved from a thick-walled



Figure 7.2. Lycurgus Cup, The British Museum, London.
Source: © The Trustees of the British Museum.

blank. The cup was one of the most luxurious glass vessels of Roman times, a cage-cup, where the glass blank was painstakingly created to leave the motif, as a "cage", suspended above the surface. The Lycurgus cup is one of the few with figures and is among the best-preserved.

7.3. Sainte-Chapelle, Paris, France

Stained-glass windows in Medieval churches collect the outside light and turn it into shapes that glow with the most striking colors inside the church. Windows



Figure 7.3. Sainte-Chapelle, Paris, France.
Source: Daniel Parks.

are often prominent in Gothic cathedrals, but in no other medieval building are the windows as dominant as in the Sainte-Chapelle. It was commissioned by King Louis IX of France as the royal chapel and built in record time from 1242 to its consecration on 26 April 1248. Together with the rose window, 15 stained-glass windows cover a surface area greater than 700 m². 1,113 biblical scenes tell the story of the world from its beginning to the arrival of the relics of the Passion of Christ in Paris. While much of the glass has had to be repaired over time, nearly two-thirds of the glass panes are still original, dating back nearly 800 years and truly forming walls of light.

7.4. The Ware Collection of Blaschka Glass Models of Plants, Harvard University, Cambridge, Massachusetts, USA

The Blaschkas brought the art of flame-working glass to a peak and



demonstrated that anything in the natural world could be imitated perfectly in glass. This exceptional collection, better known as the "Blaschka Glass Flowers", was commissioned by George Lincoln Goodale, the first director of the Botanical Museum at Harvard. Leopold (1822-1895) and Rudolf Blaschka (1857-1939) were a father and son team of Bohemian glass artists active in Dresden, Germany. They were already renowned for their invertebrate glass models, known to educational institutions and museums around the world before they commenced on their epic and intricately detailed glass models of plants. Over fifty years, from



Figure 7.4. The Ware Collection of Blaschka Glass Models of Plants, Harvard University, Cambridge, Massachusetts, USA.
Source: Allie_Caufield, Curious Expeditions, Lothar Böttcher.



Figure 7.5. The Corning Museum of Glass, Corning, New York, USA.
Source: The Corning Museum of Glass.





Figure 7.6. Global network of optical glass fibres.
Source: Gerd Atmann from Pixabay.

1886 to 1936, they produced 4,300 glass models representing the finest details of 780 plant species.

7.5. The Corning Museum of Glass, Corning, New York, USA

The largest glass collection in the world, combined with a library that seeks to build a comprehensive collection of books, archival and rare materials about glass, and a studio where artists teach their art of glassmaking: This outstanding institution was originally conceived by Arthur A. Houghton, Jr. (1906-1990), whose family-owned Corning Glass Works, now Corning Incorporated. The Museum opened its doors in the small town in the Finger Lakes region of upstate New York in 1951. Despite its distance to large cities, it welcomes more than a quarter of a million visitors from all over the world each year. The museum is an independent non-profit institution that preserves and expands the world's understanding of glass, with an educational and aspirational mission: to inspire people to see glass in a new light.

7.6. Global network of optical glass fibers

A glass rod, when heated, can be pulled into an ever thinner and seemingly endless glass thread. It was known since the 19th century that these fibers could transport light, but it took until the 1960s for researchers such as Charles Kuen Kao to set the stage for a technological revolution. Since the 1970s, glass fibers about as thick as a human hair are being used to transport huge quantities of information, functioning, in simple terms, as light bouncing in a tube. The network of optical fiber is ever expanding throughout the world. This extensive and invisible network of cables stretches over 1.2 million kilometers globally, delivering emails, news, your favorite films and cute videos of cats almost instantaneously.

7.7. Hubble Space Telescope

The Hubble Space Telescope is the first dedicated observatory launched and deployed into orbit by the space shuttle Discovery on 24 April 1990. Two mirrors, made of ultra-low expansion glass (kept at 21°C to avoid warping) offer Hubble its optical capabilities. A primary glass mirror of 2.4 m diameter and weighing approximately 800 kg reflects its light on the 0.3 m secondary







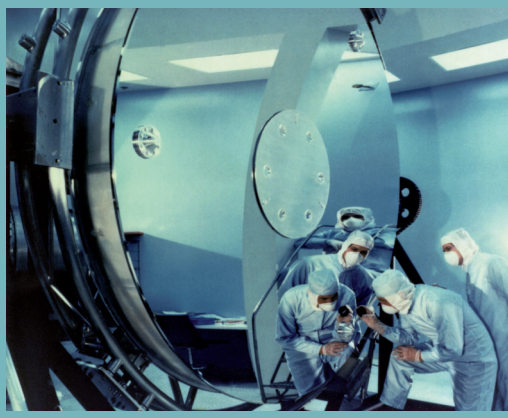


Figure 7.7. Hubble Space Telescope.
Source: NASA Hubble Space Telescope.

mirror. Hubble has revealed crystal clear views of our universe—from distant stars and galaxies never seen before, to detailed observations of the planets in our solar system. Many Hubble observations have led to breakthroughs in astrophysics, such as determining the rate of expansion of the universe. The Hubble Space Telescope is an international collaboration between NASA and the European Space Agency (ESA) and has made more than 1.5 million observations during its 30 years of service.

7.8. Other glass wonders

The selection was very hard because more than 50 objects, buildings and places from around the world were proposed, all of them wonderful suggestions that should also be eligible to be one of the 7 Glass Wonders.

In the world, there were different buildings and regions related to glass. Jena Glass Ensemble and Marinha Grande Region were two areas that have been related to glass since several centuries ago. The city of Jena (Germany) is the cradle of modern glass science and optical glass technology. It witnessed how the collaboration of Abbe, Zeiss and Schott gave birth to modern optics, and numerous historical sites are accessible throughout the city, telling the interwoven histories of glass and optics. Nowadays, the city has: the world's highest density of industrial glass producers; two universities and three major research centers where more than 50 glass-related research groups are assembled all exploring the frontiers of glass science; optical glass applications and device manufacture; and the Deutsches Optisches Museum,

which holds the world's largest and most significant archive of objects made from optical glasses. For example, it has: personally dedicated gifts by Joseph Fraunhofer; the very first apochromatic objectives; an extensive collection of early research microscopes including numerous prototypes; the first and only surviving example of the multispectral camera used in space; and the world's largest collection of historic spectacles with about 20,000 pieces.

Alongside this, the Marinha Grande Region (Portugal) was the major productor of glass in Portugal in the past (for instance through the Real Fábrica de Vidros da Marinha Grande), and it is nowadays the largest producer of bottles or glass containers (wine, beer, water, etc.) in Europe. The large facilities of glass container manufacture were represented by Fábrica de Vidros Santos Barosa & Companhia Limitada, which has now become the Vidrala Santos Barosa, Museu Santos Barosa and the Galo factory.

The Murano Island (Italy) is also famous for its glassmaking. Murano's reputation was born when the Venetian Republic decided to relocate the glassmakers and their furnaces to the island in 1291, to avoid fire hazards and protect the city's mostly wooden buildings. For centuries, Murano's glassmakers had a monopoly in high-quality glassmaking, developing and improving many techniques for making clear glass, enameled glass, glass with gold threads, multicolored glass, milk glass and imitation gemstones. Murano glass still represents the art and skill of Venetian glassmakers.

The Royal Glass Factory of San Ildefonso (Spain) is the most important European industrial building from the Illustration period used as a glass factory. It was built by order of Spanish King Charles III in 1770 in an environment declared the Biosphere Reserve. One of the most important characteristics is that the building has been preserved for its original function, the creation of high-quality glass objects for around three centuries. Currently, the building houses the furnaces for hand-craft production and the ateliers for decoration (gilding, enameling…), together with the Technological Museum of Glass and the School of Glass.

Glass manufacture is also important in Bida (Nigeria), where the Masagá community of glassmakers focuses on a nearly extinct craft that has been superseded by modern machines. They are renowned for their production of glass beads made from recycled glass and from locally manufactured raw glass known as bikini. Bikini, a molten glass, served as the main glass for centuries; but due to the difficulty of sourcing raw materials, the production of bikini glass was replaced with easily sourced recycled glass. It is a powerful message of sustainability that highlights solutions through necessity.

Besides the glass regions, around the world are magnificent buildings and incredible structures in which glass has been used in unbelievable ways (chapter 10.2).

The iconic Louvre Pyramid (Paris, France) was designed by the Chinese American architect Ieoh Ming Pei. Pei's requirements included mechanical strength, transparency and color. Saint-Gobain was asked to carry out this project. A classic soda-lime glass with a very low iron content was chosen. To avoid any residual tint, the glass was bleached with selenium. It was processed and laminated at the Saint-Gobain factory (Aisne), then tempered and polished in England. The glass was then laminated: two sheets of glass of 10 mm each sandwiching a thin sheet of polymer. The pyramid was inaugurated in 1989.

Lina Bo Bardi's Glass House (São Paulo, Brazil) is considered an icon of modern Brazilian architecture. It has been the residence of the Bardi couple for over 40 years, and, since its opening in 1951, a meeting point for artists, architects and intellectuals. Its main glazed facade, supported by slender metallic pillars, was close to the ideals of the Modern Movement and the promise of the use of industrialized materials. (chapter 10.2)

The Skywalk Bridge at the Grand Canyon West and the "White Dragon" Bridge in Vietnam are examples of glass strength. The Skywalk Bridge at the Grand Canyon West (USA) is a 10-foot-wide horseshoe-shaped bridge that extends 70 feet out over the rim of the Grand Canyon and provides a breathtaking, clear view to the Canyon floor 4 000 feet below. The Skywalk is strong enough to hold 70 Boeing 747 jumbo jets at full capacity. On the other hand, the Bach Long or "White Dragon" Bridge in Vietnam is the longest glass-bottomed bridge in the world. The bridge is suspended 150 meters above the jungle in Vietnam's northwest Son La province and stretches 632 meters, of which 290 meters is a free-hanging suspension bridge between the mountains and 342 meters is along the edge of a cliff.

There are several skyscrapers around the world that are covered by glass. The highlight is the Burj Khalifa in Dubai, which is the world's tallest building and is covered almost entirely with glass. At 829.8 m tall and with a glass surface area of 120 000 m^2, the Burj Khalifa can be considered one of the architectural marvels. And the Shard, also referred to as the Shard London Bridge and formerly London Bridge Tower, is a 72-storey skyscraper, designed by the Italian architect Renzo Piano. It forms part of The Shard Quarter development in London (UK). Standing 309.6 metres (1 016 feet) high, the Shard is the tallest building in the United Kingdom and the seventh tallest in Europe. For its erection, some path-breaking engineering methods were used, such as top-down construction, where foundations are dug while the core is built up. The panels, in total cover an area of more than 56 000 m^2 and are made of low iron glass with internal blinds. The glass was manufactured in Germany and the panels assembled in the Netherlands.

The National Library of Belarus is also covered with glass panels. During the day, all its 24 sides sparkle in the rays of the sun like a real diamond, and during the night 4646 color changing RGB LED fixtures create a stunning light show.

The futuristic design of Istanbul Radio and TV Tower (Turkey), rising 369 m, shows the important role of glass which produces a spatial continuity between the interior and the exterior through the opacity and contrast offered in the facade setup.

The Baha'i Temple in Santiago, Chile, was designed by Hariri Pontarini Architects of Toronto (Canada). Its external shell consists of over 10 000 cast glass (borosilicate) translucent panels, which were fabricated by Jeff Goodman Studio of Toronto. Glass connects a building to its environment and lends a sense of space like no other material can.

The Museum Hotel Antakya is an example of how glass helps to amalgamate a conventional hotel and the archaeological findings that appeared during the excavation.

The Photovoltaic Building of the 8.5g Tft-LCD Float Glass Production Plant is the largest single thin-film photovoltaic building in the world, covering an area of 255,000 square meters. 67,295 pieces of CIGS and CdTe photovoltaic glass, with an installed capacity of 10MW, are used as the major materials for the façades and roof of the building. The annual cumulative power generated by the photovoltaic glass is over 11,000,000 kWh, meeting 50% of the plant's electricity demand. During its 25 years of operation, this building may have reduced carbon dioxide emissions by 265,000 tons. Being low-carbon, aesthetically beautiful and economical, it is a perfect epitome for the important role glass has in sustainable development.

The Cafesjian Center for the Arts (Yerevan, Armenia) is located in the Yerevan Cascade. There, over 5 000 works can be found, mainly from Gerard Cafesjian's collection, making it the best modern art museum in Yerevan. The "Cafesjian Art Galleries" include the famous "Swarovski Crystal Palace", the stunning collection of Vincent Van Duysen, which treasures interesting creations and designs using glass and metal sculptures.



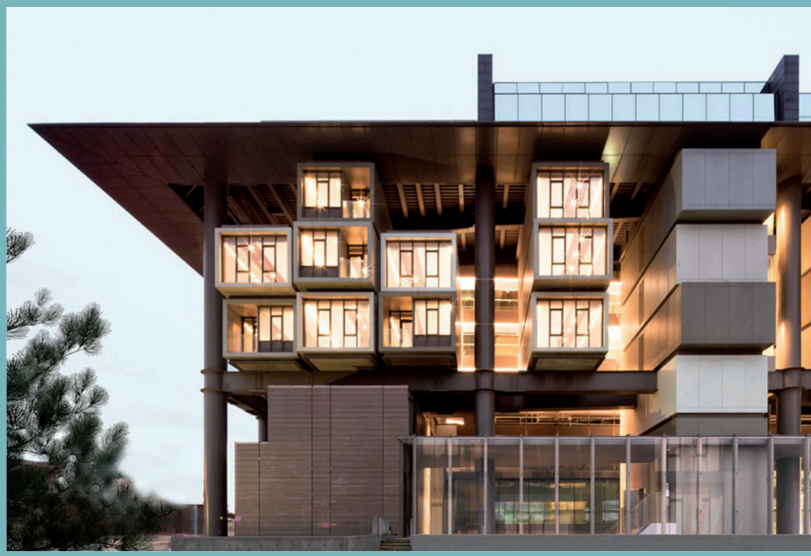






Figure 7.8. Glass used in buildings. The Baha'i Temple in Santiago (Chile), the Museum Hotel Antakya (Antakya, Turkey), the Temple of a Million Bottles or Wat Pa Maha Chedi Kaew (Thailand), Dolmabahçe Palace (Istambul, Turkey).
Source: © IYOG archive.

The Rakow Research Library in Corning (USA) houses an unprecedented collection of literature and materials documenting centuries of human interaction with glass, with the commitment to make these resources as widely available as possible to advance scholarship, artistry, craftsmanship, learning, and general awareness of glass and glassmaking.

Regarding building decoration, we should mention the Schmelzzimmer in the New Palace in Arnstadt (Germany, Thuringia); thousands of white, yellow, red, blue and green glass beads —opaque and translucent— are embroidered on silk, velvet, damask and brocade decorating a wall area of approximately 50m^2. The crystal staircase in the Dolmabahçe Palace (Istanbul, Turkey) forms a wonderful 18th-century combination of crystal bannisters, a chandelier and a vault of cast iron and glass produced by British firms; it represents the most advanced construction of its type for the time. In Saint Petersburg, Russia, the Metro Station Avtovo is decorated with 16 columns lined with decorative pressed glass with reverse relief ornamentation made by Evgeny Levinson and Andrey Grushke, which turns the station into an underground Crystal Palace.

The Sheesh Mahal, also known as "The Palace of Mirrors", is located within Jahangir's Shah Burj block in the northern-western corner of the Lahore Fort (Pakistan). It was constructed in the reign of Mughal Emperor Shah Jahan in 1631-32 by Mirza Ghiyas Begh. The ornate white marble pavilion's walls are decorated with frescoes and are inlaid with *pietra dura* and complex mirror work known as ǧna-kǧi. Sheesh Mahal was reserved for personal use by the imperial family and close aides. A similar construction is the Shish Mahal (1631-40 AD) in the Agra Fort in Uttar Pradesh (India); built by Mughal Emperor Shahjahan as a part of the summer palace, its walls and ceiling are covered by glass mosaic work. These glass pieces have a high reflectivity which glitter and twinkle in a thousand ways in its semi-dark interior. The glass was imported from Haleb of Syria.

The Great Umayyad Mosque of Damascus (Syria) built between about 706 and 714/15 CE is the oldest surviving mosque that still preserves large parts of its original architecture and decoration. It is estimated that the original mosque had the largest area of gold mosaics in the world, covering approximately 4,000 m^2 and mostly made with glass tesserae from Egypt. In this same line, the mosaics in the King's Church of St. George in Oplenac (Serbia) is the most significant example of monarchical representation in glass art in the Balkans. It is more than 3,500 m^2 and was created by the Vereinigte Werkstätten für Mosaik und Glasmalerei, Puhl & Wagner in Berlin for an order from the Yugoslav king Aleksandar I Karađorđević. And, Thai Buddhist monks, seeking to help with waste disposal and looking for a greener lifestyle, built Wat Pa Maha Chedi Kaew (Thailand), also known as the Temple of a Million Bottles, using more than 1.5 million green and amber bottles.

Along similar lines, the Amber Cullet Marker stands at what used to be a dumpsite for Mandaue City (Cebu, Philippines). It started in 2019 as an initiative of San Miguel Brewery Inc. who adopted and converted 2 hectares of the dump to an EcoPark; other SMC subsidiaries are now involved, including SMYPC Cebu Glass Plant. The Marker is in the shape of the famous San Miguel Pale Pilsen Beer bottle and is made up of cement mixed with 100 kgs of broken glass (cullet), gifted by SMYPC Cebu Glass Plant from raw materials intended for making glass bottles. It showcases the perpetually recyclable, sustainable and earth-friendly nature of glass, as well as its versatility and compatibility with other useful materials.

Not only can buildings themselves be extraordinary monuments to glass, but stained-glass windows also decorate thousands more around the world (chapter 12.2.3).

In South America, the most representative stained-glass windows are located in the Mill Building (Argentina), the Military Circle of the Palacio Paz (Argentina), the Courts of Justice Palace

of Santiago (Chile), and the Temple of Maipú (Chile).

The Mill Building has 2,000 m^2 of stained-glass windows representing scenes from Don Quixote and nine more based on the lithographs of the Frenchman Gustave Doré (1832-1883). In these works, the color of the glass takes a back seat, because what is notable is the exquisite painting work. The detail of the folds of the clothes, the texture of the fabrics, the shadows that generate life, all show a virtuoso use of grisaille and enamels.

The dome of the Military Circle of the Palacio Paz, located in Buenos Aires, is impressive, not only because of the place where it is located but also because of its history. The stained-glass windows were brought from Paris and the Palace was the most important construction of the time in Argentina.

The stained-glass window of "La Justicia" was installed at the beginning of 1900 in the Courts of Justice Palace of Santiago. Its 58 panels form a half arch 10 m wide and 5 m high and were made by the Mayer Atelier in Germany. The importance of such windows is not only the techniques used but also the interpretation of its origins and the meaning behind its symbology, dealing with issues such as justice, the republic, agriculture, industry and abundance.

In 1966, the stained-glass windows of the Temple of Maipú were commissioned by the Austrian-Peruvian artist Adolfo Winternitz. They refer to the Virgin Mary, the sacraments, evangelical parables and the geography of Chile. The central stained-glass window in the tower is 300 m^2 in size, 29 m high and 12 m wide. The execution was carried out in a factory in France, under the direction of a Swiss firm from Lausanne, using colors with more than 100 shades.

In Asia, the Dome of Light in Taiwan (China) is glass, 30 m in diameter and 680 m^2 in area; it covers the central MRT Station (Formosa Boulevard) at the concourse level in Kaohsiung Taiwan. The Dome was commissioned by the KRTC (Kaohsiung Rapid Transit Corporation) to Narcissus Quagliata in 2002, and the project was realized at the Derix Glass Studio in Germany between 2004 and 2007; it was inaugurated in 2008. Narcissus Quagliata utilized a combination of traditional and non-traditional techniques to create one single, uninterrupted composition of the universal themes of Creation, Life and Conflict, as well as archetypal images of aspects of the human condition such as Intelligence, Love, Art, War, Pain, Dreams among others.

In Europe, the Palace of Catalan Music (Spain) houses the most singular and original skylight from Catalonian Modernism. The stained-glass window was created in the atelier Rigalt, Granell and Company. The singularity of this work is that it was built as an inverted dome and represents a great flaming sun surrounded by forty maids. It is 5 meters in diameter, covering a total surface of 60 m^2. 2,600 blown roundels with different diameters were used to create the sun with a wide range of ochres, from the darkest to the lightest, providing great luminosity to the room while giving a mystical atmosphere similar to a Gothic temple.

The Cathedral of León (Spain), located on the Way of Saint James or Camino de Santiago, has one of the world's most important medieval and Renaissance collections of stained-glass windows. A total of 737 stained-glass windows decorate around 1,800 m^2. The windows were made predominantly by French glaziers, some of them with ateliers in Burgos (Spain), together with windows made in Flanders and Central Europe.

In Portugal, the stained-glass windows designed by Almada Negreiros (1893-1970) are a unique set of Iberian modernism, with nothing equivalent in the rest of the world; they form a collection that adds in an unrivalled way to the world's artistic heritage and transcends Portuguese geographical borders.

In the United Kingdom, the Rose Window of the South Transept of York Minster is the best-known stained-glass window in England. The glass was commissioned late in the 15th century,

to mark the end of the Wars of the Roses and honor the house of Tudor. Others date it later suggesting that the glazing seen today was conceived and produced c. 1515. The design of the outer panels contains two red Lancastrian roses, alternating with panels containing two red and white Tudor roses and commemorating the union of the Houses of York and Lancaster. Some suggest that the glass was inserted to illustrate and enforce the legitimacy of the new ruling house of Tudor. In 1984, a fire (caused by a lightning strike) started in the wooden roof of the minster. This caused the panels of the Rose window to shatter into more than 40 000 pieces, which fortunately remained in place, though, and restoration was possible.

In Saint-Petersburg (Russia), the stained-glass windows at the Institute of Silicate Chemistry of the Russian Academy of Sciences, designed by Anatoly Vasilyevich Pelipenko, tell of the history of glassmaking. Twelve large stained-glass windows show images of artisans and alchemists, craftsmen and scientists who enriched their time with discoveries of new glasses and technological methods of working with them. There are the figures of outstanding Russian scientists M.V. Lomonosov and D.I. Mendeleev, who made a special contribution to the study of the nature of glass and its properties. All stained-glass windows are made using the technique and technologies of the 12th-13th centuries from hand-rolled colored glass, dyed in its bulk during melting, with abundant painting, and held in place by leading with an H profile.

Finally, in Oceania, the ceiling of the Great Hall at the National Gallery of Victoria is the largest one made by the *dalle de verre* technique. It comprises a matrix of 'Alumply' on steel pillars and beams. The designer, Leonard French OBE (1928-2017), cut and fixed with epoxy resin French and Belgian glass from 1963 to 1968. Its abstract design symbolizes Birth and Creation in colors that evoke the earth and the sky with subtle references to mandalas, turtles, doves and Hindu creation myths. It combines the modern revival of Australian stained glass with the gravity of medieval glass.

And the Temple Beth Israel (St Kilda East, Melbourne, Australia) has the windows "Our story, past, present and future". Several techniques were used to produce them, working with the colors, sculptural forms within the glass, the designs, imagery and symbology. The steel frameworks complement them perfectly. Over all these windows are so broad in visual impact and stories are deeply imbedded.

Several objects were also selected for the 7 Glass Wonders competition, due to their historical and artistical context or the difficulty in their technical production.

The Portland Vase is a Roman cameo glass vase (ca. 1st cent. AD) located in the British Museum (UK). The body of the vase is a cobalt blue glass covered with white glass that has been carved, creating a sculptural ensemble. The imagery is possibly related to the story of Peleus and Thetis. The same technique is observed in the Blue Vase of Pompeii, located in the Naples National Archaeological Museum (Italy). It is a vase shaped like an amphora for wine. The decoration represents a scene of a Dionysian character, with Eros in the act of harvesting grapes, playing or feasting.

A Roman glass bottle with a decoration of the lighthouse from Alexandria, the ancient wonder, is one of the few and best representations of the lighthouse from the Roman period. The cylindrical bottle made of colorless glass with one handle (the neck and rim are missing) was found in a Roman grave in Ptuj (Slovenia). Currently, it is in the Regional Museum of Ptuj.

The Fresnel lens for lighthouses is the "invention that saved a million ships". The lens was developed by French physicist Augustin-Jean Fresnel (1788-1827) for use in lighthouses. The catadioptric form of the lens has outer elements that use total internal reflection as well as refraction; it captures more oblique light from a light source and adds it to the lighthouse beam, making its light visible from greater distances, adding immeasurably to safety at sea.



Figure 7.9. Exceptional glass objects and techniques. The Portland Vase in the British Museum (UK), the Masagá community of glassmakers (Bida, Nigeria), the art of Lino Tagliapietra, the Deutsches Optisches Museum in Jena (Germany) and the Fresnel lens for lighthouses.
Source: IYOG archive.

Chance Bros of Smethurst, Birmingham, produced more than 300 lenses for Australia alone and 2,500 worldwide, thus increasing trade and colonization throughout the British Empire.

Finally, not long ago, the Ponte Coffee Table designed by Angelo Cortesi for Fiam in the 70's combines design and excellent industrial production technology. It represents the basis of the collaboration of designers and planners committed to finding new forms because following the conception of this object, several scientific studies and technological innovations were made on the various machines used for creating curved glass objects, involving companies producing glass and processing machines.

And Lino Tagliapietra is undoubtedly the best-known and most appreciated glass artist in the world. Born in Murano in 1934, he is recognized for his creativity and for the exceptional quality of his glass works. Furthermore, he has introduced the art of Murano glass and extended his artistic influence to the United States, China, Japan and Australia. His works are exhibited in Murano and in the most important European and international museums, such as the Victoria and Albert Museum in London (UK) and the Metropolitan Museum in New York (USA). Lino Tagliapietra is an experimenter, stimulator of numerous artists and promoter of Italian craftsmanship and technique.

The last group of glasses to mention are those with singular intrinsic characteristics. Especially we highlight bioactive glasses, first developed by L. Hench; their history is described in his article 'The story of Bioglass', J. Mater. Sci: Mater. Med., 2016, 17, 967-978, celebrating 50 years of research. They represent a group of reactive materials that can bond to mineralized bone tissue in a physiological environment. Glasses and Glass Ceramics are widely used in the biomedical area. Early applications were in the form of solid pieces for small bone replacement in middle ear surgery. Many applications of bioactive glasses have been proposed in the dental and other fields. They have been widely studied for potential use in tissue engineering and regenerative medicine.

Another remarkable glass is the Gorilla Glass introduced by Corning in 2006, by 2010 approximately 20% of electronic devices with screens were using it. The main characteristics of the technology involve resistance to compression, fractures, high temperatures and malleability. It is a thin and recyclable glass that, at the same time, offers protection, ideal for devices such as cell phones, tablets and wearables.

FEVE, Glass for Europe, NGA

8. Reports on IYOG from 3 International Associations

Introduction

An important goal of the authors has been to discover how different stakeholders have viewed the effectiveness of the International Year of Glass. Another aim has been to inform the organizers of other UN sponsored years; a third is to identify those activities worth continuing. Chapter 4 collected the views of those who participated in the many activities that took place at the grass root level and is a rich source of information. Chapter 5 concentrates on educational activities through the eyes of educators and those learning while Chapter 6 is concerned with those responsible for recording our historical legacy around the world. In this chapter we have sought the views of selected partners at the interface between Industry and those who are its customers, both actual and potential.

For space reasons, just three organizations were consulted, one concerned with containers, two with flat glass. Two of these associations are from Europe, the third from the USA. Chosen partly for pragmatic reasons we hope that nevertheless these are valuable contributions wherever you live in the world and whatever your interests are.

8.1. How did the container glass industry across Europe mark the 2022 International Year of Glass?

The International Year of Glass (IYOG 2022) was a unique opportunity to celebrate glass as an outstanding material with a responsible industry behind it

FEVE
The European Container Glass Federation

Figure 8.1. Logo FEVE.
Source: FEVE.

—one that has made, and continues to make, a huge impact on civilization. It was the first time that the UN celebrated a man-made material as part of their International Years program.

One of the many ways glass has served society is through packaging. As an essential option for packing anything from food and drink, to pharmaceutical, perfumery and cosmetics products, glass is a leading example of sustainable packaging, as a material that is inert, re-useable and endlessly recyclable.

For FEVE, the European Container Glass Industry Federation (https://feve.org/), the IYOG was the perfect opportunity to showcase the assets of glass through active participation in many celebrations held during 2022, thanks to numerous consumer and marketplace campaigns that were underpinned by the publication of research pieces and media toolkits. Here, we would like to tell you about all these projects.



Figure 8.2. Future Made Clear Report.
Source: FEVE.

8.1.1. '*Future Made Clear*' Research

Our industry IYOG 2022 celebrations kicked off already in January when we invited Professor John Parker from the IYOG Council to participate in a Live Q&A as part of our "Future Made Clear" series, and to share his insights on the IYOG ambition, objectives, and plan of activities.

This was the opportunity to publish the 'Future Made Clear' research [1]: an analysis of over 150 expert reports on consumer behavior and drivers when it comes to packaging that also delves into how brands and retailers can leverage these insights. The results confirmed that now more than ever, glass packaging directly meets many of consumers' priorities; where people care about environmental sustainability and circularity, this goes hand in hand with prioritizing their own health and



Figure 8.3. Video campaign.
Source: FEVE.

wellness. Such requirements extend to the products they purchase, and the packaging those products come in.

The Future Made Clear Q&A was a suitable prelude to the official launch of the 2022 Year of Glass, marked during a two-day Opening Ceremony in Geneva at the UN Palace of Nations. Vitaliano Torno —O-I Glass' President of Business Operations & O-I Europe, and then President of FEVE— shared his thoughts on how glass packaging will be key to shaping the sustainable society of the future, in line with the UN 2030 Agenda. On the occasion, he commented: *"We have a unique opportunity to celebrate glass. Glass is endlessly recyclable, guarantees quality and safety no matter how many times it's recycled and it's virtually inert. It's the healthy choice, it is beautiful, it builds brands, and it is loved by people of all generations. That's what makes it the perfect choice for brands, retailers and consumers alike".*

Geneva officially marked the start of an intense action plan for different audiences run by FEVE in collaboration with the member companies and the partner national associations —a campaign marked by several key milestones.

8.1.2. Consumer communications: Friends of Glass video campaign '*Glass makes the moments that matter*'

The video [2] highlights how from generation to generation, glass has



Figure 8.4. InSites survey.
Source: Insites Consulting/FEVE, Packaging & Recycling Flaconnage Survey 2022.
Source: FEVE.

always been by our side to help us make the most of life —in moments big and small. From shared moments with all the family around one table to celebrations of life's biggest milestones, glass is there for all the moments that matter. That's because it's one of the most important, versatile, and transformative materials in history and it will continue to be so, long into the future. The video campaign was supported in Europe by the industry and national associations and aimed at directly engaging with consumers, and also more largely with the whole Friends of Glass community through a social media campaign. For the purpose, a ready-to-use social media toolkit was created and made available to partners. With more than 25 million people reached, including 11 million people who watched the video, the campaign was very successful: in Portugal it was even broadcast on prime-time national TV and other national channels where it reached 3 million people alone.

European consumer research

During the IYOG, FEVE and Friends of Glass commissioned a Europe-wide consumer research survey [3] to find out what consumers think about glass and packaging in general. The research was undertaken by InSites Consulting, who surveyed more than 4,100 consumers across 13 European countries. The results revealed that almost a third (28%) of consumers were buying more products in glass packaging than three years before, and that 8 out of 10 consumers believe glass is a material for the future. This strong preference for glass over other materials is driven mostly by glass' environmental credentials and health benefits, along with being seen to offer superior experience on design, taste and quality credentials. Namely, the 2022 results show five key trends:

1. glass is the only packaging continuing to increase in usage,
2. glass is considered part of a healthy living lifestyle, because it's recyclable, recycled effectively and safe when recycled,
3. glass is perceived as preventing health and environmental issues, as a food safe and shelf-stable packaging material that continues to be healthy when recycled,
4. glass recycling is supported by a system of efficient local collection and recycling systems that's proven to resonate among consumers, and
5. companies should lead on sustainability with the help of glass.

The release of the research was accompanied by a social media

micro-influencer and a press campaign; this helped to extend the IYOG messaging around Europe and the world.

8.1.3. The IYOG 2022 toolkit

Three organizations —the European Container Glass Federation (FEVE), the Food Packaging Forum (FPF) and the Glass Packaging Institute (GPI) in the US— joined forces to produce an IYOG glass packaging toolkit [4] on what's driving consumer love for glass and donated it for free to interested container glass communities worldwide. This toolkit outlined reasons to celebrate glass packaging in the IYOG, providing key messages and ready-to-use visuals for any brand, customers, retailers, or suppliers interested in joining the celebrations, and helping promote, enjoy, reuse and recycle products in glass. The toolkit was launched on the Glass Hallmark website, as the industry's Business to Business platform —and subsequently on the Friends of Glass consumer platform accompanied by a social media campaign across Europe. In 2022 alone, the IYOG Toolkit page on the Glass Hallmark website was viewed by nearly 5K users, with 8K pageviews. This led to 103 downloads, 27% of all downloads on the site. The toolkit is still valid and remains available for download.



Figure 8.5. *Age of Glass* in LUXEPACK 2022 fair.
Source: FEVE.

8.1.4. The '*Age of Glass*' action

Another important piece of the FEVE-led IYOG Action Plan was the participation in LUXEPACK 2022 —the most important trade fair for luxury packaging. FEVE hosted a booth which showcased the on-site production loop of high-end glass flacons and bottles. These flacons were filled with a specially created perfume called 'Age of Glass' which evoked the smell of molten glass when melted in the furnace. The booth was acknowledged as being amongst the most creative and original at the fair. More than 1000 visitors dropped in, and



Figure 8.6. The Close the Glass Loop partnership brings together members of the glass value chain with the objective of more and better-quality recycling in Europe.
Source: FEVE.

we were soon out of stock of the 600 samples of the Age of Glass perfume!

8.1.5. Close the Glass Loop

The IYOG was also the right time and opportunity to raise visibility on other major industry initiatives such as Close the Glass Loop [5]. This FEVE-led value chain initiative aims to achieve a 90% collection of glass packaging by 2030. Recycling in a closed loop is one of the greatest environmental assets of glass and not only does it mean glass never has to end up as a waste if it is collected and sorted, but also post-consumer recycled glass actually helps reduce CO_2 emissions in the production process. That is an important contribution to the industry commitment to decarbonize production.

8.1.6. Furnaces of the Future

The industry is engaged today to revolutionize the way we produce glass so that we can deliver carbon neutral production. The energy transition from fossil fuel-based energy sources to low carbon energies is an essential path.

Figure 8.7. Logo Glass for Europe.
Source: Glass for Europe.



The industry is building the Furnaces for the Future —regrouping all industry initiatives around decarbonization. We used the occasion of the IYOG to promote and highlight the investments being done in the industry to build the next generation furnaces. There is now a special section on the Glass Hallmark site [6] to showcase all the Furnaces of the Future projects.

8.1.7. …to be continued

All these Europe-led actions were complemented by many more actions organized nationally in Europe and around the globe; they were underpinned by a Europe-wide press campaign. In essence, the IYOG was a great moment to unite the whole glass packaging community to celebrate the unique and special assets of glass, but also to project its role into the future as part of a climate neutral and fully circular economy. The FEVE-led IYOG campaign reached over 33.4 million people throughout Europe.

Most importantly, IYOG2022 was neither the beginning nor the end of activities to promote glass. Today, as an industry we continue relentlessly our efforts to transform glass manufacturing, in the way we produce and in the way we use this wonderful material, in the way we design it to meet customer and consumer demands while respecting our planet. We continue to believe in it as a packaging for the future. Do liaise with us on our platforms and learn more about glass packaging.

8.2. Glass for Europe: sustainability at the core of Europe's flat glass industry

'Recognizing that glass has accompanied humankind for centuries, enriching the quality of life of millions, and that, as one of the most important, versatile and transformative materials of history […] emphasizing the rich possibilities of developing technologies and their potential contribution to meeting the challenges of sustainable development and inclusive societies'.

This extract from the UN resolution L.84 that confirmed 2022 as the UN International Year of Glass is a formidable recognition of the importance of the material: glass and its industry but beyond that, it found a special resonance for '*Glass for Europe*'.

First because sustainability has always been and remains at the core of Europe's flat glass sector activities and business. Across all sectors it serves, be it glass incorporated in buildings, vehicles, photovoltaic systems, electronics and appliances, furniture, etc. '*flat glass products are meant to deliver on all sustainability facets*'.

The examples of glazing contributions are plentiful and go from delivering energy and carbon efficiency to buildings and automotives, providing high levels of safety, security and durability so its products protect occupants of vehicle and buildings, help to maximize renewable energy generation in photovoltaics, contribute to a circular model with a material with

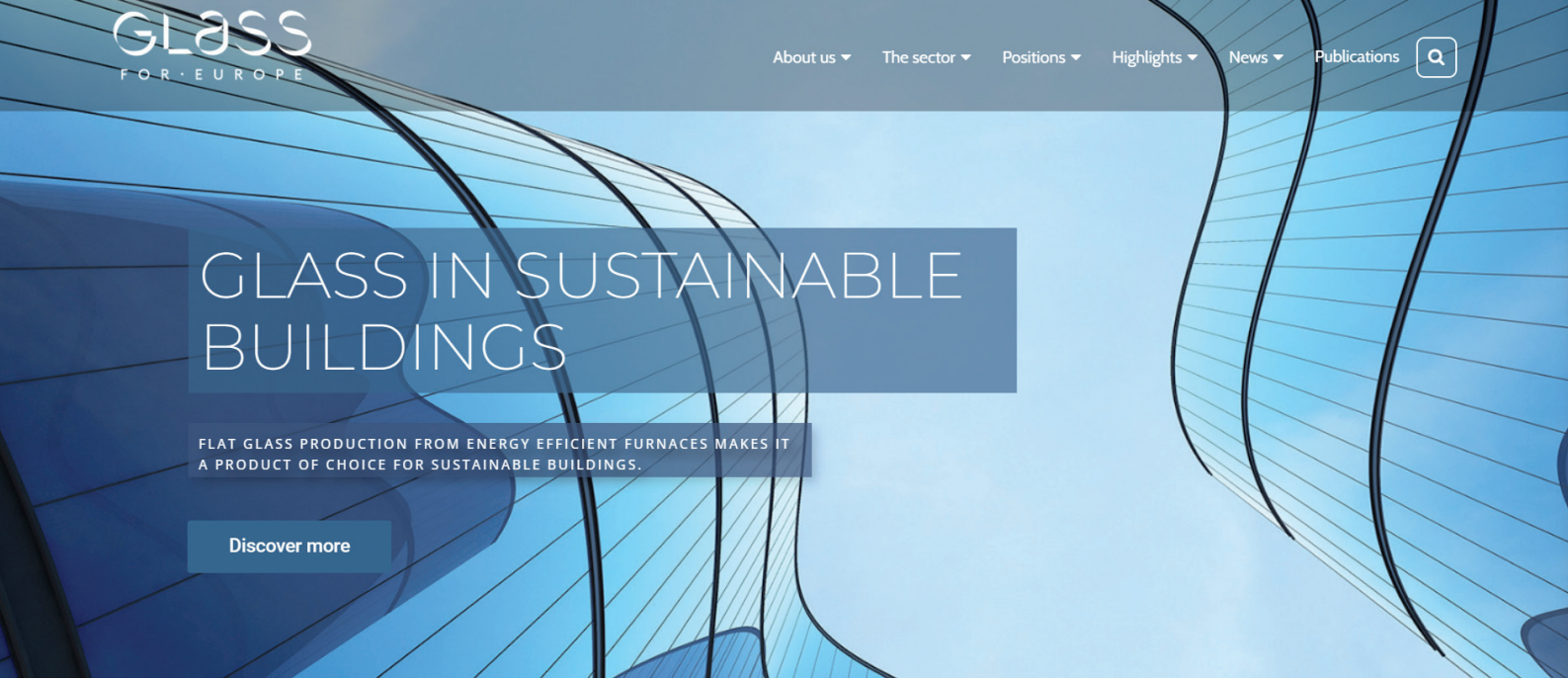


Figure 8.8. Glass for Europe compendium of highly glazed sustainable buildings in Europe.
Source: Glass for Europe.

a high recycling potential, and its industry strives to minimize the carbon and environmental impacts of glass manufacturing.

Second, this UN declaration also resonated with Glass for Europe's own mission, i.e. to bring Europe's flat glass sector together to develop support resources, allow cooperation projects to flourish and speak with a unified voice in support of the industry's efforts to deliver sustainability, growth and value across the sector during the EU's journey towards climate neutrality. The UN declaration was therefore seen as an invitation to develop new projects and intensify our efforts to champion sustainability in Europe's flat glass sector, and beyond. Activities in five domains were pursued:

1. Raising glass' credentials in sustainable buildings.
2. Mobilizing the value chain to accelerate changes.
3. Cooperating with policy makers to enable transformation.
4. Championing sustainability in flat glass worldwide.
5. Echoing the formidable potential of glass.

8.2.1. Raising glass' credentials in sustainable buildings

Throughout the year, Glass for Europe undertook several projects to objectivize and demonstrate the role of flat glass in sustainable buildings. A particular emphasis was placed on case studies and simulations on the whole life-cycle carbon impact of buildings and their glazing components.

For example, Glass for Europe conducted whole life-cycle carbon analysis of high-efficiency double and triple glazing to calculate under which conditions the use of triple glazing or high efficiency double glazing is more profitable in terms of reducing life-cycle carbon emissions. This work was conducted for windows in the residential sector in different European climate conditions and energy mixes. Its findings show that despite the higher material input needed to produce triple glazing, this product usually leads to more CO_2 savings throughout the product's lifetime. This work brings new knowledge to help objectivize glazing contributions to low carbon buildings.



Figure 8.9. 2050 vision Flat Glass in a climate neutral Europe.
Source: Glass for Europe.

Another example of activities in this field is the work undertaken in commercial buildings and glass skyscrapers. While questions are sometimes raised on the sustainability of such constructions, Glass for Europe put together a small compendium of recently erected highly glazed buildings in Europe, which achieved top sustainability ratings according to world-class standards. This small compendium, accessible online [7] provides real-life examples that glass, when commissioned and used adequately, is a material of first choice to deliver truly sustainable buildings.

Many more facts and knowledge building activities were undertaken and launched by Glass for Europe. For instance, a video explaining the main contributions of glass to sustainability in buildings was issued while, in parallel, work on a Q&A on the same topic was launched, Glass for Europe also fed into the European Commission's reflection on the topic, to name but a few.

8.2.2. Mobilizing the value chain to accelerate change

The flat glass sector is composed of a rich value chain with many actors such as glass processors, transformers, fabricators who transform flat glass plates into a final product ready to be



Figure 8.10. Glass for Europe team meeting with a machinery producer at Glastech.
Source: Glass for Europe.

assembled into buildings, cars, appliances or PV modules. Mobilizing this value chain to support cooperation and the flourishing of new projects is part of Glass for Europe's missions. In the context of the IYOG, this networking and bridging of actors of the flat glass value chain both upstream and downstream was pursued with a special focus on further collaboration to advance sustainability.

To engage with suppliers, Glass for Europe intensified its contacts with related trade associations such as VDMA or GIMAV for the machinery industry but also companies directly. To do so, Glass for Europe took part in the most relevant glass machinery fairs in Europe such as Glasstec in Düsseldorf where new contacts were established and new ideas exchanged. Speeches in related conferences were given to explain the flat glass sector's '2050 vision I Flat glass in a climate neutral Europe' [8] that identifies sustainability advances to explore.

Specific activities to enhance dialogue with the downstream value chain, i.e. processors, transformers and fabricators, were also revamped to generate more dialogue and focus on sustainability. For instance, Glass for Europe organized two meetings with partner associations representing the flat glass processing and transformation industry across different European countries. These meetings offered the opportunity for partners to exchange and disseminate information on their own activities in the context of the IYOG. Specific online workshops were also organized to delve into some key sustainability topics such as on the issues of recycling of end-of-life glazing, the use and disposal of interleaving powders, optimized logistics and transportation of flat glass, etc.

Glass for Europe also seized the opportunity of the UN IYOG to expand collaboration with research centres and the scientific community, for example in conferences such as at the 26th International Congress on Glass in Berlin. This cooperation is bearing fruits with new sustainability projects. In 2022, Glass for Europe joined the Sunrise project on the recycling of

laminated glazing with the glass recyclers association, FERVER, and some laminates producers.

8.2.3. Cooperating with policy makers to enable transformation

It is one of the priority tasks of Glass for Europe to engage with policy makers at European level to create the conditions for a thriving and sustainable flat glass industry in Europe. Considering the European Union's objective to become climate neutral by 2050 and the energy crisis which arose in 2022, collaboration with policy makers was of particular importance to preserve the industry's ability to pursue its sustainability trajectory.

Under the auspices of Glass Alliance Europe, the umbrella association of Europe's glass industry, a policy event was organized in Brussels in November 2022 entitled *'Glass, the hidden gem of a carbon neutral future*'. This event was meant to celebrate the UN IYOG and gathered many EU decision makers from the European Commission and the European Parliament. It allowed discussion around sustainability progress in the industry. Glass for Europe contributed to the two panel discussions on recycling and energy with interventions from its Chairwoman, Joana Arreguy from Saint-Gobain Glass, and its Secretary General, Bertrand Cazes.

More generally, the IYOG helped Glass for Europe educate policy makers in the European Union by putting the glass industry under the spotlight. Numerous policy discussions helped make the realities of the glass industry be recognized at the highest political level in the European Union. The best examples are two EU Commissioners who mentioned the glass industry in official statements, including the President of the European Commission, Ursula Von der Leyen, in her annual State of the European Union address.

The UN IYOG was immensely useful to create constructive and long-lasting lines of dialogue with European decision makers. These are instrumental in supporting the sustainability transformation of the flat glass sector.

8.2.4. Championing sustainability in flat glass worldwide

The international dimension of the UN IYOG and of the flat glass industry was not omitted by Glass for Europe. Considering how advanced is the European-based flat glass industry in terms of sustainability, Glass for Europe took it as its mission to disseminate the European sector's 2050 vision and sustainability efforts worldwide, with the goal to inspire and drive global efforts.

Glass for Europe took part in numerous conferences across the globe on sustainability in glass making contributions to several conferences in North and South America, and Asia, most often organized in collaboration with like-minded organizations such as NGA, the Singapore Glass Association, etc. Emphasis was placed on recent efforts to drive more recycling of glazing, the decarbonization of the glass making process as well as whole life-cycle analysis in glazing and buildings.

As part of these efforts, Glass for Europe supported the organization of the opening and closing ceremonies of the IYOG. Glass for Europe's Chairman, Mr. Philippe Bastien from AGC Glass Europe gave a visionary speech on the European industry's aspirations for 2050 at the opening ceremony held in Geneva. Glass for Europe's Secretary General made two interventions at the debriefing event held at the United Nations in New-York City to report on activities regarding glazing in sustainable buildings and glass recycling.

Beyond the outreach benefits of such activities, they greatly contributed to establishing closer ties with representatives in the flat glass sector worldwide, which still contributes nowadays to the exchange of best practices to support sustainability advances.

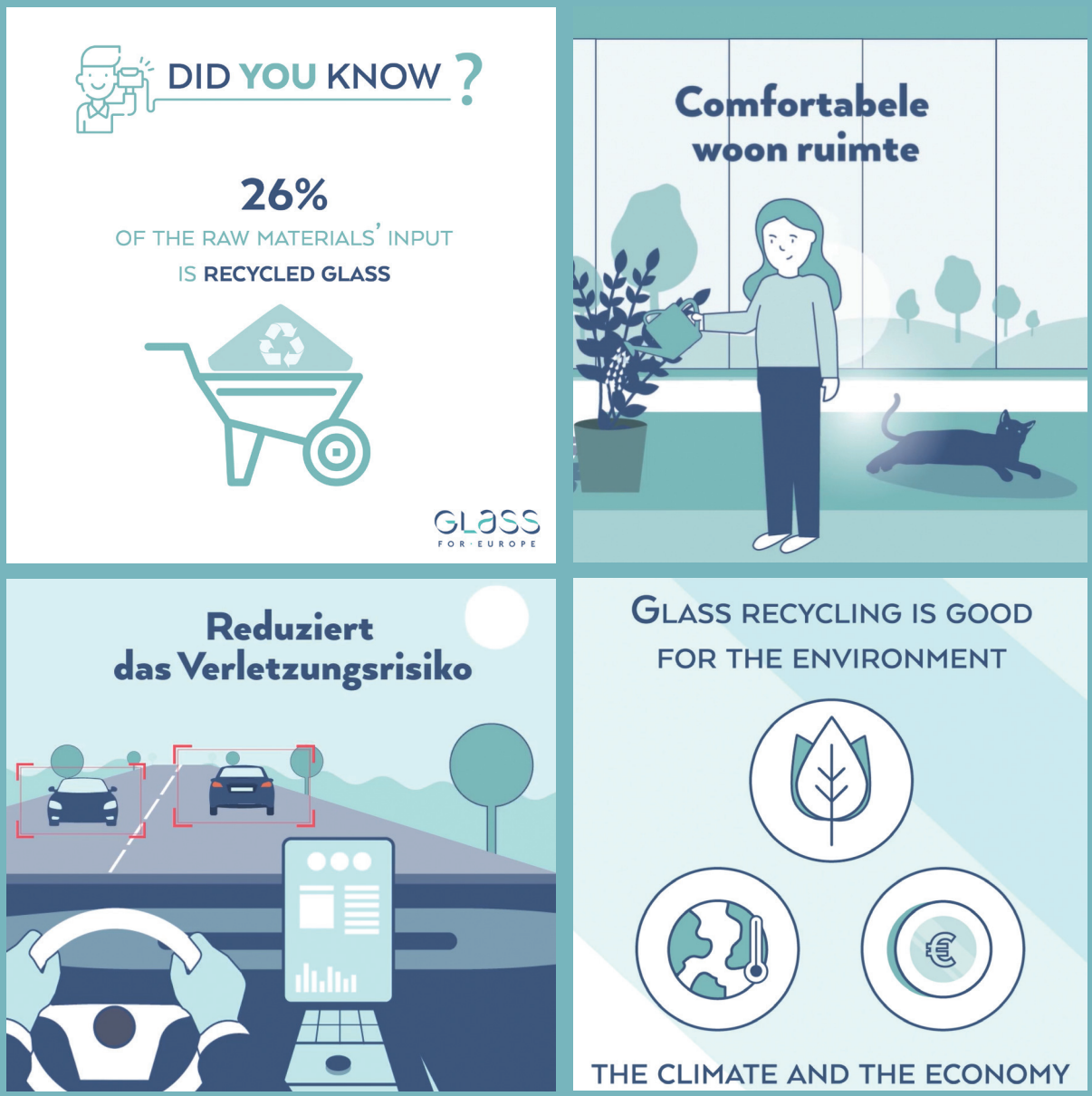


Figure 8.11. Examples of small educational videos and social media campaign materials.
Source: Glass for Europe.



Figure 8.12. Glass in transport in Glass for Europe website.
Source: Glass for Europe.

8.2.5. Echoing the formidable potential of glass

The UN IYOG also carried two additional dimensions of importance to Glass for Europe: the celebration of the glass material and education around its benefits. For this reason, Glass for Europe developed many communication activities throughout the year under different formats such as short video clips, infographics, social media campaigns, etc.

For instance, four short educational videos were prepared and disseminated by Glass for Europe on industrial efforts to reduce CO_2 emissions, innovations in glass, glass recycling and energy savings realized thanks to advance glazing. Other videos, infographics and visuals were also prepared on the topic of glass in sustainable buildings.

As part of our educational efforts, an entirely new section on Glass for Europe's website was created to present the different types of applications of flat glass and explain their main properties and benefits. Since its launch, this new section of the website has attracted thousands of visitors, who can better understand the contributions of flat glass in all its forms to a more sustainable society.



Figure 8.13. Sustainability at the core of flat glass industry.
Source: Gla Source: NGA. urope.

Dedicated social media campaigns were run to accompany all new communication materials. Most of the materials were translated or dubbed in different European languages such as Italian, German, French, Polish, etc. The social media campaigns were led in conjunction with our partner associations to amplify outreach throughout Europe.

Ultimately, all these activities around the UN IYOG by Glass for Europe only made sense because the European-based flat glass industry continued its efforts throughout 2022 to lead the way in sustainable flat glass manufacturing.

To name only a little of the 2022 industrial progress realized in Europe, new high-efficiency float glass furnaces were built and lit up, new investments in on-site renewable energy production





Figure 8.14. NGA Members support IYOG by downloading digital badges for use in their publications.
Source: NGA.

capacity were made, quantities of recycled flat glass cullet reintroduced in furnaces continued increasing, Environmental Product Declarations for flat glass products became the norm while new production technologies were successfully piloted and tested. It is in Europe in 2022 that the world's first production of zero-carbon float glass was realized in a demonstration project lasting several weeks.

Put it in simple terms: the European-based industry walks the sustainability talk!

A glimpse of Glass for Europe's activities around the UN IYOG was presented in a short video clip [9] released at the end of the year 2022. The ending of the video summarizes Glass for Europe's state of mind as the UN IYOG came to a close: 'Beyond 2022: Sustainability, a journey to be continued'.

Glass for Europe is precisely building upon and continuing this path in 2023 and beyond thanks to the higher gear mode rendered possible by the UN IYOG.

8.3. NGA - National Glass Association - North America

The National Glass Association (NGA) represents America's building glass manufacturers, suppliers, fabricators, and installers. NGA's 1,800 member companies employ 71,000 Americans who produce and install glass for homes and commercial buildings and who generate more than $10.3 billion in annual revenue. NGA promotes and defends the use of glass in the built environment. Our advocacy and technical initiatives respond to the relentless, ever-changing challenges to our industry.

8.3.1. 2022 Glass & Glazing Advocacy Days, Washington D.C.

Industry leaders from NGA member companies, Congressional members and agency officials convened in Washington, D.C., April 4-5 for the association's first annual NGA Glass & Glazing Advocacy Days. NGA member companies are following up with their local representatives to continue the momentum and conversation generated during the event.

NGA provides one-page summaries for legislators and stakeholders to share how glass is an adaptable, sustainable, energy-efficient, strong, beautiful, safe and essential building product.

8.3.2. NGA's 5 Policy Priorities

8.3.2.1 High-performance Glazing

According to the U.S. Energy Information Agency, in 2020, the combined total energy consumption by the residential and commercial sectors represented about 40% of total U.S.



Figure 8.15. NGA Glass and Glazing Advocacy Days, Washington D.C.
Source: NGA.

energy consumption. Energy efficient glass can help reduce the amount of energy needed for residential and commercial buildings. NGA members are continually developing new kinds of high-performance glass, and installation of fenestration/glazing & high-performance products improve building resiliency and efficiency and supports skilled worker job creation along with urban renewal. Moreover, high-performance glazing has many health and wellness benefits. We urge the Department of Energy, Environmental Protection Agency, General Services Administration, Department of Defense and Congress to incentivize continued use of energy efficient glass.

Video link [10]: *New IGU Technologies for Carbon Reduction and Zero Net Energy* presented by Stephen Selkowitz, Principal, Stephen Selkowitz Consultants | Affiliate, Lawrence Berkeley National Labs. Learn about the latest IGU technologies, and the research and development still in progress, that will aid in the reduction of a building's carbon footprint and bring us closer to the goal of a zero net energy building.

Article link [11]: by NGA energy code consultant Tom Culp, Birchpoint Consulting. Is the energy savings gained by moving from double to triple glazing outweighed by the extra energy used to make the third pane in the first place?



Figure 8.16. NGA member companies met face to face with Congressional members to advocate for glass as an essential building product.
Source: NGA.

8.3.2.2. School Security

In active shooter events, windows can be the first line of defense, slowing down an attacker when installed as security glazing resistant to forced entry, allowing more time for schools to enact emergency plans and for first responders to arrive. NGA members have developed protective glazing including forced entry, blast and bullet-resistant glass that is designed to resist penetration from a variety of firearm ammunitions. U.S. building glass manufacturers stand ready to help make schools and other buildings safer.

NGA's task group on School and Facility Security developed a new industry consensus repeatable mechanical test method for forced entry of buildings, weakening the glass by shooting in a prescribed pattern, then simulating an attack with a mechanical impactor. ASTM F3561 *Standard Test Method for Forced Entry-Resistance of Fenestration Systems After Simulated Active Shooter Attack* was published in September 2022.

NGA is actively involved with standards and codes bodies, including the International Code Council. NGA's Glazing Industry Code Committee is

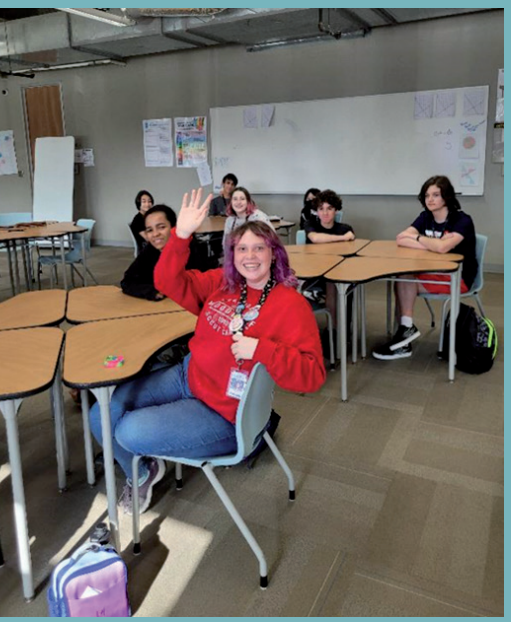


Figure 8.17. NGA visited the PISD Academy High School to introduce glass as a career path. This is a STEAM School where it's encouraged to "try" out different career paths in science, technology, engineering, art and math.
Source: NGA.



Figure 8.18. National Glass Association, the Council of Manufacturing Associations and the Steel Manufacturing Association visited with college students in Houston, Texas to talk about careers in glass and the building industry.
Source: NGA.

working with related industry associations to propose changes to the International Building Code to require security glazing in high-risk occupancy buildings, including schools.

8.3.2.3. Workforce Development and Registered Apprenticeship Programs

The glass industry creates jobs —the glass industry employs 71,000



Figure 8.19. Swarupa Ganguli, Acting Chief, Resource Conservation Branch, US EPA addressed attendees at NGA Glass and Glazing Advocacy Days on opportunities for glass recycling.
Source: NGA.

Americans who produce and install glass for homes and commercial buildings. To help develop the workforce, NGA's Glazier Apprentice Curriculum is used as a part of U.S. Department of Labor-approved, registered apprenticeship programs for glaziers. Students who complete the curriculum earn a credential from the NGA and National Center for Construction Education and Research (NCCER). Glazier apprentices help fulfill America's need for skilled trade workers.

8.3.2.4. Bird-Friendly Glazing

NGA members have developed solutions for bird collisions with buildings. For consistency in implementation, we encourage referencing NGA's *Best Practice for Bird Friendly Glazing Design Guide*, as GSA Facility Standard P-100 has already done.

Following the event, U.S. Sen. Tina Smith (D-MN) cosponsored the Federal Bird Safe Buildings Act. This legislation would require the Federal General Services Administration to incorporate relevant features and strategies to reduce bird fatalities into newly constructed, acquired or substantially altered public buildings. The bill also mandates that GSA develop a related design guide and annually certify its active use. This bill was reintroduced in the 118th Congress in 2023.

8.3.2.5. Window Glass Recycling and Sustainability

Currently building glass recycling is not generally done. Glass is infinitely recyclable and NGA members believe window glass recycling will eliminate a significant amount of landfill waste, reduce raw material mining, reduce fuel use and emissions, and help promote sustainability. We are committed to working with EPA and Congress to develop a plan for opportunities and technologies to recycle architectural glass.

NGA's task group Sustainability and Recyclability of Architectural Glass, comprised of flat glass manufacturers, glass fabricators, recycling companies and design professionals is examining the challenges of diverting architectural glass from landfills and strategies to collect it and reintroduce it into the supply chain.







Figure 8.20. The Guinness Book of World Records recognized the Imagination Station in Toledo, Ohio for collecting the most glass bottles for recycling in one hour. The community crushed the previous record by almost four times, collecting 9,511 kg of bottles.
Source: NGA.

8.3.3. Community Participation in IYOG Activities: Toledo, Ohio

August 2 was declared the International Year of Glass Day by the City of Toledo, The City of Rossford, The Lucas County Commissioners, The Wood County Commissioners, The State of Ohio, via Governor Mike DeWine's office, and US Congressional representative, Bob Latta. Celebration included a tour of the NSG Pilkington Rossford float plant, public glass art and music at Rossford Stroll the Streets, three ceremonies commemorating IYOG Day, and a celebration dinner.

The community of Toledo, Ohio worked together on mosaic



Figure 8.21. Check out the interactive timeline [15] of the history of glass.
Source: NGA.

glass art, culminating into a glass butterfly mobile in the museum (chapter 12.2.3).

Imagination Station Toledo fused fashion and science during a runway show, developing the seed project *Elements of Style: Glass City Chic* —presented by Comfort Line FiberFrame. A nod to the International Year of Glass, local STEAM professionals wore fabulous, glass-inspired looks highlighting the incredible versatility and jaw-dropping beauty of glass (chapter 3.2).

Publications

NGA's 2022 Annual Report [12]

NGA's GANA Glazing Manual IYOG Edition [13]

NGA's Glossary of Architectural Glass and Glazing [14]

References

[1] https://glasshallmark.com/consumer-trends-report/.
[2] https://www.friendsofglass.com/international-year-of-glass/.
[3] https://glasshallmark.com/use-glass/consumer-prefer-recycled-glass-study/.
[4] https://glasshallmark.com/use-glass/international-year-glass-toolkit/.
[5] https://closetheglassloop.eu/.
[6] https://glasshallmark.com/the-furnace-for-the-future-the-glass-industrys-shared-ambition-for-a-low-carbon-future/.
[7] https://glassforeurope.com/sustainable-buildings/.
[8] https://glassforeurope.com/wp-content/uploads/2020/01/flat-glass-climate-neutral-europe.pdf.
[9] https://www.youtube.com/watch?v=-WuDto5mUBM.
[10] https://www.youtube.com/watch?v=Wkh6v8uQ6Us.
[11] https://www.glass.org/triple-glazing-and-embodied-energy-yes-juice-worth-squeeze.
[12] https://www.glass.org/sites/default/files/2023-01/AnnualReport_2022.pdf.
[13] https://members.glass.org/cvweb/cgi-bin/msascartdll.dll/ProductInfo?productcd=GANAGLAZINGDOWN.
[14] https://members.glass.org/cvweb/cgi-bin/msascartdll.dll/ProductInfo?productcd=GLASSGLOSSARYÇ.
[15] https://www.glass.org/IYOG.

Alicia Durán and John M. Parker

9. Publications & Information Dissemination during the IYOG

9.1. Introduction: IYOG publications

Numerous reports were written during the IYOG to publicize the UN and IYOG goals, advertise our activities and inform the wider public of our ambitions with respect to sustainability, equality and, yes the contribution that glass makes. Early on and with the help of experts in their fields we created the book, 'Welcome to the Glass Age', targeting firstly the Ambassadors of the United Nations, secondly our sponsors and importantly the wider public, particularly a younger audience. The current volume is a concluding report for the same UN Officers but also for wider dissemination: as a statement of what was achieved, as a guide for organizers of future UN sponsored years, to provide some continuation and to generate new actions, ideas that interested groups everywhere can use.

Both the 'Welcome to the Glass Age' and this report will be online for free download in perpetuity.

In the process of creating written documentation, online videos available at no cost have been created. Several explain for a broad audience the many, often unseen roles of glass in our daily lives; some suggest potential research areas for future developments. These links are available in Chapter 5 on education.

The 'Welcome to the Glass Age' book has been re-imagined as a series of posters, one for each chapter. The book and posters have been translated into both English and Spanish. These were used as displays at formal events in Spain attracting a broad audience. A second set of posters targeted 'Sustainability' and

the advantages that glass offers. This message was a central theme of the IYOG and the posters have been reformatted for different audiences and age groups (see Chapter 4.8.2 and Chapter 5.2).

Of course, many organizations created new material in various formats a) to report on what happened, and b) to amplify the content of particular events and themes under the IYOG umbrella. In what follows are articles by Journalists, Influencers, Glass experts, Observers and at the end is a list of publications linked specifically to the IYOG. Special issues of the main scientific journals are important for promoting the IYOG and the Glass Age.

9.2. IYOG History recorded in published journals

Greg Morris wrote in Glass International:

The International Year of Glass (IYOG) helped bring the glass industry together like never before.

The celebratory year marked the role of glass in places all around the world and highlighted what a wonderful material it is. Without it, you could suggest that mankind would not be as developed as it is today.

We all know that glass is used in everyday items such as food and beverage bottles as well as windows and windshields. But it is also applied in some of today's hottest technologies such as glass fibers for high-speed internet, digital windscreens for drivers, touch screen technology and foldable mobile phones.

Communications, optics, renewable energy and even health care have all benefitted from the revolution which has taken place in glass. Such is its prevalence in modern life, that the present period is referred to as the Glass Age.

IYOG's opening ceremony at the Palace of Nations in Geneva, Switzerland in February was an indication of its purpose over the course of the year (Figure 9.1). The Palace of Nations was home to the League of Nations —the predecessor to today's United Nations. The League of Nations brought countries together after the horrors of World War One with a purpose of establishing co-operation between nation states.

A collective bond of solidarity was evident throughout the year of glass, in places as geographically far apart as Mexico and India, China and the United States.

Part of our role at Glass International is to bring the glass industry together as a community. By doing so, it means the sector can focus on common ground issues in a non-competitive environment and explore the challenges and opportunities that face all of us, no matter what company or sector we work for.

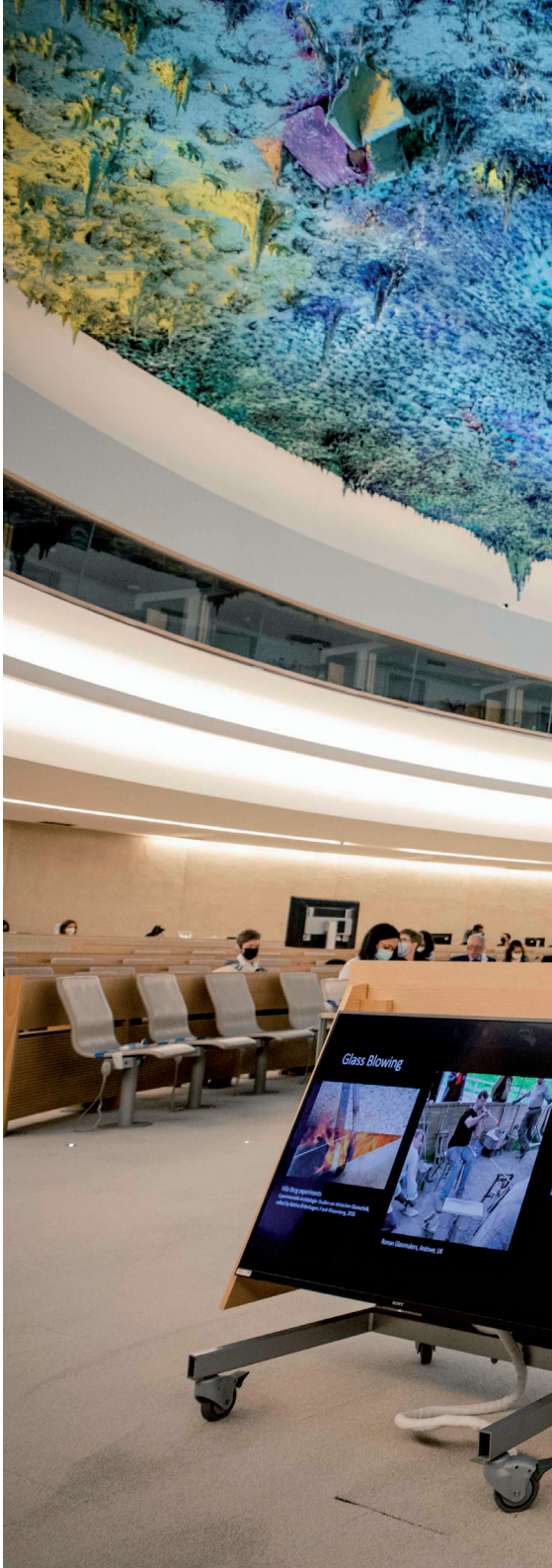




Figure 9.1. The opening ceremony of the IYOG brought various sectors of the industry together.
Source: © IYOG archive.



Figure 9.2. Among the celebrations during IYOG was a visit to Mexico's Museum of Glass in Monterrey, which was organized alongside the Glassman Latin America industry trade show.
Source: © IYOG archive.

IYOG helped galvanize and bring together sectors of the glass community which had previously operated separate from one another.

It may not be well known, but the different types of glassmaking require alternative processes to make a particular type of glass. For example, the process to make window glass or automotive glass is entirely different from that to make food and drink bottles, which in turn is equally different to the process to make pharmaceutical glass or tableware glass.

As a result, the industry operates almost in silos, each sector so focused on its own processes that there is only a little interaction between say, the flat glass industry and those from the tableware or the hand-blown sectors for example.

Here at Glass International, we observed a change, a difference which we hope will be profound and lasting. Inspired by the ethos of the Year of Glass, individual glass sectors came together to forge communities and build relationships with one another.

And these communities were not restricted by geography. As the world emerged from Covid lockdowns, the use of video technology enabled more interaction and connections. During the monthly IYOG meetings, members from the 18 regional committees established around the world shared ideas and innovations together on a series of regular video calls.

It wasn't uncommon for, for example, representatives of the joint Indian, Iran and Pakistan committee glass industry to share ideas with their European counterparts from the specialty glass sector, or for glass artists in the Oceania regional committee to highlight plans to their Italian counterparts.

The result of this collaboration was a celebration of glass around the globe on a scale never seen by the industry before, with too many highlights to mention!

My personal favorite was one organized by Glass International last May. At the Glassman Latin America event in Monterrey, Mexico, of which Glass International is a media partner,



Figure 9.3. Pilkington UK hosted hydrogen trials at its St Helens, UK site. Photo courtesy of NSG Group.

we organized a trip to the nearby Museum of Glass (Figure 9.2).

Widely known as the home of Mexican glass, the museum highlights the history of Mexican glass and focuses on aspects such as glass art, and hand blown, crafted glass.

The majority of Glassman visitors consists of those from the glass packaging industry —the manufacture of glass bottles, perfumes and jars which are generally manufactured within a large glassworks using the latest automated, high-tech machinery.

We touched earlier upon the fact the glass sectors operate various silos and this was a prime example of the sectors crossing that boundary.

While visitors from the show may have come from a different area of glassmaking, they still appreciated the impressive exhibits in front of them and were fascinated by the art of glassmaking which was showcased by the museum. For many delegates, it was a first taste of an unfamiliar method of making glass and something which they could absorb and learn about. Such was the success of the museum visit that another cultural tour is planned alongside the next Glassman trade show, to be held in Mexico City, in May 2024.

One important point of the collaboration between the various glass sectors was the opportunity it gave to discuss common challenges facing the industry.

Glass manufacturing is an energy-intensive business, no matter in what form it is made. The industry knows it needs to decarbonize to survive —otherwise customers and end consumers will choose a different material to drink their beer, eat their food and spray their perfume with.

Renewable energies such as hydrogen, biofuels, green electricity have all been the subject of much discussion by the industry. But the industry is still relatively at the start of its net-zero journey, particularly when it comes to new energies to fuel the glassmaking process.

Successful pilot schemes have been held at the Encirc and Pilkington UK sites, for example, focused on the use of biofuels and hydrogen respectively to make glass (Figure 9.3). These tests of just a few weeks duration were successful in making high quality, low carbon glass. The challenge is to now ensure the use of these energies on a permanent basis.

Glassmaking is a complex process, and the industry has to grapple complicated ideas, so any change to the manufacturing process will not happen overnight. So now more than ever the various sectors need to collaborate and share ideas of how the industry can go green.

If the industry can achieve its net zero aims, the rewards are immense. Not only will glass appeal to a new generation of consumers but it will also be an example to young engineers of an industry worth investing your career in. If glassmakers can achieve the decarbonization dream, then the International Year of Glass should be regarded as helping play a significant role in achieving this.

An interesting article underlining Women in Glass Making was published in Glass International, April 2022 [1]; entitled 'An Indigenous Woman in Glass' it summarizes Courtney Calahoo's presentation at the Opening conference of IYOG in Geneva.

Glass Worldwide announces that 2022 will be the International Year of Glass

An ebullient Alicia Durán, Chair of the Steering Committee for the IYOG2022, spoke to Glass Worldwide after receiving UN approval for a campaign that she has helped to champion since 2018.

A UN badged International Year requires a United Nations resolution. The journey to put the spotlight on glass and tell the full story of its transformational properties began in America when tech giant Corning and other researchers and universities began to build the idea of the 'Age of Glass', recognizing the importance of glass applications in all the different sectors.

"The possibility of an International Year of Glass (IYOG) was presented by Manoj Choudhary, then President of the International Commission on Glass (ICG) and David Pye, past ICG President, at the ICG Conference in June 2018 in Yokohama," Alicia Durán told Glass Worldwide. "At that point, I was elected new President of the ICG and we started looking at the possibilities of an International Year of Glass in 2022 to coincide with key dates such as the ICG Congress 2022 in Berlin and the centennial anniversaries of the Deutsche Glastechnische Gesellschaft (DGG) and discovery of Tutankhamun's tomb with the collection of ancient Egyptian glass".

Selling glass

The IYOG steering committee's application to the UN centered on promoting the history of glass and its future potential, as well as showing how the glass community is supporting UN developmental goals for its 2030 agenda.

"For example, container glass is infinitely recyclable and an important example of a circular economy," notes Prof. Durán. "There is a revolution in architecture facilitated by glass and the carbon neutrality it can bring to buildings. Glass is also a very significant material in the progress of technologies such as optical fibers that permit the development of the internet and 5G; new paradigms that are the physical base

of globalization. Glass is also a base resource for green energy with applications in solar, wind and many more. And, last but not least, in health applications, bioactive glasses have many different uses and of course, as highlighted by the Covid-19 pandemic in the last year, pharmaceutical glass is the container of choice for vaccines. So, glass is everywhere and is a material at the base of sustainable development".

Plan of action

The proposal received a very positive response at the 3rd International Convention of Glass Associations in July 2019, as well as from ICG's members and the International Committee for Museums and Collections of Glass (ICOM).

By November 2019, in co-operation with more than 25 experts and many different organizations, we had a document following the goals of the United Nations 2030 Agenda for Sustainable Development", explains Prof. Durán. "From there we had an executive summary and an eco-social document; we counted on the support of many countries and arrived with a very strong proposal that presented the perspective and landscape of the international glass industry. Support and letters of endorsement continued to grow and we currently have support from more than 1500 organizations from many different sectors.

The target was for unanimous approval in July 2020, but the pandemic caused a 10-month delay. In the meantime, in November 2020 we increased support with the released of a video campaign to great effect. Spain, Egypt and Turkey offered support from the outset and were joined by Brazil, China, Colombia, Costa Rica, Cuba, Ecuador, Guatemala, Hungary, Japan, Kiribati, Mongolia, Russian Federation, Senegal, Slovakia, Venezuela (Bolivarian Republic of) and Vietnam as the 19 co-sponsors of IYOG, a record for this type of resolution".

Resolution passed

A draft resolution outlining the committee's ambitions was proposed by the Spanish Permanent Mission at the United Nations, negotiated with the Missions of UN countries during April 2021 and the formal resolution was agreed at the United Nations General Assembly on May 18, 2021.

Extracts from the resolution recognize that "glass has accompanied humankind for centuries, enriching the quality of life of millions, and that … [it is] one of the most important, versatile and transformative materials of history".

According to the resolution, "the International Year of Glass, 2022 will underline the technological, scientific, economic, environmental, historical and artistic role of glass in our societies, emphasizing the rich possibilities of developing technologies and their potential contribution to meeting the challenges of sustainable development and inclusive societies, achieving world economic recovery and building back better from the coronavirus disease (COVID-19), and bringing together the threads of technology, social history and art through educational programs and museum exhibitions".

Naturally, the IYOG committee was thrilled with the result.

"On the first of January, IYOG will begin!" enthuses Prof. Durán. "I am very happy and many people are really happy. It is a dream come true and is surely the most important project in my life. There is much work to do but I know we will succeed. This is not an individual project or the project of a few experts; it's a common project of the entire glass community in the world. The involvement of the glass industry is total —it's amazing! We will be counting on Glass Worldwide as a partner to keep everyone informed!".

Next steps

There is still a lot of work to do, reports Prof. Durán. With no financial support from United Nations, a fundraising campaign was launched to finance the IYOG's opening conference in Geneva on 10-11 February and other events will be funded by national organizers. Conferences will be staged by ICOM, the Contemporary Glass Art Association

and the Corning Museum of Glass, and there will be a US Glass Day in Washington.

The Spanish Research Council, CSIC, will stage two exhibitions. One will focus on the role of glass in the goals of United Nations 2030 Agenda for Sustainable Development. The other, supported by ANFEVI, FEVE and the Friends of Glass, will be dedicated to circular economy and recycling. Both will be presented in English and Spanish and the layouts and templates of these exhibitions will be offered to all the other countries for possible translation.

A high quality book in English and Spanish is also set to be produced, with a layout that can be adapted by other countries, and there will be another exhibition and book coordinated by Abividro (the Brazilian Association for Flat Glass Distributors and Processors) in Brazil, focusing on glass architecture.

IYOG will feature at China Glass Expo in April 2022, glasstec 2022, glasspex India 2022 and ICG Congress 2022 in Berlin, and, in the immediate future, at Vitrum 2021 in Milan this October.

International endeavor

"Co-ordinating all the proposals and activities all over the world is a huge undertaking and we are currently finalizing an international council committee, ideally consisting of 50-60 people with representation from each country", said Prof. Durán. "For example, John Parker and David Moore from the Society of Glass Technology are coordinating a UK steering committee. An executive committee will then be created. "The concept is to publish all activities through the website, for organizers to share full details of their events so that other countries can replicate those they are interested in".

With "thousands" of IYOG events being organized at a local level, and a variety of projects in the pipeline, 2022 is set to be a memorable year for glass.

Later Glass Worldwide reported on the IYOG2022 Opening Ceremony to kick-start 'The Age of Glass'

Communities from all glass sectors and regions have eagerly anticipated 2022: the International Year of Glass, following formal resolution approval granted by the United Nations General Assembly last May. With onsite numbers limited because of COVID-19 restrictions, Glass Worldwide joined 140 esteemed attendees for IYOG2022's two-day official opening ceremony, held at the UN Palace of Nations in Geneva, Switzerland to celebrate the unique characteristics of glass in all its forms.

Preceded by a FEVE- and GPI-sponsored welcome networking reception to start festivities, 30 globally renowned speakers from industry, academia, the media, museums and the art world officially opened IYOG2022 with presentations that detailed the latest scientific and technical breakthroughs to demonstrate how glass can aid the development of sustainable societies. The event was broadcast live to a global audience on the UN WebTV site and can still be viewed.

The opening ceremony commenced with a greeting from Professor Alicia Durán, IYOG Chair and Research Professor at the Institute of Ceramics and Glass (CSIC) in Madrid, followed by further welcome addresses from dignitaries including Agustín Santos Maraver (Spanish Ambassador at UN Spanish Mission in NY), Sadık Arslan, the Permanent Representative of Turkey to the United Nations Office at Geneva), Ambassador Ahmed Ihab Gamaleldin (Permanent Representative of Egypt to the UN Office in Geneva) and Shen Yanjie (Science and Technology Counsellor, Permanent Mission of China in Geneva).

Throughout the event, attendees and speakers consistently recognized the landmark achievements of Alicia Durán and her supporting teams in attaining formal UN approval for IYOG2022 and coordinating the multitude of international activities planned for the coming months. Stressing that the opening ceremony was just the start of the movement, Professor Durán stated: "We are announcing that we are not just entering the year of glass —we are entering the 'Age of Glass'". For an exclusive interview with Alicia Durán,

Phoenix Award Person of the Year 2019 and soon-to-be recipient of the 2022 Otto Schott Research Award, that details the story of IYOG's conception and the attainment of UN approval, see the July/August 2021 issue of Glass Worldwide.

Figurehead speakers

A selection of onsite and remote speakers representing the glass manufacturing and processing sectors in Geneva included Philippe Bastien (Chairman of Glass for Europe and Regional President, AGC Glass Europe), Reinhard Conradt (ICG President), Dr Frank Heinricht (CEO, SCHOTT), Jeffrey Evenson (Chairman of Corning Museum of Glass and Chief Strategy Officer, Corning Inc.), Emmanuelle Gouillart (Scientific Director, Saint-Gobain), Dr. Prof. Ahmet Kirman (Chairman of Şişecam), Erik Muijsenberg (Vice President of Glass Service), Corinne Claireaux (CelSian Academy Manager), Prof. Peng Shou (Academician Chinese Academy of Engineering and Board Chairman of China Triumph International Engineering Co Ltd), Ilkay Sökmen (Glass Technologies Director, Şişecam) Naoki Sugimoto (Executive Officer & General Manager, Materials Integration Laboratories at AGC), Vitaliano Torno (President of FEVE and Business Operations at O-I) and Dino Zandonella Necca (President of Vitrum and ADI).

FEVE and O-I's Vitaliano Torno proudly endorsed glass as the ideal packaging material for promoting sustainable production and consumption patterns, including reuse and recycling, as efforts to build a truly sustainable future accelerate. "We have a unique opportunity to celebrate glass. Glass is endlessly recyclable, guarantees quality and safety no matter how many times it's recycled and it's virtually inert. It's the healthy choice; beautiful; it builds brands and is loved by all generations. That's what makes it the perfect choice for brands, retailers and consumers alike", he commented.

Using the occasion to confirm the EU flat glass industry's commitments towards climate neutrality, Philippe Bastien of Glass for Europe and AGC Glass Europe said: "Today, flat glass is on track when it comes to sustainability, and we have tomorrow's solutions ready too. No other material provides such transparency, energy-efficiency, safety and durability at an affordable cost in the construction industry. We want to go much further and faster in slashing CO_2 emissions as much as possible from flat glass manufacturing. Many of our Glass for Europe members have [under] taken very ambitious commitments". Naoki Sugimoto from AGC in Japan added: "It is such an honor for AGC to support the International Year of Glass. Glass has been an unsung hero so far, but with United Nations approving IYOG2022, glass has the chance to become the hero".

Şişecam's Ahmet Kirman stated: "Şişecam is boldly taking responsibility and moving forward to protect, empower and transform its ecosystem. This understanding and sense of responsibility underlie Şişecam's vigorous efforts for the declaration of 2022 as the International Year of Glass by the UN. As an active member of ICG —the world's most prestigious institution of glass science in the world— Şişecam has supported the goal of the United Nations International Year of Glass 2022 from the very start. Throughout the year, Şişecam will focus on amplifying the global focus on glass".

"This year will provide special opportunities to engage across disciplines and to expand our understanding and we hope it will spark creativity and attract new talent to our field to continue the vital role of glass in advancing civilization", added Jeffrey Evenson of Corning.

Sponsors

Dr Frank Heinricht of SCHOTT covered the crucial role that glass plays in life science and the pharmaceutical industry and his company sponsored a grand Cocktails and Gala Dinner. Major IYOG 'Diamond' sponsors are AGC, Corning, Şişecam and Vitrum 2023 / Gimav. 'Avventurina' IYOG sponsors are Libbey and Saint-Gobain while

'Cristallo' sponsors include Glaston, Nazeing Glass Works, Nipro Pharma Packaging and SPIE. Abividro, Glass for Europe, Nippon Electric Glass, NGA, SGD Pharma, Sumitomo Electric, Verescence and Vical are IYOG 'Lattimo' sponsors. FEVE and GPI were sponsors of the welcome reception and other sponsors included Glass Service (lanyards), IRIS Inspection machines (attendee bag and red carpet photographs), Stevanto Group (charge station and coffee break), SPIE (notepads and pens) and Verate (technical sponsors). Glass Service (GS) Vice President Erik Muijsenberg, involved as an ICG Steering Committee member and a keen IYOG supporter from the very beginning, said: "We are honored to have designed for this event the lanyards that we believe will become a unique collector's item with this once in a lifetime opportunity in this glass age. We are proud to be an ICG-IYOG Official Sponsor". Jean-Luc Logel, CEO of IRIS Inspection machines, added: "We are proud to support this landmark event which celebrates the essential role glass plays in the health of humanity and the environment and coincides with the 20th anniversary of IRIS's foundation". China Triumph International Engineering Company (CTIEC) is a supporter of IYOG which is promoted and led by ICG (International Commission on Glass), Community of Glass Associations, and ICOM (international committee for museums and collections of glass).

Representing the IYOG Council, Professor John Parker from Sheffield University enthused: "Whether you're a brand looking to make your product stand out or a consumer keen to celebrate an iconic material, 2022 is the year to recognize glass for its many proven credentials and build on a longstanding cultural heritage, for example by advancing its contribution to the UN's Sustainable Development Goals. Europe enjoys the world's highest glass recycling rates, and significant progress has been made in glass manufacturing in recent years to increase sustainable production and consumption. There is further potential to progress towards a climate-neutral Circular Economy, by moving to renewable energies and advancing the sustainable use of natural resources. This all starts with encouraging more people to choose and recycle glass, to appreciate its recycling and reuse as an inherent part of our future consumption patterns, and to do it right, so that more glass ends back in new production loops".

British Glass Technical Director Dr Nick Kirk said: "It's a pleasure to attend such a prestigious event for our industry to represent the UK glass industry and begin the celebrations of our unique industry. Glass has always been a key part of our everyday lives, from food and drinks packaging to windows that bring light into our homes and the screens on our phones and laptops, and it will remain that way as we move forward to a more sustainable future with the glass sector leading the way in decarbonization. It's a wonderful opportunity to show why our industry and the material it produces is so great and I look forward to what we have ahead of us for the rest of 2022".

Program

Themed to celebrate the heritage and importance of glass, the 2 day opening conference program was published in the Glass Worldwide publication but is already printed in Chapter 2.5 of this book.

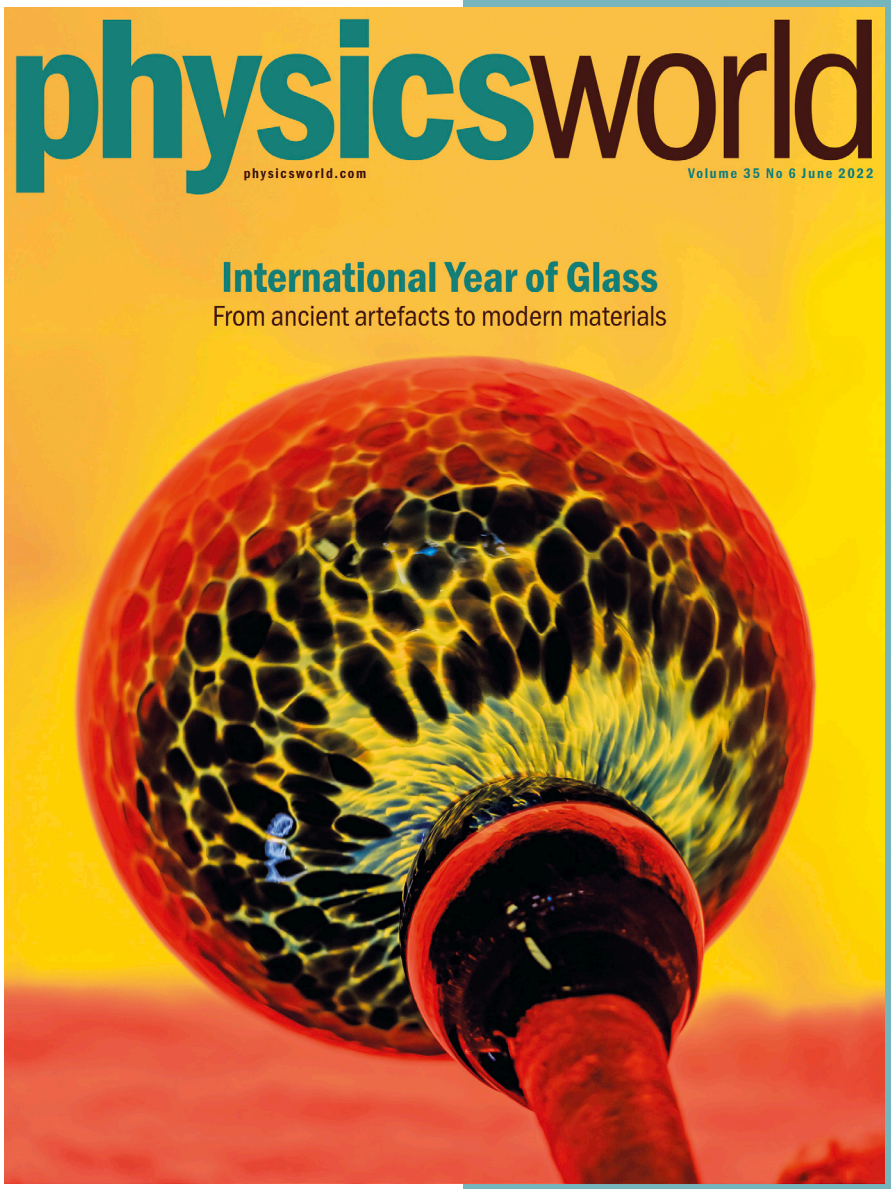
Forthcoming events

A host of IYOG celebrations include events coinciding with China Glass in April, Mir Stekla in Moscow in June, the ICG/DGG Congress in Berlin in July, Italian Glass Weeks in Milan and Venice in September, Glasstec in Düsseldorf in September and the closing IYOG2022 congress in Tokyo in December.

9.3. Communications on the Web

James Dacey is a science journalist and content creator based in Madrid, Spain.

Figure 9.4. Physics World magazine, June 2022, a special IYOG issue.
Source: IOP Publishing.



He has written extensively for a wider audience than would normally read articles on Glass. He wrote:

Magnifying inspiring glass stories through content

There is no point explaining the wonders of glass to someone who works with the material. They already know! The golden opportunity with the International Year of Glass (IYOG) was to reach and inspire new audiences. One important tool for achieving this was to publish articles (and other content types) in a range of publications. For my part, I did this by producing journalistic content for specialist science publications, predominantly for *Physics World*, the world's leading physics magazine. Most of this content is freely available on the *Physics World* website, which receives more than 1.2 million page views and 800,000 visitors each month.

Glass is a familiar —but deeply underappreciated— material. Everyone values its everyday applications such as windows, glassware and spectacles. But few people appreciate the extent to which glass-based technologies continue to shape the modern world —from telecommunications to healthcare and green energy solutions. "Because glass is



Figure 9.5. Volunteers helping to rescue shattered glassware following the 2020 industrial explosion in Beirut.
Source: © AUB Archaeological Museum.

invisible it does not always get the visibility it deserves", noted IYOG chair Alicia Durán when I interviewed her for the article 'A transparent tool for a fairer planet' published in the June 2022 edition of *Physics World,* a special issue inspired by the IYOG.

With this in mind, I used content during the IYOG to highlight the versatility and less celebrated applications of glass. As with all effective science communication, I attempted to *show* instead of *tell* audiences how glass impacts on their everyday lives. One example was to combine a narration with eye-catching visuals in the video 'Are we living in the Age of Glass?'. I also commissioned a podcast 'Fixing our bodies with glass' which explored two remarkable bioglass applications: glass putty that can heal broken bones, and glass surfaces patterned with nanoscale features that can resist unwanted bacteria.

Inspiring glass stories

As explained in the IYOG book *Welcome to the Glass Age*, it was clear that a central organising committee could not oversee all affiliated IYOG events across the world. The power of the international year would come from enabling and promoting local initiatives from the global glass community. Sharing some of these stories in international publications helped amplify their messages, and hopefully inspired others to take a lasting interest in glass.

One example is my article 'Piecing together a shattered history' for *New Scientist*, a story linked with the 2020 industrial explosion in the port of Beirut, Lebanon. That tragedy, which killed over 200 people and injured thousands, also smashed 72 glass artefacts dating back to the ancient Romans at the nearby American University of Beirut (AUB). In the aftermath, the AUB Archaeological Museum curator Nadine Panayot convened the international community in restoration efforts, including the IYOG-associated workshop Through Shattered Glass in January 2022. Later in the year, a selection of restored items was displayed in an exhibition at the British Museum in London, and Panayot is now leading an interdisciplinary project to study the origins of glass in Lebanon and the surrounding region.

New Scientist has a weekly circulation of 120,675 and 4m monthly website visits and the commissioning editor

Anna Demming said: "While the Beirut explosion was and remains a horrific personal tragedy for many people, this story was able to highlight how scientists are finding a way to not just bounce back from the disaster but use the circumstances of their misfortune to achieve what they had not been able to before. It was also full of intriguing nuggets about the long history of this versatile material, which has been a linchpin of civilization in numerous ways for thousands of years".

Glass offers hope

Another member of the glass community to inspire during the IYOG is Oksana Kondratyeva, a Ukrainian glass artist and architect. In a talk in April organized by The Worshipful Company of Glaziers and Painters of Glass, Kondratyeva spoke about Ukraine's stained-glass legacy and the damage to cultural glass from the recent Russian invasion. In my article 'The glass that offers hope' (and in an interview for the *Physics World podcast*) Kondratyeva described how glass art in Ukraine's underground stations became a source of hope to citizens sheltering amid airstrikes. It is a reminder that the power of glass to inspire is far greater than most of us can imagine.

Here is a summary of the IYOG content produced by James Dacey and other journalists for *Physics World* and *New Scientist* during 2022.

TITLE	AUTHOR
Article: International Year of Glass gets cracking in Geneva [2]	James Dacey
Article: Glass: a transparent tool for a fairer planet [3]	James Dacey
Video: Are we living in the Age of Glass? [4]	James Dacey
Article: A glassy solution to nuclear waste [5]	Rachel Brazil
Article: The many secrets of glass [6]	Jon Cartwright
Article: Blown away by the wonders of glass at Corning's spectacular museum [7]	Robert Crease
Article: Using physics to fuel fibre-optic innovation [8]	Joe McEntee
Article: Gorilla Glass: the unsung hero of the smartphone [9]	James McKenzie
Podcast: Fixing Our Bodies With Glass [10]	James Dacey/Andrew Glester
Article: The Glass That Offers Hope [11]	James Dacey
Podcast: Ukraine's stained-glass heritage shines through [12]	James Dacey (interviewer) & Hamish Johnston
Podcast: An interview with Alicia Durán about IYOG [13]	James Dacey (interviewer) & Hamish Johnston
Podcast about Physics World's coverage of IYOG [14]	Hamish Johnston & Tushna Commissariat
June IYOG special issue of Physics World (Members only) [15]	Various
Article: 'Piecing together a shattered history' [16]	James Dacey
Video: Piecing together the story of ancient glass after the Beirut explosion [17]	David Stock

Table 9.1. IYOG content for *Physics World* and *New Scientist* (2022).

The Regional Organization RO04 included Şişecam, Turkey, a large International Glass Company. Their in-house communications team worked hard to tell the stories of Glass and the IYOG to a wider constituency. Their report (Chapter 4.4) provides links to the material they produced and statistical information on the audience size.

9.4. Special issues of Journals

Publishers of the main scientific journals related to glass created special issues around important glass themes.

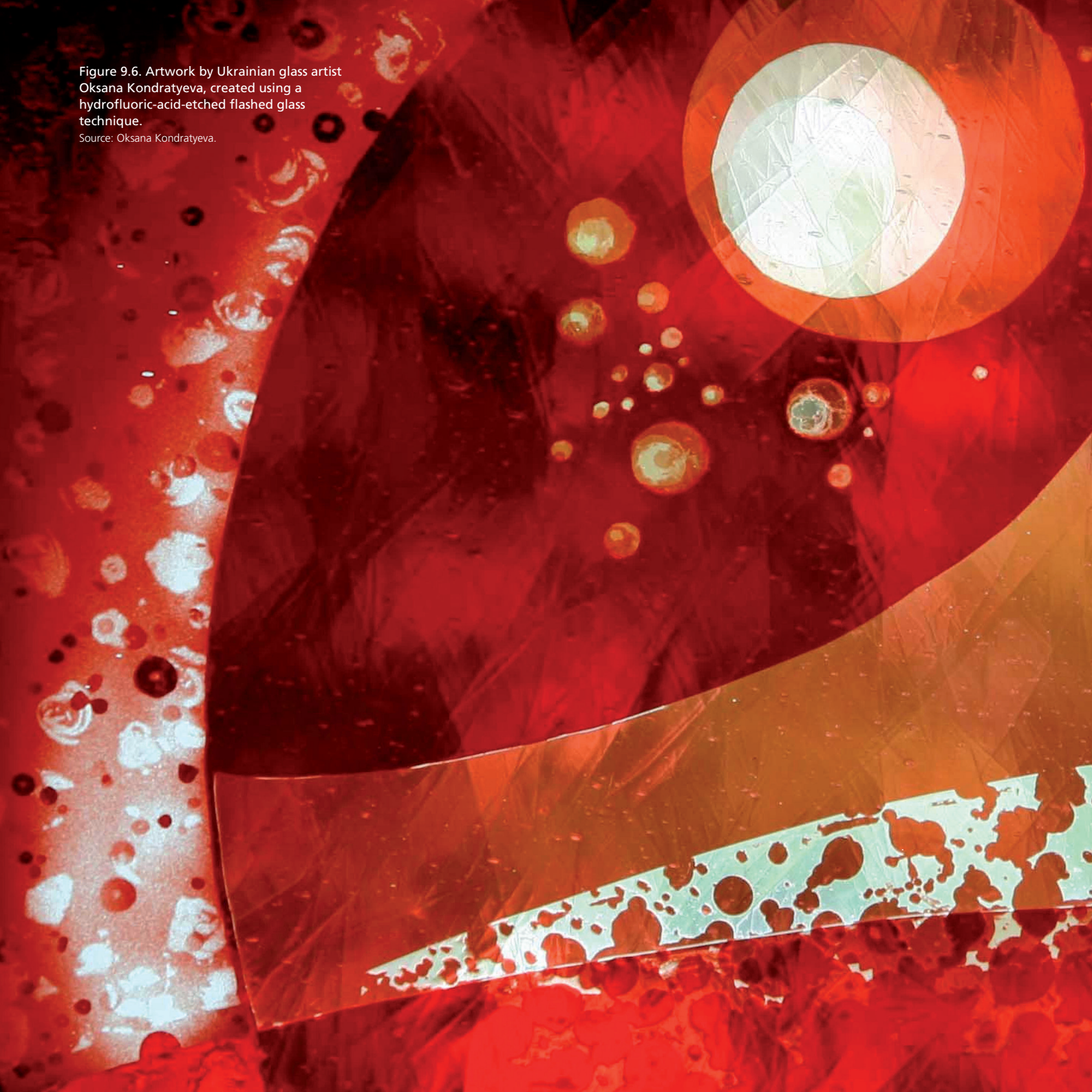


Figure 9.6. Artwork by Ukrainian glass artist Oksana Kondratyeva, created using a hydrofluoric-acid-etched flashed glass technique.
Source: Oksana Kondratyeva.



International Journal of Applied Glass Science, published by Wiley
Mario Affatigato, Editor in Chief and Alicia Duran, Co-Editor

The designation of 2022 as the International Year of Glass (IYOG) by the UN created an excellent opportunity for the entire worldwide glass community to celebrate the long and storied history of this amazing material. For people involved in scientific publishing, the year also provided an opportunity to look forward to advances in the study and applications of glass that may be on the horizon. The International Journal of Applied Glass Science, published by Wiley for the American Ceramic Society, jumped at the chance to create such a forward-looking forum for our authors.

The Special Issue dedicated to IYOG was published in July of 2022, covering a wide range of glass-related topics. All authors were asked to take a perspective looking forward, and the areas of the articles showed great breadth. From the future of optical fibers (Ballato, Shao) to laser-controlled crystallization (Musterman) to bioactive glasses (Galuskova), the incredible variety of applications of glasses was on full display. Industrial perspectives were included through the articles coming from Corning (Kohli) and NEG (Li) and through a paper that addressed glass use in the pharmaceutical industry (Guadagnino). Critical ongoing research in areas of significant current and future importance, like glass indentation strength (Varshneya article), modelling (Welch, Urata, Habasaki), and batteries (Qi), was also reported. Finally, the topic of glass structure —in its full richness— was thoroughly explored by Hauke, Vedishcheva and Hehlen.

The goal of the IYOG was to present to the world the amazing contributions of this material over the past three thousand years while reminding leaders and policymakers of its current and future importance. The economic impact of the topics listed in the papers above cannot be understated. The size of the fiber optic market alone in 2022 was $8.4 billion (Grand View Research, *Fiber Optics Market Size, Share & Trends Analysis Report By Type (Single Mode, Multi-mode, Plastic Optical Fiber (POF)), By Application (Telecom, Medical, Oil & Gas), by Region, and Segment Forecasts, 2023-2030*. 2023) [18]; that of glass substrates for displays was valued at $6.4 billion the same year. The market size of bio-glasses was only $161.65 million in 2021, but was projected to total $235.90 million by 2030. Although inflated by the COVID pandemic and subsequent vaccination campaigns, the pharmaceutical glass market has reached nearly $5 billion (Grand View Research, *Pharmaceutical Glass Packaging Market Size, Share & Trends Analysis Report by Product (Vials, Bottles, Cartridges & Syringes, Ampoules), by Drug Type (Generic, Branded, Biologic), by Region, and Segment Forecasts, 2023-2030*) [19]. This growth indicates a bright future for glass and its applications, especially as new areas and functionalities are developed.

The role of the Journal publishing industry remains essential to the scientific activity and progress of glass science. The International Journal of Applied Glass Science —albeit young by publishing standards— remains committed to playing a vital role in maintaining the position of glass as an essential component of humanity's future development, and our Special Issue in 2022 is a prideful example of our work.

Optical Materials Express, Optica Publishing Group
John Ballato, Ulrich Fotheringham, Mathieu Hubert, Stefan Nolte, Laeticia Petit and Kathleen A. Richardson.

Whether directly or indirectly, technological, architectural, or artist, the intersection of glass and light is as beautiful as it is enabling.

Indeed, it was only a few years ago that the UN celebrated the International Year of Light (IYL 2015). To celebrate the IYOG 2022, while paying homage to the IYL and this fusion of glass with light, a virtual Feature Issue of *Optical*

Materials Express [20] was organized and published in December 2022.

"Celebrating Optical Glass: The International Year of Glass 2022" [21] garnered 28 articles covering topics in optical and photonic glasses covering optical fiber materials to glass, amorphous materials, laser materials and processing, liquid crystals, and nonlinear optical materials. This includes a range of articles, including one opinion piece, 12 invited articles, and 15 contributed papers.

More specifically, this Feature Issue included articles discussing the state of the art in optical glasses, optical fibers, crystals embedded in glasses, laser materials and processing methods, and optical glass characterization methods. Importantly, and separating this Feature Issues from others, is a piece highlighting education and training of the global workforce needed to sustain the field of optical glasses well into the future.

Each paper is discussed in more detail in the Introduction to the Feature Issue [22], which was authored by the organizers, an international team of scholars in optical glasses representing academia and industry: Kathleen Richardson (CREOL, The College of Optics and Photonics, USA), John Ballato (Clemson University, USA), Ulrich Fotheringham (Schott AG, Germany), Mathieu Hubert (Corning Inc., USA), Stefan Nolte (Freidrich Schiller University/Fraunhofer IOP, Germany), and Laeticia Petit (University Tampere, Finland).

Optical Materials Express encompasses synthesis, processing and characterization of materials for applications in optics and photonics. Topics include advances in novel optical materials; their properties, modeling, synthesis and fabrication for optics and photonics; how such materials contribute to novel optical behavior; and how they enable new or improved optical devices. It is one of several journals published by Optica (formerly OSA), a professional technical society dedicated to promoting the generation, application, archiving and dissemination of knowledge in the field. Founded in 1916, it is the leading organization for scientists, engineers, business professionals, students and others interested in the science of light.

NB Cover page of Journal edited by Kathleen Richardson.

Heritage, MDPI: "New Advances in Stained Glass Research: Materials, Production Techniques and Conservation"

The issue focuses on the technical aspects of the production, the degradation and the conservation of stained glass, as well as on the importance of databases in the field of stained-glass research. It was edited by Dr. Marcia Vilarigues (VICARTE, Portugal), Dr. Sophie Wolf (Vitrocentre Romont, Switzerland) and Dr. Teresa

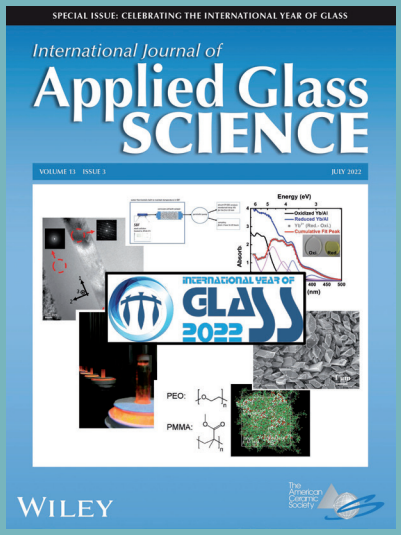


Figure 9.7. Cover of the special issue of IJAGS dedicated to IYOG.
Source: IJAGS.

Palomar (Instituto de Cerámica y Vidrio (ICV-CSIC), Spain).

The issue included six papers:

- "Interpreting Medieval Scottish Church Stained Glass Windows: Decoration and Colour in Relation to Liturgy and Worship" by Craig J. Kennedy and Michael Penman.
- "Comparison of Hyperspectral Imaging and Fiber-Optic Reflectance Spectroscopy for Reflectance and Transmittance Measurements of Colored Glass" by Agnese Babini, Phil Green, Sony George and Jon Yngve Hardeberg.
- "An Overview of Germanic Grisailles through the Stained-Glass Collection at Pena Palace" by Alexandra Rodrigues, Mathilda L. Coutinho, Carla Machado, Luís Cerqueira Alves, Andreia Machado and Márcia Vilarigues.
- "Austrian Stained Glass in the Interplay of Research and Conservation: Reflections on How to Preserve an Endangered Art Genre" by Christina Wais-Wolf, Petra Weiss and Christoph Tinzl.
- "XRF Imaging (MA-XRF) as a Valuable Method in the Analysis of Nonhomogeneous Structures of Grisaille Paint Layers" by Edyta Bernady, Maria Goryl and Małgorzata Walczak.
- "Dating Nathan: The Oldest Stained Glass Window in England?" by Laura Ware Adlington, Ian C. Freestone and Léonie Seliger.

The Spanish biannual journal "ARCOVE. La Revista"

This journal published two special numbers during 2022 in commemoration of the IYOG, coordinated by Sílvia Cañellas, with the help of the technical-scientific committee formed by Jonás Armas, Ana Carranza, Fernando Cortés, Pepe Cubillo, Núria Gil and Teresa Palomar.

In the journal No. 3 (April 2022), the following articles were highlighted:

- "CONVERSANDO CON Joan Vila-Grau" by Núria Gil,
- Historical article: "Vidrieras Saladriga: tres generaciones (1641-1797)" by Sílvia Cañellas,
- Practical article: "El amarillo de plata en vidrieras. Usos y aplicaciones" by Javier Lozano.

The journal No. 4 (October 2022) included the following:

- "CONVERSANDO CON Marta de Paz Urueña" by Sílvia Cañellas,
- Historical article: "Las vidrieras de la Iglesia del Hospital del Niño Jesús (Madrid) y la Casa Mayer de Múnich" by Mª Pilar Alonso Abad,
- Technical article: "Plomo: de la estructura de las vidrieras a nuestra estructura ósea" by Jonatan Díaz,
- Practical article: "De la restauración a la conservación. Colaboración transversal en las vidrieras de San Pedro de Olite (Navarra)" by Amaya B. Sánchez Bakaikoa and Violeta Romero Barrios.

Journal of Non-Crystalline Glasses (Elsevier) special issue: Glass as a Transformative Material: Past, Present, and Future

Edgar Dutra Zanotto; LaMaV - DEMa - Federal University of São Carlos, Brazil
Editors: Lina Hu, Liping Huang, Morten Smedskjaer, Edgar Dutra Zanotto,
Guest editors: Rui Almeida, Jincheng Du, Randall Youngman, Jianrong Qiu

To celebrate the IYOG, the first manmade material to be designated as the subject of a UN International Year, four distinguished scientists listed above were invited by the regular editors to suggest a list of well-known researchers from around the world. They wrote in their preface [23] that the topics covered the fundamental glass science of oxide and non-oxide glasses, the glass transition, sol-gel processing, mixed modifier effects, glass-ceramics processing and characterization, and viscoelasticity and rigidity through the glass transition. Laser-glass interactions, nanoclusters, and quantum dots in glasses (which provided the basis for the 2023 Nobel Prize in Chemistry) are also featured. In addition, various computer simulation studies are included, ranging

from atomistic to continuum simulations of glasses, interatomic potential development for glass simulations, pressure quenching effects on glass structure, and molecular dynamics simulations of crystal growth in glass-ceramics. Emerging areas, such as machine learning in glass research and persistent homology for medium-range glass structure determination, are also included. Finally, advanced applications in optical communications, scintillators, photonic devices, thermoelectric, bioactive glasses, and vitrification are presented as a form of nuclear waste disposal. These papers provide just a glimpse into modern glass science and technology's active and diverse research areas.

Amorphous in structure, glass is inherently complex. The glassy state is not in thermodynamic equilibrium and exhibits spontaneous relaxation, transitory behavior and crystallization, which remain the focus of numerous studies exploring these unique phenomena. As a result, glass research covers a wide range of methodologies, from classical materials research methods to advanced computer simulations and characterization techniques. As an ancient yet modern material, glasses continue to play a critical role in our daily lives, and they have been pursued to address significant challenges in our society's energy, environmental, and healthcare issues. The collection of papers in this issue, available worldwide in open-access format, showcases the frontiers of glass research and could attract future generations of scientists to the exciting world of glass. The guest and regular editors hope the interested reader can have an exciting glimpse into the future through the window of glass.

List of articles

- M.D. Ruiz-Martín, D. Holland-Moritz, F. Yang, C.C. Yuan, G.G. Simeoni, T.C. Hansen, U. Rütt, O. Gutowski, J. Bednarčík, A. Meyer, Microscopic structure and dynamics of glass forming Zr2Co melts and the impact of different late transition metals on the melt properties, https://www.sciencedirect.com/science/article/pii/S2590159122000516.
- Shingo Urata, Sayako Hirobe, Kenji Oguni, Shaofan Li, Atomistic to continuum simulations of fracture and damage evolutions in oxide glass and glass-ceramic materials: A critical review, https://www.sciencedirect.com/science/article/pii/S259015912200022X.
- Søren S. Sørensen, Tao Du, Christophe A.N. Biscio, Lisbeth Fajstrup, Morten M. Smedskjaer, Persistent homology: A tool to understand medium-range order glass structure, https://www.sciencedirect.com/science/article/pii/S2590159122000437.
- Jinhua Yu, Zheng Wang, Wei Chu, Yanwen Bai, Lina Hu, Interatomic potential controlled glass forming processes of binary CuZr melts, https://www.sciencedirect.com/science/article/pii/S259015912200070X.
- Hugo M. Flores-Ruiz, J. Quetzalcóatl Toledo-Marín, Cristian Fernando Moukarzel, Gerardo G. Naumis, Space-time rigidity and viscoelasticity of glass forming liquids: The case of chalcogenides, https://www.sciencedirect.com/science/article/pii/S2590159122000371.
- Hirokazu Masai, Optically active glass with a multifaceted approach, https://www.sciencedirect.com/science/article/pii/S2590159122000255.
- Shiliang Kang, Yanqing Fu, Hao Gu, Changgui Lin, Chalcogenide glass for thermoelectric application, https://www.sciencedirect.com/science/article/pii/S2590159122000310.
- Jincheng Du, Randall Youngman, Jianrong Qiu, Rui M. Almeida, A window to the future: Frontiers of glass research from a world perspective, https://www.sciencedirect.com/science/article/pii/S2590159122000474.

- Mohd Zaki, Sahith Reddy Namireddy, Tanu Pittie, Vaibhav Bihani, Shweta Rani Keshri, Vineeth Venugopal, Nitya Nand Gosvami, Jayadeva, N.M. Anoop Krishnan, Natural language processing-guided meta-analysis and structure factor database extraction from glass literature, https://www.sciencedirect.com/science/article/pii/S2590159122000231.
- Jianchao Lu, Zhitao Shan, Jun Zhang, Yucai Su, Kangfeng Yi, Yanfei Zhang, Qiuju Zheng, Mechanical properties of mixed modified oxide glasses, https://www.sciencedirect.com/science/article/pii/S2590159122000450.
- Alfonso Pedone, Marco Bertani, Luca Brugnoli, Annalisa Pallini, Interatomic potentials for oxide glasses: Past, present, and future, https://www.sciencedirect.com/science/article/pii/S2590159122000358.
- Shingo Nakane, Recent research on Li_2O-Al_2O_3-SiO_2 glass-ceramics for expansion of applications, https://www.sciencedirect.com/science/article/pii/S2590159122000413.
- Maria Basso, Elena Colusso, Marco Tancon, Stefano Bortolin, Matteo Mirafiori, Massimo Guglielmi, Davide Del Col, Alessandro Martucci, Hydrophobic hybrid silica sol-gel coating on aluminium: Stability evaluation during saturated vapour condensation, https://www.sciencedirect.com/science/article/pii/S2590159122000632.
- Wei Sun, Volkmar Dierolf, Himanshu Jain, Molecular dynamics simulation of seeded crystal growth in glass, https://www.sciencedirect.com/science/article/pii/S2590159122000334.
- Jong Heo, Byoungjin So, Zhiyong Zhao, Tihitnaw Fentahun Degu, Continuous-wave green laser irradiation to form PbS quantum dots in glass, https://www.sciencedirect.com/science/article/pii/S2590159122000498.
- Jincheng Du, Randall Youngman, Jianrong Qiu, Rui M. Almeida, A window to the future: Frontiers of glass research from a world perspective, https://www.sciencedirect.com/science/article/pii/S259015912200053X.
- Jingshi Wu, Aram Rezikyan, Matthew R. Ross, Peter J. Lezzi, Jian Luo, Anping Liu, Temperature and thermal stress analysis of ultrashort laser processed glass, https://www.sciencedirect.com/science/article/pii/S259015912200053X.
- Haidong Liu, Yunfeng Shi, Liping Huang, Deformation behaviors of a model metallic glass under 3-D nanoindentation studied in molecular dynamics simulation, https://www.sciencedirect.com/science/article/pii/S259015912200053X.
- Junzhou Tang, Ziyu Lin, Degui Tu, Tianxia Wei, Rui Duan, Shifeng Zhou, Design and fabrication of Tb^{3+} doped Gd_2O_3-WO_3-SiO_2 scintillating glass, https://www.sciencedirect.com/science/article/pii/S259015912200053X.
- Tian Hu, Wenyan Zheng, Zhiyu Liu, Jiannan Jia, Xiuxia Xu, Qiang Xu, Xvsheng Qiao, Xianping Fan, Strategies to host silver quantum clusters in borosilicate glass: How to mutually fulfill PL efficiency and chemical stability? https://www.sciencedirect.com/science/article/pii/S2590159122000528.
- Chunde Li, Chen Wang, Aldo R. Boccaccini, Kai Zheng, Sol-gel processing and characterization of binary P_2O_5-CaO and ternary P_2O_5-CaO-Li_2O mesoporous phosphate bioactive glasses, https://www.sciencedirect.com/science/article/pii/S2590159123000110.
- Xiaonan Lu, Jincheng Du, Effects of boron oxide on the structure, properties and bioactivities of bioactive glasses: A review, https://www.sciencedirect.com/science/article/pii/S2590159122000383.
- Brian Topper, Lucas Greiner, Randall E. Youngman, Darren Stohr, Efstratios I. Kamitsos, Doris Möncke, Effect of modifier cation size on the structure, properties and nickel speciation in BK7 type alkali borosilicate glasses, https://www.

sciencedirect.com/science/article/pii/S2590159123000134.

- Bing Yuan, Bruce G. Aitken, Sabyasachi Sen, Viscoelastic behavior and fragility of Se-deficient chalcogenide liquids in As-P-Se system, https://www.sciencedirect.com/science/article/pii/S2590159122000486
- S.J. Grutzik, K.T. Strong, J.M. Rimsza, Kinetic model for prediction of subcritical crack growth, crack tip relaxation, and static fatigue threshold in silicate glass, https://www.sciencedirect.com/science/article/pii/S2590159122000541
- A.M. Khegai, S.V. Alyshev, A.S. Vakhrushev, K.E. Riumkin, A.A. Umnikov, S.V. Firstov, Recent advances in Bi-doped silica-based optical fibers: A short review, https://www.sciencedirect.com/science/article/pii/S2590159122000462.
- Xiaofeng Liu, Yuting Yang, Jianrong Qiu, Emerging techniques for customized fabrication of glass, https://www.sciencedirect.com/science/article/pii/S2590159122000346
- Mengguo Ren, Jincheng Du, Effect of pressure quenching on the structures and properties of borosilicate glasses: Insights from molecular dynamics simulations, https://www.sciencedirect.com/science/article/pii/S2590159122000322.

Other special issues of Journals and Online Files

1. Special Issue of the Journal of the Chinese Ceramic Society (see Chapter 4.3.6).
2. Cycle of interviews with Stained Glass Artists (see Chapter 4.5.4). Online.
3. For National Day of Glass, Washington DC, a volume edited by Varshneya, Choudhary and Pye with brief updates on glass science, engineering and art (Chapter 4.7.3).
4. A website called 'May the Glass be with you' with links to >365 videos on Artistic Glass.
5. Chapter 4.9.2 a French book entitled 'Les secrets du Verre' designed for young people.
6. The French Academy of Sciences produced 2 special issues one for Geoscience and a second for Physics (Chapter 4.9.2.).
7. A special issue on Glass Science in IYOG2022 published in the May issue of the Japanese journal Chemistry and the Chemical Industry.
8. The Archaeologist, Issue 116, Summer 2022, A Special Issue entitled 'Archaeological Glass' Editorial: John Parker, Teresa Medici and Patrick Gavaghan on the IYOG; 6 articles on Glass.
9. Special Issue: "International Year of Glass 2022: Glass Contributing to the SDGs", 14 articles in the March 2022 Issue of Bull. Ceram. Soc. Japan (Ch 4.10.3).
10. A Special Issue on 'Glass Science in IYOG2022' in "*Chemistry and Chemical Industry*" [24] (May) The contents and contributing authors list was new and different from the special issue in *Ceramics Japan*, published earlier in March (Ch 4.10.10)
11. News from the Glass Division of the Korean Ceramic Society. A professional journal, *Ceramist* published a special issue on glass this month, consisting of 8 invited papers focused on various aspects of glass.
12. The Glass magazine, The Swedish Federation of Glazing contractors publishes a magazine "Glas" four times a year and during 2022, different perspectives were highlighted on how glass solutions contribute to a better society from a scientific, economic, and cultural perspective.
13. The Danish glass magazine called "Magasinet GLAS" is published quarterly. During the IYOG, the magazine highlighted both IYOG activities and the crucial role of glass in the development of sustainable society, particularly smart applications in buildings.
14. A major publication, *Lights Everlasting: Australia's commemorative*

stained glass from the Boer War to Vietnam was published by Australian Scholarly Publishing, Melbourne, in May 2023, the first Australian book to document this rich source of stained-glass history (Chapter 4.16).

15. The 13 chapters of IYOG book 'Welcome to the Glass Age' were reproduced in 4 parts in Kanch (Glass). A complete PDF version of the book is available online [24].

References

[1] https://issuu.com/quartzbusinessmedia/docs/glass_international_april_2022/s/15591759.
[2] https://physicsworld.com/a/international-year-of-glass-gets-cracking-in-geneva/.
[3] https://physicsworld.com/a/glass-a-transparent-tool-for-a-fairer-planet/.
[4] https://physicsworld.com/a/are-we-living-in-the-age-of-glass/.
[5] https://physicsworld.com/a/a-glassy-solution-to-nuclear-waste/.
[6] https://prod-physicsworld-iop.content.pugpig.com/blog/2022/05/22/the-many-secrets-of-glass/pugpig_index.html
[7] https://physicsworld.com/a/blown-away-by-the-wonders-of-glass-at-cornings-spectacular-museum/.
[8] https://physicsworld.com/a/using-physics-to-fuel-fibre-optic-innovation/.
[9] https://physicsworld.com/a/gorilla-glass-the-unsung-hero-of-the-smartphone/.
[10] https://physicsworld.com/a/fixing-our-bodies-with-glass/.
[11] https://physicsworld.com/a/the-glass-that-offers-ukraine-hope-oksana-kondratyeva-on-the-interface-between-art-science-and-architecture/.
[12] https://physicsworld.com/a/ukraines-stained-glass-heritage-shines-through/.
[13] https://physicsworld.com/a/laser-powered-photonic-circuits-drive-displays-double-anonymous-peer-review-takes-on-gender-bias-international-year-of-glass-hits-its-stride/.
[14] https://physicsworld.com/a/achieving-success-in-research-collaborations-celebrating-the-un-international-year-of-glass/
[15] https://physicsworld.com/p/magazine/archive/physics-world-june-2022/
[16] https://www.newscientist.com/article/mg25634061-500-piecing-together-the-story-of-ancient-glass-after-the-beirut-explosion/.
[17] https://www.youtube.com/watch?si=kQ0bToLIaGbvitDp&v=BZLnbJ-mDoI&feature=youtu.be.
[18] https://www.grandviewresearch.com/industry-analysis/fiber-optics-market#:~:text=Fiber%20Optics%20Market%20Size%20%26%20Trends,6.9%25%20from%202023%20to%202030.
[19] https://www.grandviewresearch.com/industry-analysis/pharmaceutical-glass-packaging-market.
[20] https://opg.optica.org/ome/home.cfm.
[21] https://opg.optica.org/ome/virtual_issue.cfm?vid=526.
[22] https://opg.optica.org/ome/fulltext.cfm?uri=ome-12-12-4660&id=521853.
[23] https://www.sciencedirect.com/science/article/pii/S259015912200053X?via%3Dihub.
[24] https://aigmf.com/glass-age.php.

H. Inoue and s. Tanabe

10. IYOG2022 Closing Ceremony, Dec 8-9

The IYOG Closing Ceremony attracted 190 attendees and 68 online. A local IYOG Japan Executive Committee organised it, supported by a) the Ministry of Education, Culture, Sports, Science and Technology, b) the Ministry of Economy, Trade and Industry and c) the Ministry of Foreign Affairs. The main goals were to summarize and to celebrate the many activities of the IYOG, and declare a future where a new glass-related network could be built, transcending the boundaries between industry and academia, science and art. A brochure and event web site (https://iyog2022.jp/) recorded the Ceremony, organizers and supporting organizations. The 56 speakers and participants represented 19 countries: USA, South Korea, Italy, Germany, Turkey, Uzbekistan, China, France, Netherlands, UK, Spain, Czech Republic, Ireland, Estonia, Belgium, Russia, India, Indonesia, Thailand.

The ceremony was held in the Yasuda Auditorium on the Hongo campus of the University of Tokyo, where the University has its Graduation ceremonies. The line of ginkgo trees running from the main gate to the Campus have become a symbol of the University of Tokyo. Construction of the auditorium began in 1921 but interruption by the Great Kanto Earthquake delayed completion to July 1925. The building is of the period, with a Gothic exterior and was built with an anonymous donation from Zenjiro Yasuda, the founder of the former Yasuda Zaibatsu; it only later became known as the Yasuda Auditorium. Renovations took place from 1988-94.



Figures 10.1. Close up of the entrance to the Yasuda Auditorium where the Closing Ceremony was held.
Source: © IYOG archive.



Figures 10.2. Yasuda Auditorium on the Hongo campus of the University of Tokyo.
Source: © IYOG archive.

Professor Tanabe, chair of the executive committee, welcomed the guests, then introduced the background to the IYOG and the year's events. Next, Mr. Naohito Kimura, Deputy Director-General of the Minister's Secretariat, Ministry of Education, Culture, Sports, Science and Technology, Dr. Akira Tsuneto, Deputy Director-General, Minister's Secretariat, Ministry of Economy, Trade and Industry gave congratulatory addresses, followed by Professor Reinhard Conradt, President of the International Commission for



Figure 10.3. Lecture Theatre.
Source: © IYOG archive.

Glass (ICG); Dr. Teresa Medici, the International Association of Museums (ICOM Glass) Chair, and Professor Arun Varshneya, Chair of the Society of Glass Technology (SGT) all passed on their greetings. Next were two keynote speeches. Professor Alicia Durán (CSIC, Spain), chair of the IYOG International Committee (former president of the ICG), spoke on the theme "Welcome to the Glass Age" with passionate words about the charm of glass, which will continue to be indispensable for humankind's development. Next, Prof. Manoj Choudhary, Chair of the North American IYOG Committee (Professor at Ohio State University), spoke online on: "Glass: Indispensable Material for Sustainable Development", discussing how glass contributes to the UN's SDGs.

From the Japanese glass industry, Dr. Yoshinori Hirai, Representative Director and President of AGC Corporation, Mr. Motoharu Matsumoto, Representative Director and President of Nippon Electric Glass Co., Ltd., and Mr. Michael Greenall, Chief Technology Officer of Nippon Sheet Glass Co., Ltd. and Mr. Yasuya Nakano, President and CEO of Corning International K.K.

spoke on the efforts of the glass industry from the perspective of top management. From neighbouring Korea, Professor Yong Gyu Choi of Korea Aerospace University talked on the characteristics and applications of chalcogenide glass.

To encourage participation by a younger audience, the nominal 10,000 yen participation fee was reduced to 5,000 yen for students (onsite/online). Also, financial support was provided from central IYOG funds to assist the participation of selected young speakers. Of the invited speakers and chairs 14 were female and 22 male. 23 of them, experts, young researchers, and young artists, contributed sessions on:

- Session 1: Glass structure from advanced simulation and characterization.
- Session 2: Characterization & Application.
- Session 3: Biomedical Glass.
- Session 4: Sustainable Glass Production.
- Session 5: Glass Art & Museum.

In addition, an exhibition of glass art of the "ì:tɔ:tén" was held near the Yasuda Auditorium. On the first afternoon, the audience were entertained by a guitarist using a quartz glass guitar pick developed by Professor Fujino of Kyushu University. An Award Ceremony for the "Seven Glass Wonders", solicited and selected by an International Committee, followed the next morning. Completing the day, an awards ceremony was held for the "World with and without Glass - Still Image and Video Contest", organized by the Executive Committee.

The International Closing Ceremony was a fitting end to the year's events and the Conference Chair, Prof. Hiroyuki Inoue (The University of Tokyo, Japan) expressed everyone's heartfelt gratitude to the speakers and chairs both on the stage and on the screen.

10.1. The Closing Ceremony Program

Thursday, Dec. 8, 2022

- 9:30 Welcome Address/Setsuhisa Tanabe (Chair of Japanese IYOG Executive Committee)
  Congratulatory messages:
  Naohito Kimura (Ministry of Education, Culture, Sports, Science and Technology, Japan)
  Akira Tsuneto (Ministry of Economy, Trade and Industry, Japan)
  Reinhard Conradt (President of ICG)
  Teresa Medici (Chair of ICOM Glass)
  Arun Varshneya (President of SGT)
- 10:50 Plenary lecture/Alicia Durán (Consejo Superior de Investigaciones Científicas) "Welcome to the Glass Age"
- 11:30 Plenary lecture/Manoj Choudhary (The Ohio State University) "Glass: Indispensable Material for Sustainable Development" *on-line*
- 13:20 Invited talk/Yoshinori Hirai (AGC Inc.) "The Identity of Glass"
- 13:55 Session 5: Glass Art & Museum Moderator: Teresa Medici
- 14:00 Karol Wight (the Corning Museum of Glass) "The Corning Museum of Glass: Inspiring People to See Glass in a New Light"
- 14:25 Ruriko Tsuchida (Toyama Glass Art Museum) "The activities and role of the Toyama Glass Art Museum in the Glass City, Toyama"
- 14:55 Marzia Scalon (Fondazione Giorgio Cini) "The General Archive of Glass: Preserving the past to imagine the future"
- 15:20 Future Generation Tomomi Tamura (Nara National Institute for Cultural Properties)
  "Archaeometrical Study on the Ancient Sandwich Glass Beads Found in Japan"
- 15:35 Future Generation Zuzana Kubelková (glass artist) "Tendencies in young glass"
- 16:05 Special Music Concert "Glassy Sound" Moderator: Shigeru Fujino (Kyushu University)
  Joshua Breakstone (guitar) and Satoshi Inoue (guitar) "Body and Soul", "All The Things You Are", "Autumn Leaves"

- 16:40 Session 1: Glass structure from advanced simulation and characterization, Moderator: Jincheng Du
- 16:45 Liping Huang (Rensselaer Polytechnic Institute) "Deformation Behavior of Glass under Sharp Contact Loading Studied by Molecular Dynamic Simulation"
- 17:10 Daniel Neuville (University of Paris) "Configurational entropy: an insight into the structure of glasses and liquids"
- 17:40 Jincheng Du (University of North Texas) "Understanding silicate glass-water interactions from atomistic simulations"
- 18:05 Future Generation Federica Lodesani (University of Modena and Reggio Emilia) "Possible nucleation pathways of lithium disilicate from melt through metadynamics simulations"

Friday, Dec. 9, 2022

- 9:00 Award Ceremony of Seven Glass Wonders
- 9:20 Session 2: Characterization & Application Moderator: Lothar Wondraczek *on-line*
- 9:25 Cindy Rountree (Le Centre CEA de Saclay) "Dub-Critical Crack Growth in Oxide Glasses"
- 9:50 Jianrong Qiu (Zhejiang University) "Exploration of glass manufacturing technology" *on-line*
- 10:15 Future Generation Takuma Nakamura (Tohoku University) "Transparent glass-ceramic fiber toward active photonic applications" Moderator: Mathieu Hubert (Corning Inc.) & Kiyoharu Tadanaga (Hokkaido University)
- 10:35 Hong Li (Electric Glass Fiber America, LLC) "The Science behind the Application and Production of Continuous Reinforcement Fiber Glass"
- 11:00 Lothar Wondraczek (University of Jena) "A better glass: From property exploration to digital design and high-throughput formulation" *on-line*
- 11:30 Future Generation Katelyn Kirchner (The Pennsylvania State University) "Physics-based Modeling of Spatial and Temporal Fluctuations in Oxide Glasses"
- 11:45 Future Generation Gülin Demirok (Şişecam) "A Scientific Journey of Fiber Glass: From Natural Resources to End-Products"
- 13:00 Invited talk / Motoharu Matsumoto (Nippon Electric Glass Co., Ltd.) "The unlimited possibilities of glass - For the realization of a sustainable society" *on line*
- 13:30 Invited talk / Yong Gyu Choi (Korea Aerospace University) "Exploiting Unique Properties of Chalcogenide Glass for Practical Applications"
- 14:05 Invited talk / Michael Greenall (NSG Group) "Float Glass. Carbon Neutral by 2050"
- 14:35 Invited talk / Yasuya Nakano (Corning International) "A Bright Future for Glass"
- 15:25 Session 3: Biomedical Glasses. Moderator: Julian R Jones (Imperial College London)
- 15:30 Delia Brauer (University of Jena) "Glass in the human body: glass-based biomaterials for repairing bones and teeth" *on-line*
- 15:55 Céline Saint Olive (NORAKER) "Glass for Bone Regeneration - From a Business Perspective"
- 16:25 Future Generation Justin Chung (Seoul National University Hospital) "Silica-polymer hybrids for bone regeneration"
- 17:00 Session 4: Sustainable Glass Production. Moderator: Terutaka Maehara (AGC Inc.)
- 17:05 Oscar Verheijen (Glass Trend) "Glass Trend - the global platform to jointly decarbonize glass production"
- 17:30 Tolga Uysal (Şişecam) "Sustainable Glass Manufacturing; An Industrial Glass Manufacturers' Perspective; Drawbacks and Opportunities" *on-line*
- 18:00 Steve Whettingsteel (Krysteline Technologies Ltd) "Developing a more sustainable glass recycling system"
- 18:25 Future Generation Shuntaro Hyodo (AGC Inc.) "Immersed Radiant Heater - A unique heat source for glass melting"

18:45 Closing ceremony



Figure 10.4. Exhibition of "ìːtɒːtén" art near to the Yasuda Auditorium.
Source: © IYOG archive.



Figure 10.5. The conference audience were entertained by two guitarists, one using a quartz glass guitar pick developed by Professor Fujino of Kyushu University.
Source: © IYOG archive.

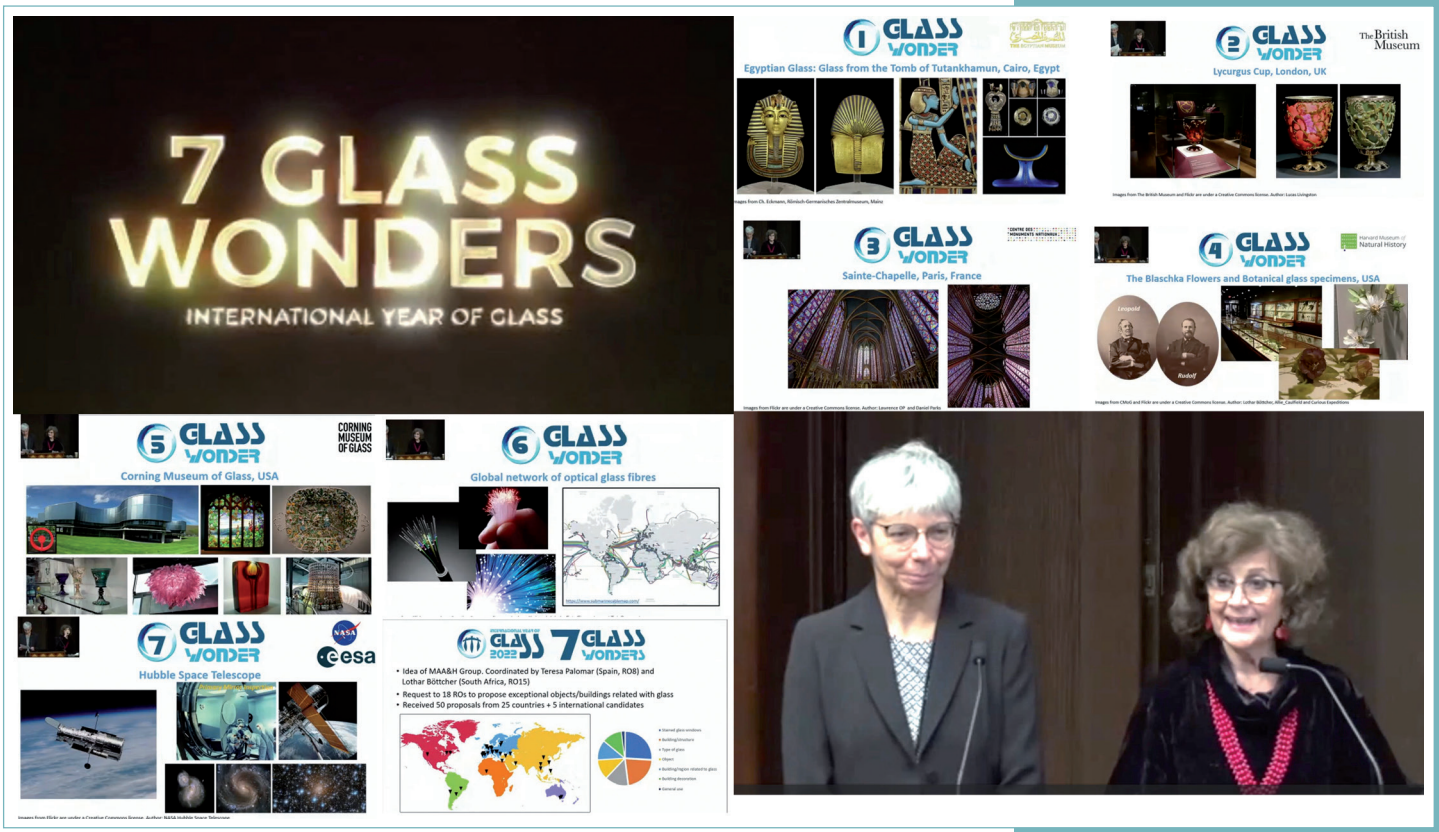


Figure 10.6. The 7 Glass Wonders announced at the award ceremony, together with Teresa Medici and Alicia Durán, members of the panel of judges.
Source: © IYOG archive.

In the Ceremony of 7 Glass Wonders Awards, Teresa Medici and Alicia Durán presented the 7 Glass Wonders selected by the jury. But there were more than 50 candidates to these awards including magnificent buildings and structures around the world, incredible constructions in which the glass was used in unbelievable ways. The following figures show some of the most well-known: Louvre Pyramid (Paris, France), Lina Bo Bardi´s Glass House (São Paulo, Brazil), Skywalk Bridge at the Grand Canyon West (USA), National Library of Belarus, the Shard (London, UK), and the Photovoltaic Building Of 8.5g Tft-Lcd Float Glass Production Plant (China).

Further information in chapter 7.



Figure 10.7. Glass buildings and structures around the world presented as candidates of the 7GW. Louvre Pyramid (Paris, France).
Source: © IYOG archive.



Figure 10.7. Lina Bo Bardi's Glass House (São Paulo, Brazil).
Source: © IYOG archive.

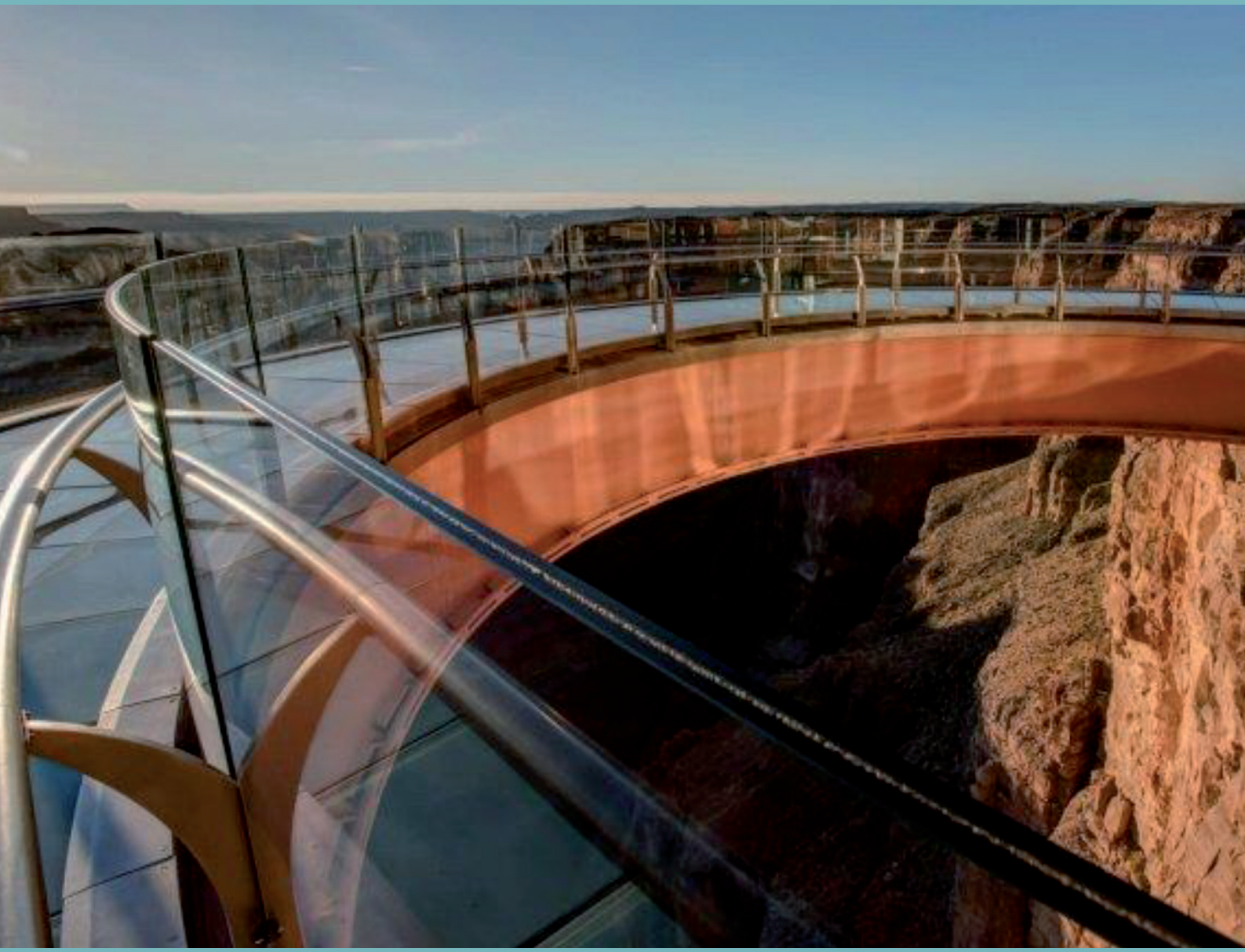


Figure 10.7. Skywalk Bridge at the Grand Canyon West (USA).
Source: © IYOG archive.



Figure 10.7. National Library of Belarus.
Source: © IYOG archive.



Figure 10.7. The Shard (London, UK).
Source: © IYOG archive.



Figure 10.7. The Photovoltaic Building Of 8.5g Tft-LCD Float Glass Production Plant (China).
Source: © IYOG archive.



Figure 10.8. Speakers at the Closing Ceremony.
Source: © IYOG archive.

10.2. Revenue and expenditure for the closing ceremony

Corporate sponsorships negotiated were as follows: three PLATINUM (1,500,000 JPY), six GOLD (500,000 JPY), nine SILVER (300,000 JPY), and ten BRONZE (200,000 JPY). Five more companies sponsored adverts: (100,000 JPY) each.

Contributions were also received from a Fund of the Institute of Industrial Science, Nippon Sheet Glass Material Engineering Subsidy and the IYOG2022 International Executive Committee (for younger participants). Smaller sums were also received from the nominal Registration fees and the Participation Fees for the banquet. The total available was €90,095*.

Expenditure

1. Glass Art Exhibition: €16,352
2. Music, Zoom, Lunch for invitees, admin, booklet: €15,565
4. Venue fee: €13,506
5. Travel/accommodation expenses for invited speakers: €37,470
10. Banquet Fee for Yushima Tenmangu Sanshuden Venue: €7,205

Total: 90,098 €*

* 1 JPY is assumed to be 0.007 €, and the figures shown here in Euros are approximate, so do not quite balance.



Figure 10.9. Sponsors of Closing conference IYOG in Tokyo.
Source: © IYOG archive.

10.3. Committee for IYOG Closing Conference

IYOG Closing Conference Programming Committee

Jincheng Du (University of North Texas, USA); Mathieu Hubert (Corning Incorporated, USA); Hiroyuki Inoue (The University of Tokyo, Japan); Julian Jones (Imperial College London, UK); Teresa Medici (Regional Government of Lombardy, Italy); İlkay Sökmen (Şişecam, Turkey); Lothar Wondraczek (University of Jena, Germany); Yuanzheng Yue (Aalborg University, Denmark)

IYOG Closing Conference Steering Committee

Conference Chair: Hiroyuki Inoue (The University of Tokyo, Japan)

Shigeru Fujino (Kyushu University); Hiroyo Segawa (NIMS and Tokyo Institute of Technology); Junko Habasaki (Schrödinger, Inc.); Kazuro Kizaki (The University of Tokyo); Koichi Kajihara (Tokyo Metropolitan University); Tetsuo Kishi (Tokyo Institute of Technology); Kiyoharu Tadanaga (Hokkaido University); Kohei Soga (Tokyo University of Science)

Japanese IYOG executive committee

Chair: Setsuhisa Tanabe (Kyoto University, Japan)

Vice-Chair: Hiroyuki Inoue (The University of Tokyo, Japan)

General Secretary: Satoshi Yoshida (AGC Inc., Japan)

Members: Tetsuji Yano; Akitoshi Hayashi; Shigeru Fujino; Hiroki Yamazaki; Tsuyoshi Honma; Yusuke Daiko; Kiyoharu Tadanaga; Atsunobu Masuno; Takumi Fujiwara; Kohei Soga; Koichi Kajihara; Atsunori Matsuda; Go Kawamura; Masamoto Tafu; Chikara Ohtsuki; Tomokatsu Hayakawa; Yomei Tokuda; Koji Fujita; Masahiro Shimizu; Masahide Takahashi; Tokuro Nanba; Hiromichi Takebe; Madoka Ono ; Tomoko Akai; Shinji Kohara; Hiroyo Segawa; Hiroyuki Inano; Kei Maeda; Ruriko Tsuchida; Junko Habasaki; Yasuhiro Saito; Yoshihiro Matsuno.

A further 11 academics and a retiree formed an Advisory Board and Kazuyuki Kuroda (President, The Ceramic Society of Japan) offered unique advice.

Alicia Durán and John M. Parker

11. Sponsors

Sponsors played a key role in the development and running of IYOG, particularly in the Opening Ceremony. Indeed, the nomination of 2022 as the International Year of Glass of United Nations carried a commitment from the organizers (ICG, COGA and ICOM-Glass) not to incur any expense for the United Nations. The Fundraising campaign is described in detail in Chapter 1 while Chapters 2 and 3 explain how these funds were spent. In this chapter we have invited the main sponsors and supporters to send a short text to express their perspective and evaluation of the IYOG.

The funding of these special sponsors was vital in running both the Opening Ceremony in Geneva, the closing Debriefing event at the UN headquarters in New York as well as supporting student attendance at the ICG Congress triennial conference in Berlin and the Closing Ceremony in Tokyo. Both UN events were recorded for posterity and will be available indefinitely on the UN website, widely accessible via links given on the IYOG2022 website and elsewhere. They were viewed by audiences of more than 7,000 people online and many more thousands after the event, a UN record.

Most of the remaining half of the sponsorship income was used for seed funding of projects globally (Chapter 3). Thousands of events took place in total with audiences of millions; almost 10% were given support. They ranged from a) Glass blowing demonstrations and Glass Art displays to b) educational lectures for the public on sustainability and recycling, c) to books and posters designed to encourage young people to take up careers in the Glass field, and



Figure 11.2. Aiming to achieve net zero carbon.
Source: AGC.



Figure 11.1. Logo of AGC.

d) events reported on national television channels and in the press. Many events provided focused support for the underprivileged in Society. We have also been able to arrange recognition by UNESCO of *'Glassmaking techniques'* which have been *'inscribed to the Representative list of the Intangible Cultural Heritage'*.

11.1. Yoshinori Hirai, President & CEO, AGC Inc., Japan sent these reflections

The IYOG was designated for 2022 to celebrate and raise awareness about the importance of glass in various aspects of human life. The initiative aimed to promote glass as a material with significant scientific, artistic, and industrial applications and to make it known that glassy materials play a vital role in helping us achieve the SDGs. As one of the diamond sponsors, AGC were very honored to support various events and projects all over the world, including the opening ceremony in Geneva in February, the National Day of Glass in Washington DC in April, the triennial ICG Congress in Berlin in July, the closing ceremony in Tokyo in December, and the UN de-briefing in New York in December. It was also a great pleasure for us to give some lectures in these formal events. Below are our thoughts on the value and achievement of various activities and events held in 2022. We believe that the enthusiasm during IYOG all over the globe will definitely be handed down to the next generations.

1. Promotion of Glass Industries: The IYOG involved initiatives to highlight the role of glass in various industries, including manufacturing, architecture, and technology in terms of energy saving and carbon neutrality. This could include conferences, exhibitions, and workshops to showcase advancements in glass technology.
2. Scientific and Educational Events: The IYOG might have featured events focused on the scientific properties of glass and its applications in research and development. Educational programs and outreach activities could have been organized to engage students from elementary to graduate school levels and the general public in understanding the scientific aspects of glass.
3. Art and Design: Glass has a long and rich history in art and design. The IYOG could have included exhibitions, installations, and festivals that celebrated the artistic aspects of glass, including traditional and contemporary glass art.

According to the record, more than 1,000 events and activities around the world were held in 2022 to celebrate IYOG and more than one million people enjoyed these activities. This confirms great success of IYOG2022. We would like to express our sincere respect to the IYOG organizing committee for their continuous effort. We believe that much more active collaboration among glass scientists, artists and industries will definitely generate new ideas and innovative glass products for the coming sustainable society.

11.2. Corning's retrospective remarks on the International Year of Glass

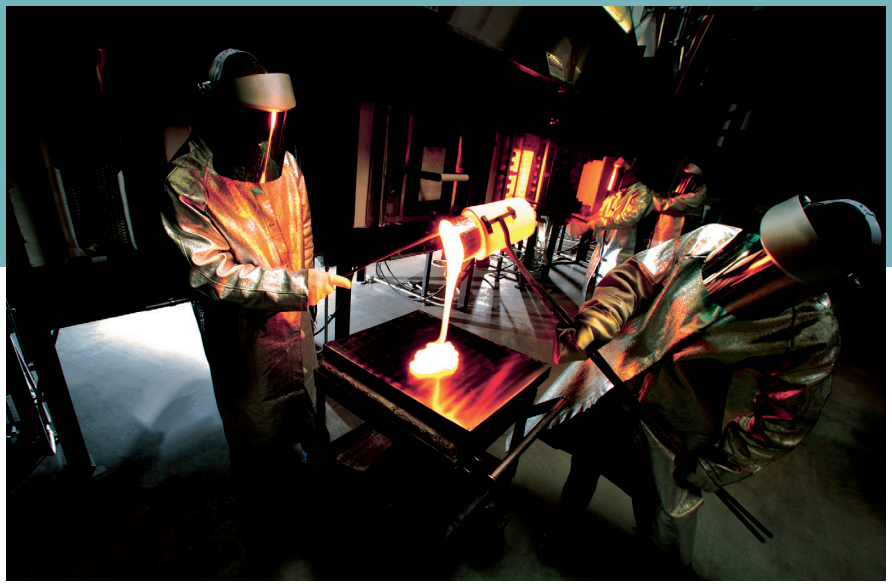
Glass touches our everyday lives, but we don't always see it. One of the amazing properties of glass is, after all, its transparency.

As material that delivers data over thousands of miles, enables vivid displays, and brings you the world on your smartphone display, crisply and clearly, glass is not always meant to be seen. That is why, when the United Nations International Year of Glass 2022 first came into focus, Corning supported the celebration from the start. To us, while glass usually transmits light invisibly, it should really be in the spotlight.

As a sponsor of the International Year of Glass, we saw the importance of spreading the word. The UN's yearlong celebration promoted the art and technology of glass as a material vital to the progress of humankind. The year of glass proclaimed the scientific —yet magical— capabilities of glass. But it also helped spark creativity and attract new talent to our field.

CORNING

Figure 11.3. Corning logo.



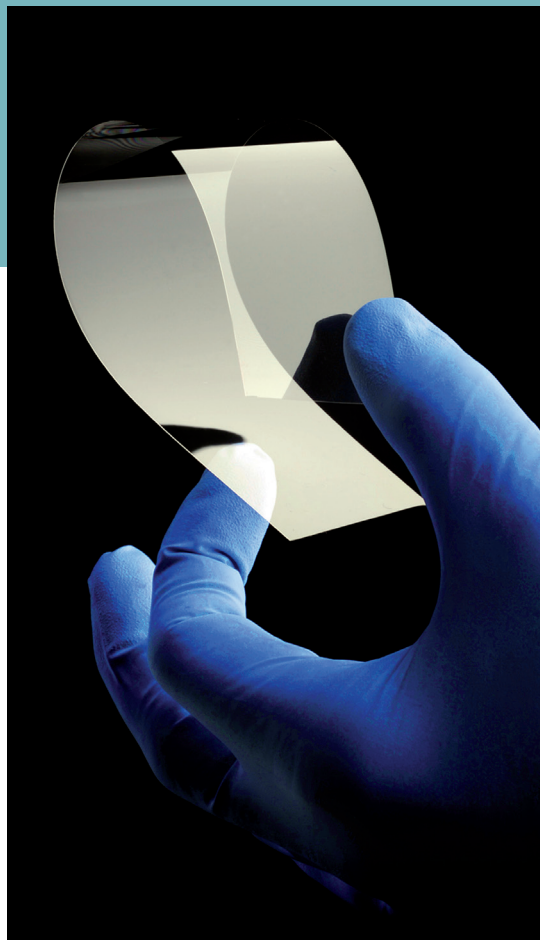


Figure 11.4. Corning glass research and flexible glass.
Source: Corning glass research.

At Corning, we use our expertise in glass to change the way the world works, learns, and lives. We make intentional use of its transformative properties to create products varied and impactful. When formed into vials, glass safely carries lifesaving vaccines to protect public health. When drawn into low-loss optical fiber, which Corning invented in the 1970s, glass helps bridge the digital divide, providing internet and equal access to information. When crafted into labware, glass becomes a vessel for advanced medical research —in more ways than one.

As we saw through the International Year of Glass, glass has the potential to do even more. Corning glass can propel artificial intelligence and scale up data centers. In solar panels, it can help harness the power of the sun, enabling renewable energy for a more sustainable world. Even the age-old glass application —windows— is getting more futuristic; they can darken on demand and help decrease buildings' energy consumption. And there is so, so much more.

Thanks to the tireless planning and organization of experts, artists, and researchers around the world, the International Year of Glass showed future generations the essential impact glass has on advancing the world. Throughout a year of forums, lectures, and gatherings, many were enamored with this truly special material —just as we are every day.

As we look to the future of glass, we're inspired by the words of our Executive Vice President and Chief Strategy Officer Jeffrey Evenson, as delivered at the International Year of



Figure 11.6. SCHOTT ultra-thin glass: SCHOTT UTG® is at the heart of the foldable revolution in the consumer electronics market. With a bending radius below 1mm after processing, it will enable foldable devices of the future.
Source: Schott.

Glass opening ceremony in Geneva: "The greatest advancements in glass still lie ahead".

11.3. Specialty glass from SCHOTT: Pushing us forward today and tomorrow

For centuries, glass has shaped civilizations and paved the way for advancements in fields like science, art, and architecture. It's been a constant throughout humanity and continues to play a leading role in innovations like foldable smartphones and next-generation semiconductors.

SCHOTT has been a proud leader in specialty glass for almost 140 years and embraced the opportunity to sponsor the United Nations' International Year of Glass (IYOG) in 2022. The company supported three international events to raise awareness of the importance of glass in science and technology and to promote sustainability in the glass industry. The versatility and special properties of this material make it so unique, allowing us to utilize it in different forms and an incredible variety of applications.

"Glass is often taken for granted despite its pivotal role in our everyday lives, so when the United Nations announced the International Year of Glass, we at SCHOTT immediately recognized its significance and wanted to share this message with the world", said Dr. Frank Heinricht, CEO at SCHOTT. "We've seen first-hand how glass has evolved from the optical glass developed by our founder Otto Schott for tools like

SCHOTT
glass made of ideas

Figure 11.5. Schott logo.



Figure 11.7. SCHOTT Glass-ceramic powder in tablet form: SCHOTT's glass ceramic powder has the potential to increase the performance and the stability of solid-state batteries for the next generation of E-Vehicles.
Source: Schott.

microscopes to complex materials driving technological breakthroughs, for example, our ultra-thin glass, which protects photovoltaics in space. Furthermore, as the first in our industry to set the ambitious goal of achieving climate-neutral production by 2030, we demonstrated how we plan to transform our energy-intensive industry to a more sustainable one".

Amid the celebration of glass and all its capabilities, the company continued to forge ahead in delivering new possibilities. SCHOTT's specialty glass is used in the National Ignition Facility (NIF) in California. In late 2022, the team at NIF achieved ignition —a breakthrough in laser fusion that brings us one step closer to a clean, infinite, carbon-free energy source. The technology company also developed a new glass vial, the first on the market to protect deep-cold therapeutics stored at temperatures down to -80°C, required for vaccines, such as gene therapy and mRNA drugs.

The technology company continues to be involved in pioneering projects like developing glass-ceramic powders for high-performance solid-state batteries and reinventing manufacturing processes to be more environmentally friendly.

SCHOTT's specialty glass has and will continue to play a vital role in society; the IYOG was a testament to the innovative work being done globally by the entire glass industry, showcasing the essential role of glass in advancing global industries. The leading company takes pride in uniting the international community in celebrating glass' contributions and will continue creating innovative products and solutions that benefit people and the planet.

11.4. The perspective of Şişecam is presented below

Glass is a material that has played a pioneering role in the development of civilizations throughout human history.



Figure 11.9. Şişecam Headquarters, İstanbul/Türkiye.
Source: Şişecam.

It holds strategic importance in various aspects of our lives. It also promises to be one of the most strategic materials of the future with its sustainability-oriented features. There is no doubt that glass, already indispensable in its traditional uses, will be the main component of many different and new applications in the future thanks to its unique transparency, formability, hardness, widespread availability, and sustainability features. As key stakeholders of the glass industry, we are responsible for extending the incomparable contributions of glass to every field it can enter and expanding its area of benefit. Targeting recovery in every area where glass is used is a crucial opportunity for our planet in the fight against climate change.

2022 was declared the "International Year of Glass" to emphasize the importance of this remarkable material. Şişecam, a pioneer player in the global glass industry played a leading role in the declaration of the "International Year of Glass" by facilitating support from various leading organizations across different sectors. At the request of Şişecam, nearly 40 institutions and organizations supported the application to the United Nations.

Şişecam's Chairman and Executive Member of the Board of Directors Prof. Dr. Ahmet Kırman delivered a closing speech at the opening event of the 2022

ŞİŞECAM

Figure 11.8. Şişecam logo.

Figure 11.10. Vitrum logo.



Figure 11.11. VITRUM 2023.
Source: VITRUM.

International Year of Glass in Geneva. Prof. Dr. Kırman touched on the role of glass in human history and its contribution to the development of civilizations in his speech.

To celebrate the "International Year of Glass" and draw attention to its sustainability, Şişecam conducted a comprehensive communication campaign in Türkiye, Bulgaria, and Italy to explain the miracles of glass in every field and raise public awareness. As part of the communication plan, all Group brands, especially Şişecam's corporate brand, intensively communicated the "International Year of Glass" throughout the year.

Şişecam produced and broadcasted a film on the miraculous properties of glass from the perspectives of sustainability and technology on digital channels and social media. The film was viewed more than 1.5 million times in Italy, Bulgaria, and Türkiye, and it reached nearly 60 million interactions in social media. In addition, within the communication campaign, advertorial content was placed in leading business and economics magazines.

Şişecam believes that glass can transform the world into a better place for all. It can protect the planet, and the future of billions. Its creative spirit shapes a better tomorrow with clarity and transparency. Through glass Şişecam sees a better future.

11.5. Raising global awareness about glass among VITRUM major missions

"Welcome to the Age of Glass!": it was with this remark that the international glass community introduced the International Year of Glass 2022 at the Opening Ceremony held in the UN Headquarter of Geneva.

After two years from that moment, we can say without hesitation that the countless events and activities organized by associations, international organizations and people had the strength to raise the global awareness about glass and its importance, "a material that", by quoting the VITRUM President, Mr. Dino Zandonella Necca, "often goes unnoticed as it's transparent, but it plays a fundamental role in our everyday life and for a sustainable and innovative development".



Figure 11.12. Terrazza Sant'ambrogio-Milano.
Source: VITRUM.

Based on these premises, VITRUM, major sponsor of the UN International Year of Glass 2022 and funder of the Community of Glass Associations that put the basis of a year dedicated to glass, has contributed to the celebration with the Italian Glass Weeks (Milan, 10-18 Sept, 2022 - Venice 17-25 Sept, 2022), Italy's first festival dedicated to industrial and artistic glass among two iconic cities, by featuring 300+ exhibitions, workshops, art installations, shows, activities for children and families as well as guided tours, cultural seminars, workshops and much more in order to highlight the internationally recognized excellence of Italy in the field of glass.

The Festival drew more than 450,000 visitors to 300+ events in more than 200 different locations, allowing people to cultivate a new awareness of glass and the industry behind it, in which Italy in an undisputed leader.

VITRUM activities continued also the year after in order to keep the flame of the new Age of Glass alive: thanks to VITRUM 2023 and Vision Milan Glass Week, Italy has hosted from 4 to 10 September two major events focused on glass. VITRUM 2023, as international trade show, provided space for 218 of the leading glass companies from 29 countries and for more than 10,000 daily B2B meetings between specialized industry professionals, perfect for an

event that traditionally makes quality and consolidating relationships its strength.

From the other side, Milan Glass Week focused on glass and its applications by involving 190,000 visitors over the 7 days of the event in some of the most exciting venues in Milan, the quintessential Glass Capital. And let's not forget the creative workshops for kids, in which hundreds of children between the ages of 5 and 10 years took part.

Sustainability and technological innovation were the two key drivers of both VITRUM 2023 and the Milan Glass Week, as highlighted during the Convention of Glass Associations, the annual meeting of the Community of Glass Associations, hosted during the trade show days, thus giving prominence to a material that can be recycled an infinite number of times and that can act as the driver of a solid circular economy and of innovation with an infinite number of applications.

While waiting for VITRUM 2025, which will bring the international attention on the glass industry's excellences back to Italy, a series of activities is planned for 2024 aiming to further discover the links between glass and the challenges that will characterize our society, such as artificial intelligence and sustainable development. In parallel, VITRUM will continue with its efforts to strengthen the bounds among the main international stakeholder through the Community of Glass Associations.

11.6. Prof. Peng Shou from CTIEC

Finally, Prof. Peng Shou from CTIEC was a key supporter of IYOG during the UN process and throughout the whole year.

The 2022 UN International Year of Glass marks the coming of the glass age for the world. As a witness and a contributor of glass technology advances, we're proud that "glass is shaping our lives and changing the world for the better". We are full of aspirations to build a dream of glass together.

In 2022, we built an "open and shared future" together. The International Year of Glass is a significant event with far-reaching impacts as it is the platform of dialogue and communication. We saw the necessity of openness for a better future through IYOG2022 and took this opportunity to embrace the world, the future and modernization, promoted

CNBM | CTIEC

Figure 11.13. CTIEC logo.





Figure 11.14. Project of one furnace with 8 lines in Tongcheng, China.
Source: Picture provided by Prof Peng Shou.

various projects, and strived to create a fascinating, beautiful and unique world of glass.

In 2022, we embraced innovation together. Glass development depends on innovation. We focused on carbon peaking and neutrality targets and embraced new world trends such as the digital economy to build a global community of innovation. We worked to promote technological and industrial projects, set up examples of international friendship, mutual trust and innovation leadership.

In 2022, we embraced a win-win future through cooperation. Given unprecedented changes unseen in a century, the global glass industry is more determined to pursue win-win cooperation. We put aside our differences, grasped the macro picture and general trends of the industry, and jointly opened up a new circuit for a bigger miracle in the global glass history.

From a decoration material in the past to a strategic material at present, glass is full of potential and possibilities. In the future, it will lead more radical transformations and play an indispensable role in our lives. The finish of IYOG2022 is not the end of our joint efforts. This international synergy will not vanish. We shall continue to carry on the spirit of IYOG2022, stand and work together to make glass shine brighter and to make our shared dream of glass more brilliant.

Alicia Durán and John M. Parker

12. Debriefing Event, 13-14th Dec. New York: IYOG2022 draws to a conclusion and a new future beckons

12.1. Introduction

Chapter 10 described the IYOG 2022 closing ceremony in Japan (7-8th December). It gave voice to scientists, technologists and artists worldwide who had two days together to share the common goals, aspirations and achievements of all who had participated in IYOG2022 and to consider the next steps. The 1.5h debriefing session at the United Nations Headquarters in New York on 14th December and the subject of this chapter was the final live event of the UN International Year of Glass. It focused on unpacking the many activities that had taken place during IYOG2022 and describing their positive impacts on wider society primarily to an audience of UN Officers, those who had granted the United Nations stamp. It was also an opportunity for the IYOG Steering Committee to celebrate with the local community.

The venue was the General Assembly building of the United Nations, USA with social events spilling over to the Conference Hotel RIU Plaza New York Times Square. The program was organized by a local USA committee along with the Executive Committee of IYOG. The NGA and Urmilla Jokhu-Sowell in particular played a major role in coordinating local efforts.

To finance this event a local fund-raising team worked hard to generate local sponsorships while IYOG funds remaining from the Geneva sponsors (chapter 1), provided more than €45,000, over half the total cost. A website was designed by Lewis Wilson and a brochure by Simon Smith as for the Opening Ceremony in Geneva.



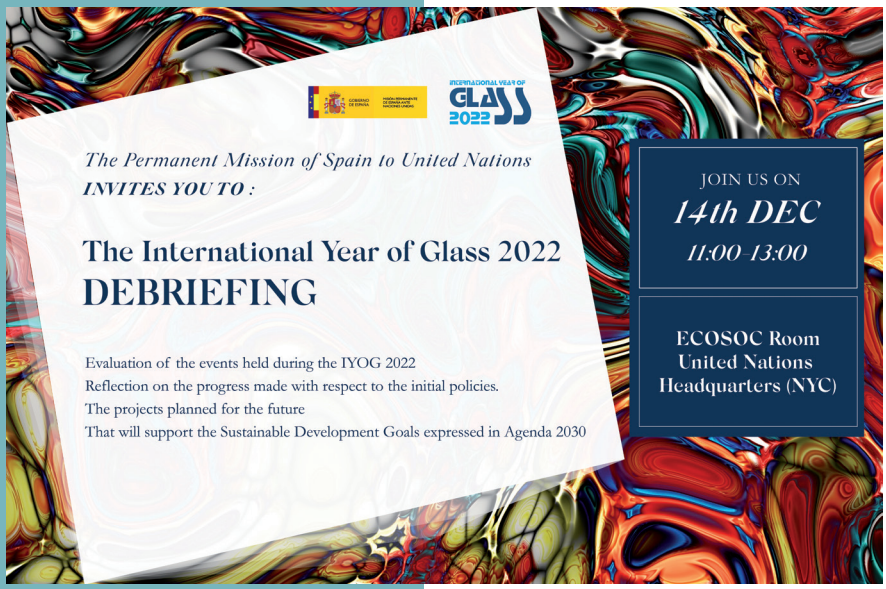


Figure 12.1a. Sponsors of the UN-NY Debriefing event.
Source: © IYOG archive.
Figure 12.1b. The formal invitation sent to members of the United Nations.
Source: © IYOG archive.

We also warmly thank the Permanent Mission of Spain at NY-UN for its help and support in the organization and for solving technical issues.

The event took place in the ECOSOC room and all the delegations at the UN were invited as well those who were actively involved. Although only around 130 attended in person, more than 1,000 attendees followed the streamed event online and several thousands more connected in the ensuing weeks.

The program started the previous evening (13th) at 6pm with a Reception and Red Carpet Photos.

After leaving the hotel on the morning of December 14th, on a cold but snow-free day everyone staying at the hotel moved to the UN Headquarters, many on foot. As for the Opening event in Geneva, visitors had to pre-register but with the correct 'paperwork', entry was straightforward.

12.2. Program

The formal event started promptly at 11am in the UN ECOSOC room (Figure 12.3) with well over 100 guests, many of whom had travelled there that morning. Prof Alicia Duran welcomed everyone and reminded the audience that the aim of the morning was to inform the United Nations how the Glass Community internationally had responded so



Figure 12.2. Red Carpet at the Welcome Reception.
Source: © IYOG archive.

positively to the award of a United Nations International Year of Glass, and to thank the UN for the multitude of opportunities they had created.

Next, she introduced the first speaker, Fernando Valladares, Research Professor at CSIC and an international expert in global change and climate challenges. His presentation reminded the audience of the reality of the situation the world community faces and proposed possible solutions.



Figure 12.3. Audience in the ECOSOC room.
Source: © IYOG archive.

12.2.1. A talk by Prof. Fernando Valladares, MNCN-CSIC, Spain

Prof. Valladares (Figure 12.4) entitled his 25-minute talk 'The interplay between climate change and the glass industry'. Here we include the text of his talk.

'The interplay between climate change and the glass industry', Fernando Valladares, MNCN-CSIC, Spain
The global glass industry holds a pivotal position in various sectors, contributing significantly to construction, packaging, research, transport and storage of liquids and beverages, and numerous other applications. However, this seemingly indispensable industry is not immune to the far-reaching impacts of climate change, and it is in return having an impact quota on global greenhouse gas emissions. The glass industry is deeply entwined with climate change through its reliance on energy-intensive processes. Glass manufacturing, characterized by high-temperature operations, often relies on fossil fuels, contributing significantly to greenhouse gas emissions. The production phase of glass involves energy-intensive processes such as melting raw materials, forming, and shaping. Emissions of greenhouse



Figure 12.4. Opening panel of the Debriefing IYOG, Fernando Valladares, Alicia Durán and Agustín Santos Maraver, Spanish ambassador at UN-NY (left to right).
Source: © IYOG archive.

gases, particularly carbon dioxide, are inherent in these processes. The transportation of raw materials to manufacturing facilities and the distribution of finished glass products contribute significantly to the industry's overall carbon footprint. Considerations for localized production to reduce transportation distances must be explored.

The manufacturing of glass involves high-temperature processes, typically in furnaces powered by natural gas. This contributes to greenhouse gas emissions. According to the U.S. Environmental Protection Agency (EPA), the glass-manufacturing sector accounted for approximately 1.1% of total industrial sector emissions in 2018. Implementing energy-efficient technologies and using recycled glass cullet can significantly reduce these emissions.

The high temperatures required in glass furnaces result in the release of not only CO_2 but also other pollutants like nitrogen oxides (NOx) and particulate matter. These emissions contribute not only to global warming but also to air pollution, affecting both climate and public health. However, recent advancements in technology and a growing emphasis on sustainability have prompted the development of more energy-efficient glass production methods. One notable improvement is the adoption of electric melting technologies and the utilization of renewable energy sources. Electric melting not only reduces emissions but also enhances flexibility in adjusting production levels, contributing to overall energy efficiency. Additionally, the integration of solar and wind energy into glass manufacturing processes has



Figure 12.5. Recycling of glass containers.
Source: Pixabay.

the potential to minimize the industry's carbon footprint.

The extraction and processing of raw materials for glass production, including silica sand and soda ash, can result in habitat disruption and ecosystem degradation. While glass is often lauded for its recyclability, its use still poses important environmental challenges. Challenges such as contamination and inefficient recycling systems need to be addressed. According to the Glass Packaging Institute, for every ton of glass recycled, over a ton of natural resources are saved, including 600 kilograms of sand, 150 kilograms of soda ash, and 140 kilograms of limestone; recycling just one glass bottle saves enough energy to light a 100-watt bulb for four hours. Recycling reduces energy consumption and helps reduce the demand for virgin materials, mitigating the environmental impact associated with extraction.

Embracing recycling and promoting a circular economy is crucial for the glass industry. For example, waste glass powder is being explored as a partial replacement for cement [1]. Waste glass has started to be widely preferred for concrete production in civil engineering applications in recent years. Glass is infinitely recyclable without losing its quality or purity, making it an ideal material for a closed-loop system. By increasing the recycled content in glass production, the industry can significantly reduce its reliance on virgin raw materials and curb the energy-intensive processes associated with their extraction and refinement. Furthermore, the recycling of glass helps to diminish landfill waste, as glass is inert and does not leach harmful chemicals into the environment. Implementing efficient recycling systems and educating consumers about the importance of recycling glass containers can contribute to a more sustainable and climate-friendly industry. Consideration of factors such as durability, insulation properties, and overall life cycle assessment are key sustainability strategies together with innovations in design and manufacturing techniques, including light-weighting and energy-efficient glass products.

The IYOG in 2022 served as a platform for assessing the industry's advancements and challenges. Insights gained during this IYOG include advancements in sustainable practices, innovations in glass technology, and collaborative efforts by industry stakeholders to address environmental concerns. The IYOG also witnessed a



Figure 12.6. Philip Johnson's glass house, New Cannan, US.
Source: Image by tookapic from Pixabay.

surge in research and development initiatives with especial attention on innovation, which led to the creation of novel glass technologies and applications. Researchers explored advanced glass compositions with enhanced properties, contributing to improvements in strength, transparency, and insulation. Additionally, breakthroughs in smart glass technology gained attention, opening up new possibilities for dynamic and interactive glass surfaces in buildings and devices. The IYOG 2022 prompted important advances in photonic applications that drive a great many current and future commercial and societally beneficial products and services [2].

One of the primary conclusions of the IYOG is the heightened awareness of the importance of glass in various aspects of our daily lives. The year-long celebration provided a platform to showcase the versatility and indispensability of glass in industries such as architecture, automotive, healthcare, and technology. The emphasis on glass as a sustainable and recyclable material gained prominence, leading to increased efforts to promote eco-friendly practices in the production and usage of glass products.

Moreover, the global collaboration and exchange of knowledge during the IYOG fostered stronger ties among



The international journal of science / 4 November 2021

nature

Glass is the hidden gem in a carbon-neutral future

Recycling glass does not degrade it, and manufacturing it can be carbon-free. So why are countries still burying glass in the ground?

Glass can be recycled infinitely without losing any of its properties. Why, then, are most countries – with the exception of those in Europe – still burying most of their glass as landfill by the tonne? In 2018, the United States alone offloaded almost 7 million tonnes of glass into landfill sites, accounting for 3.2% of all solid municipal waste, according to the US Environmental Protection Agency.

The push to cut plastics use is accelerating the search for new materials, especially for containers that can hold liquids. But glass is an existing material that could be the star of a net-zero carbon economy.

Worldwide, glass manufacturing produces at least 86 million tonnes of carbon dioxide every year. But most of this can be eliminated when glass is recycled, and existing technologies could turn glass manufacturing into a mostly carbon-free process. What needs to happen is for countries to stop sending glass to landfill sites, and to make glass recycling mandatory.

Glass is made by heating limestone, sand and soda ash to 1,500 °C. This heat comes from natural gas, and it accounts for between 70% and 85% of the carbon emissions from glass manufacturing. The remaining emissions are a by-product of the chemical reactions between the raw materials. But some of these materials can be replaced with crushed recycled glass, known as cullet. When cullet is melted, no CO_2 is released. And furnaces don't have to burn so fiercely to melt glass as to melt the raw materials, offering further carbon savings. According to the European Container Glass Federation (FEVE), an industry group

Shattered glass from an explosion in Beirut in 2020 is sorted for recycling.

"Communities and companies should be helped to create infrastructure to collect glass and recycle it."

emissions, and that, too, needs to be understood.

When it comes to glass recycling, Europe is the world's most advanced region by some margin, and has ambitions to be even better. Researchers could study how Europe's recycling scheme came about, its strengths and weaknesses and whether there are lessons for other countries. Three-quarters of glass used for containers such as bottles is collected for recycling across all 27 member states and the United Kingdom. As a result, new glass made in the European Union already contains some 52% recycled material. The glass-container industry has set itself a target of collecting 90% of all waste container glass in the EU by 2030.

But other countries are not where they need to be. Moreover, data on glass recycling are difficult to find, partly because most countries are not reporting what they are doing. There seems to be no international body that

Figure 12.7. *Nature* editorial November 2021.
Source: *Nature*.

various professionals and scientists, with conferences, workshops, and exhibitions that provided a platform for sharing insights, discussing challenges, and exploring collaborative solutions. This interconnectedness facilitated the dissemination of best practices, ensuring that advancements in one region could benefit the global glass community.

The year 2022 also underscored the role of glass in addressing pressing global challenges. The use of glass in sustainable architecture gained prominence, with a focus on energy-efficient buildings and environmentally conscious designs. The development of solar technologies utilizing glass substrates showcased the potential of glass in contributing to renewable energy solutions. These applications not only demonstrated the versatility of glass but also positioned it as a key player in the transition toward a more sustainable future. According to Furszyfer Del Rio *et al.* (2022) five questions were examined and are still requiring further attention: What alternatives exist to abate the climate effects of glass and thus make the full life cycle of glass more sustainable? What are the key determinants of energy and carbon from glass? What technical innovations have been identified to make glass manufacturing low to zero carbon? What benefits will amass from more carbon-friendly process in glass manufacturing, and what barriers will need tackling [3]? Glass manufacturing and use across multiple sectors (including buildings, automotive manufacturing, construction, electronics and renewable energy) are exploring and balancing the options to decarbonize the glass industry. There are still relevant barriers for decarbonization, which range from financial to infrastructural capacity.

On the economic front, the IYOG also had a positive impact on the glass industry. Increased awareness and appreciation for glass products led to a rise in demand, benefiting manufacturers and businesses across the supply chain. Governments and policymakers recognized the economic potential of a thriving glass industry, leading to supportive policies and investments in research and infrastructure.

In conclusion, the links between climate change and the glass industry are multifaceted and demand a holistic approach for mitigation. This holistic approach was promoted during the 2022 International Year of Glass. It became evident the role for stakeholders, including manufacturers, policymakers, and consumers, to collaborate in fostering a sustainable future for the glass industry, contributing to global efforts in combating climate change. After thousands of years of glass forming an essential part of our civilization, after centuries of understanding the environmental impacts of glass and after decades of quantifying the risks from climate change, the time has come to ask a disturbing question: is humanity ready for glass?

The final question the speaker poses is important. The next pages go some way to answering Prof. Valladares but Prof. Durán takes up the implied challenge with a stirring commentary at the conclusion of this chapter.

12.2.2. Presentations

Most of the remaining time was taken by three presentations focused on UN2030 Humanitarian Goals, with selected examples of what had been achieved and possible future scenarios. These multimedia presentations highlighted the best of the many hundreds of activities in every continent that ran during IYOG2022, and which had involved millions of people. They: a) highlighted the lessons learned, and b) outlined selected legacy projects that will both generate lasting, positive memories and promote exciting future activity. The themes selected as examples were:

- Equality and Education.
- Sustainability and Climate Change.
- Health Issues and Social Well-being.

Glass naturally was the unifying thread. The first topic showed the value



Figure 12.8. Panel for Equality and Education. John Parker, Katy Devlin and Andrew Page.
Source: © IYOG archive.

of, and the strides taken in inclusive working and cross boundary collaboration. The second highlighted the green credentials of glass, its contribution to sustainable living, energy generation and a zero-carbon footprint, and the final section showed how glass is contributing to physical health, for example through bioactive products, and to mental well-being by grounding communities in their local history, facilitating communications and valuing both manual and academic skills.

12.2.3. Theme 1: Equality and Education

This presentation, by J. M. Parker, Sheffield Univ., A Page of Urban Glass, New York and K. Devlin from NGA, highlighted IYOG activities that supported the UN 2030 Sustainable Development themes of Education and Equality. Marco Demichelis assembled images, short videos, stills and slides, generated during the year. A script with three voices was timed to match the running video. So *ad hoc* comments were not possible, but many more IYOG activities were covered even within a tight schedule. It focused on inclusive, lifelong, quality education; gender equality; empowering women and girls; and reducing inequality within and between countries. Since its first creation the video has been re-worked and is now online[1], where it receives a steady flow of interest.

Generating a legacy of educational materials

We highlighted the many books and video clips produced during the year – a starting point for the comprehensive lists in Chapter 11. Many talks had been broadcast online, often free, accessible globally, recorded for posterity and including a diverse mix of presenters. Audiences were all genders, all ages, both privileged and underprivileged, from the North, South, East and West (in spite of time differences!). The IYOG generated online reading material, encouraged competitions that crossed borders, and engaged school children in different age groups by exploring more interactive teaching methodologies; IYOG grants enabled international collaboration (Chapter 5).

Equality and education for all ages

Activities involving younger participants included: a) school computers in

1. https://www.youtube.com/watch?v=-tUyKho9ZtY.

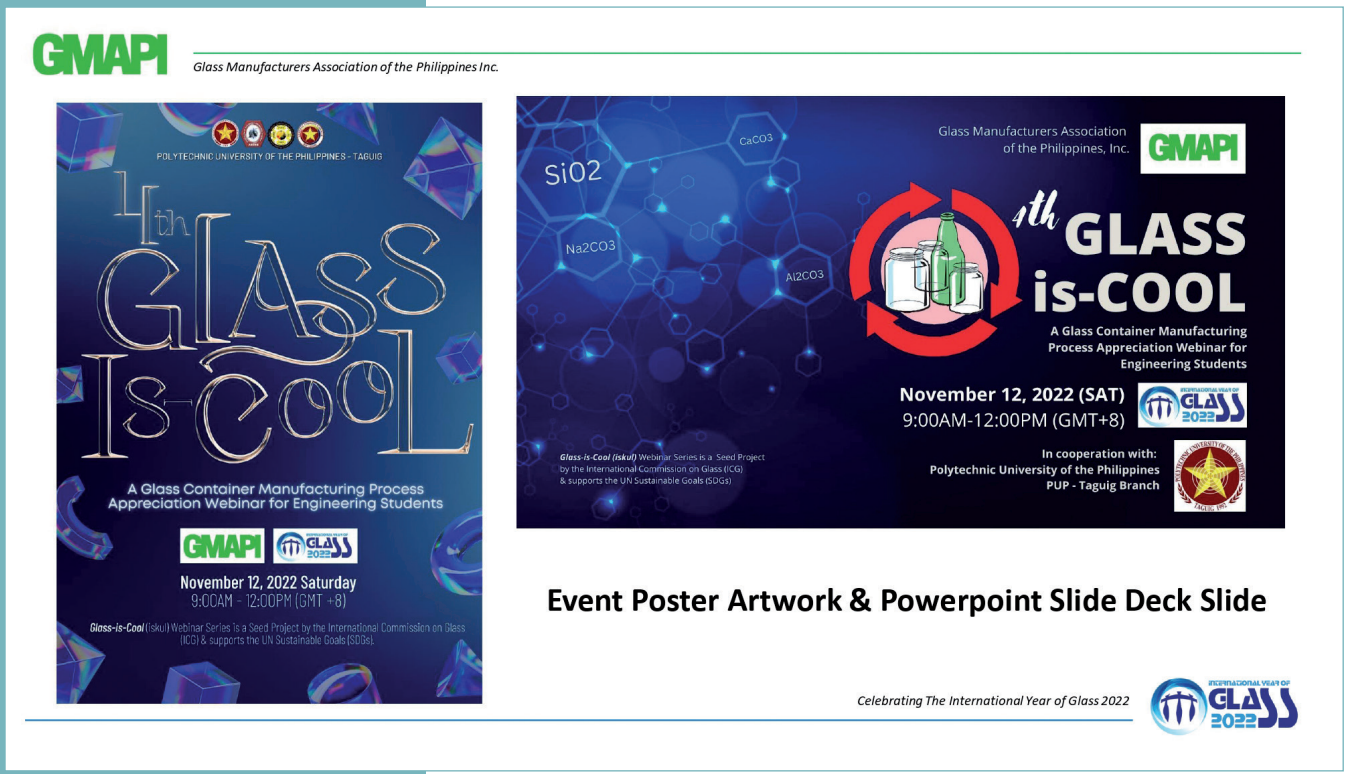


Figure 12.9. Report 4th Glass is Cool, PUP Taguig Branch, Philippines.
Source: © IYOG archive.

exchange for recycled bottles in the Philippines (Figure 12.9), b) essay writing competitions on sustainability in India c) museum tours. Some we co-financed (Chapters 3 & 5). All countries have issues with education and pupils who are not fully engaged by a standard/one size fits all educational model. So, *one American Group* put on glass blowing classes for young adults burdened by the negative influences of a gun culture —an example of the value of manual skills as an aid to well-being (Chapter 6.2 has other examples). Other activities targeted an older age cohort, offering opportunities to try new skills and learn more about their environment and its history.

Gender equality

A short film taken in the Royal Glass Factory in Spain, demonstrated how female glass blowers have proved equally as able as their male counterparts in glass







Figure 12.10. Art as a way to increase inclusion, diversity, gender equality, innovation and collaboration.
Source: © IYOG archive.



Figure 12.11. Women in glazing NGA.
Source: NGA.

blowing. Artists worldwide worked hard to share with a broad public the dynamic and theatrical process of glass blowing and shaping. Indeed, these were not only demonstrated, but members of the public from widely different backgrounds were often given the opportunity to try it themselves; some of these activities were documented on video. Figures 12.10 and 12.11 demonstrate the value of a diverse, inclusive work force.

Expanding horizons

The IYOG saw industrial sponsors help to make possible almost 30 glass festivals around the world. Because so many of these regular events had been postponed

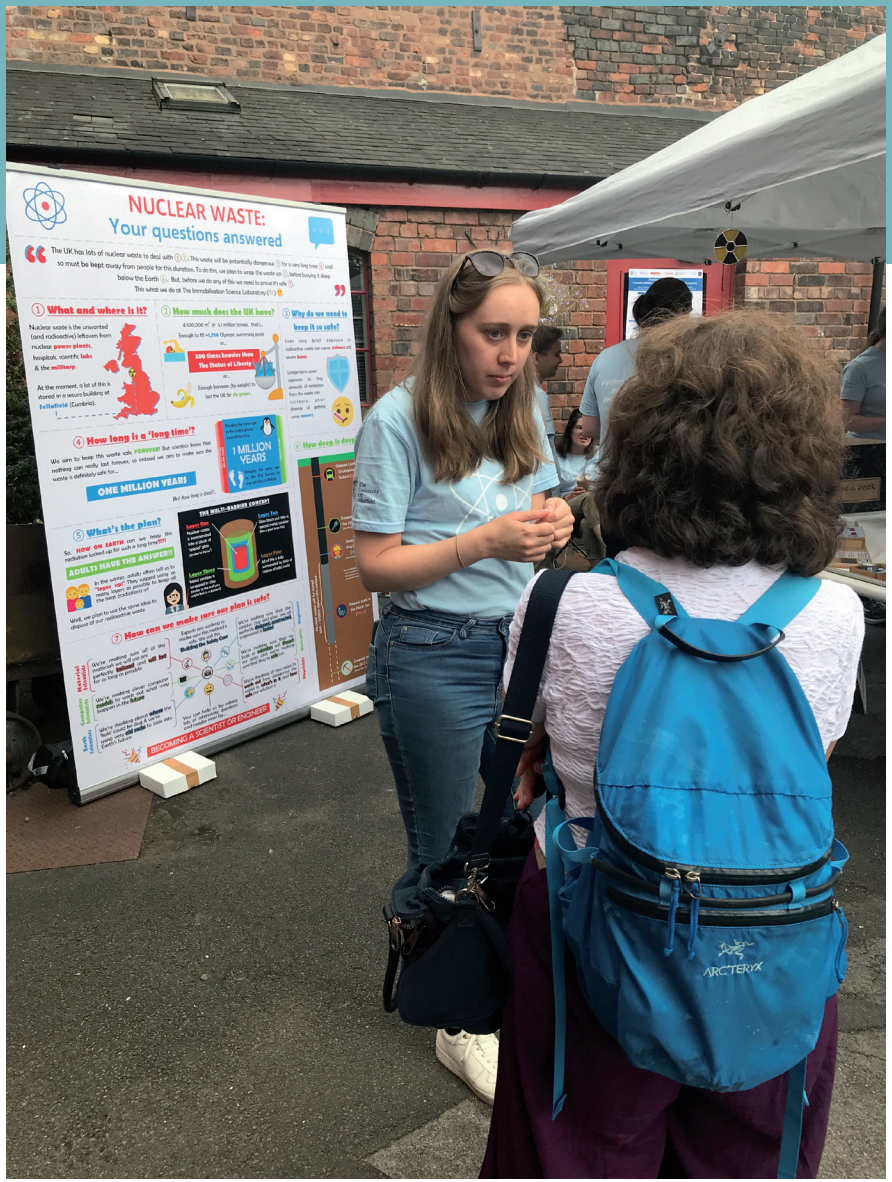


Figure 12.12. Conversation at the Stourbridge Glass Biennale between a visitor and a research student working on Nuclear Waste Disposal.
Source: © IYOG archive.

during the COVID pandemic, the opportunity to hold these celebrations of glass once again created a fantastic buzz and boosted attendance. We heard Janine Christley's recorded talk about the UK Glass Biennale and the International Festival of Glass which brought artists from the Far East to the UK; we watched a video of a Glass Garden created largely by students at the UK Chelsea Flower Show but with glass experts on hand to talk to members of the public, some seizing the opportunity to share ideas, experiences and questions around sustainability, a critical topic given especial prominence.

The IYOG's international stage became a forum for concerns such as the importance and preservation of heritage, both physical glass landmarks, and centuries of learned skills, under threat due to shifts in glass production. So, we saw the results of an international collaboration to restore ancient Glass Treasures shattered in the 2020 chemical explosion in Beirut (Chapter 6).

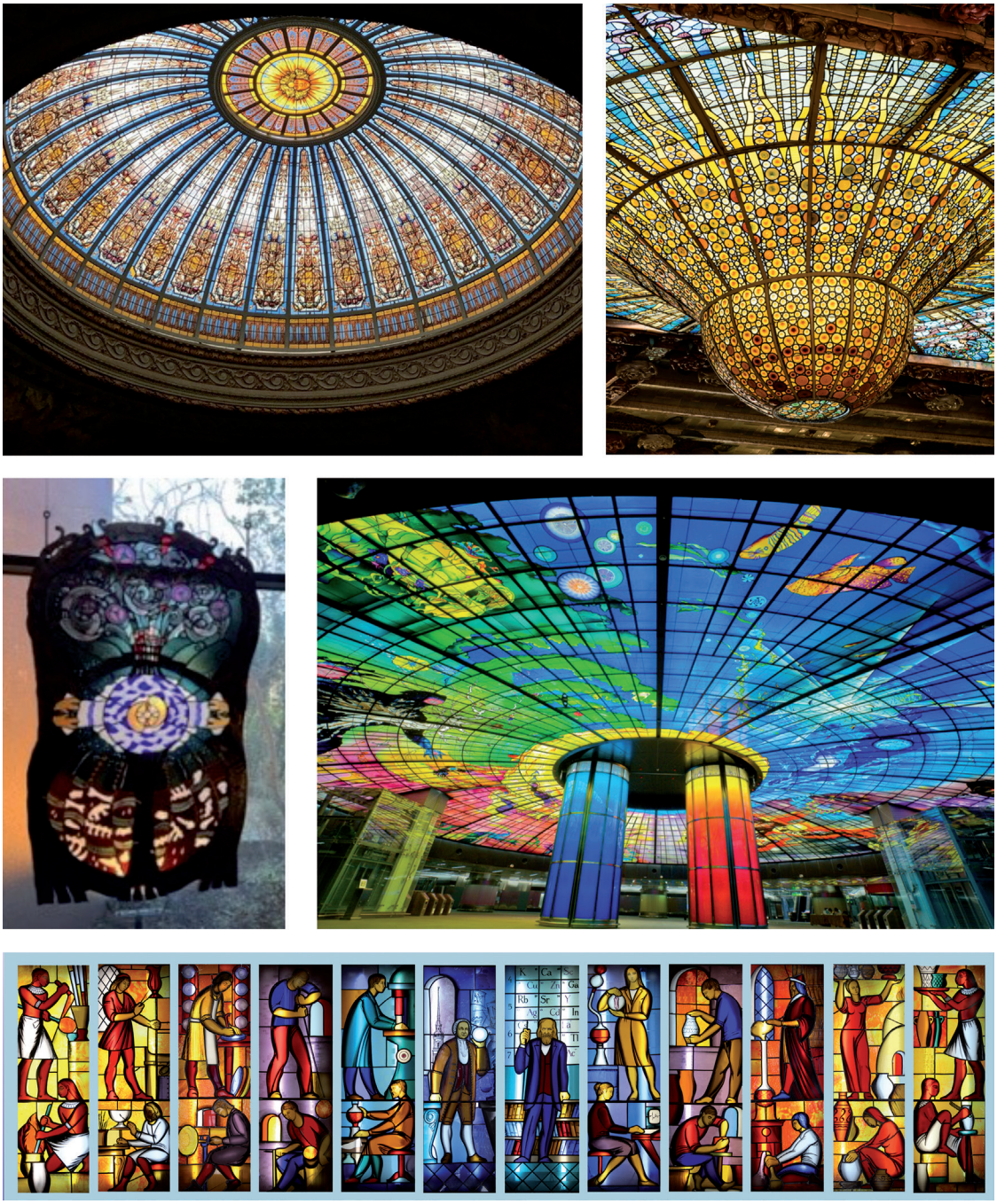


Figure 12.13. Stained glass windows proposed as candidates for the seven Glass Wonders contest and a vital contribution to our international glass heritage.
Source: © IYOG archive.



Figure 12.14a. Teresa Medici, Urmilla Jokhu-Sowell, Andrew Page, Katy Devlin Himanshu Jain, Bertrand Cazes and Erik Muijsenberg leading Sustainability Theme 2 at the UN (left to right).
Source: © IYOG archive.



Figure 12.14b. Listening to the UN event.
Source: © IYOG archive.

Amazingly, thanks to training programs, several Lebanese have learned glass-working skills. We also learned of the Worldwide Mosaics for Afghan Women project, in which sections of glass mosaics, based on the designs of traditional Afghan patterns, were 'stitched' into a mosaic 'scarf' to preserve this cultural heritage. The scars produced by glass cuts received during the process became almost a badge of honor.

IYOG focused on equality, but it has also created a physical legacy, for example those beautiful Afghan Patterns can so easily be circulated and displayed around glass museums for years to come, while the home of the Shattered Glass Project in Lebanon is now a vital cultural heritage center.

The IYOG Closing Ceremony in Japan had included the unveiling of the *Seven Glass Wonders of the World*, as identified by a panel of experts (Chapter 7 and Figure 12.13) and the outcome was repeated in New York. Other IYOG projects were also designed to generate an awareness of the Glass around us, for example a photographic competition on Glass and Place for German children and visits to a lighthouse museum in Australia to see their huge lenses able to transmit visible warnings of danger over considerable distances.

12.2.4. Theme 2: Glass helps achieve sustainable development goals of the United Nations

This theme was presented by a panel: Himanshu Jain, Erik Muijsenberg and Bertrand Cazes with coordination by Katy Devlin.

The various activities of IYOG, especially the concluding event held at the UN Headquarters on December 14, brought into focus how glass has is contributing to its various sustainable development goals. The enlisting of glass-based products and advanced technologies already in use impressed the importance of this material to the



Figure 12.15. A truly transparent solar energy window introduced by Ubiquitous energy generates electricity from invisible parts of solar spectrum without diminishing visibility and aesthetic trade-off.
Source: © IYOG archive.

public at large. With the impact of glass on sustainable development demonstrated, hopefully new policies, incentives, guidelines, and regulations will be developed, which will enable the glass to meet these goals faster. On the other hand, the discussions helped glass scientists and engineers understand precisely the technological needs that they should address to meet today's grand challenges. Although glass has impacted many sustainable development goals, its role in the following four was most readily recognized.

Affordable and clean energy
To achieve the United Nations' affordable and clean energy goal comprehensively, it is important to consider all the three aspects: production, conservation, and storage. Glass has already enabled advanced technologies and is making significant impacts on the generation and conservation of energy. It has also made promising advancements towards energy storage, which are ready for commercialization at scale. Chapter 4 of the book 'Welcome to the Glass Age' written by panelist Himanshu Jain gave a comprehensive overview of the exciting possibilities in this area.

The sun as a source of clean heat energy has been known for millennia, but achievable temperatures using solar energy were limited to the boiling point of water, which inhibited its exploitation in industrial applications or to convert heat into electricity. This barrier could be overcome only by providing >400°C

temperatures with the use of large, scratch and weather resistance mirrors made with highly transparent glass. The resulting solar thermal power stations are now able to produce 1 GW electricity. A more direct conversion of sunlight into electricity is made possible using the photovoltaic effect in silicon cells, but such devices can be employed in practical conditions only when protected with low reflectivity, high transmissivity, and high strength glass. Such solar panels covered with low-iron glass on the roofs of houses, buildings, even on rural non-agricultural land are now a common sight in many countries. With appropriate design low-cost thin film solar cells are being integrated in large buildings contributing to their sustainability. An emerging product for producing electricity from sunlight is a special glass window that transmits visible wavelengths while converting invisible ultraviolet and infrared light into electricity. A third major option for generating clean electricity is based on windmills. The efficiency of a windmill increases with the length of its wings which can be larger than 100 meters in offshore installations. Such structures require materials with high stiffness, low density, and long fatigue life. The material of choice for constructing such wings is a polymer composite that is reinforced with typically 50-80 weight percent high modulus glass fibers.

With 30% of the world's energy consumed in the operation of buildings, glass is playing a pivotal role in conserving energy on this account. Glass fiber insulation is widely used in modern buildings to maintain comfortable temperatures inside for the inhabitants under extreme cold and hot weather conditions. With suitable glazes and coatings, glass windows providing comfort and aesthetics have become nearly as efficient as much thicker walls. In addition, smart windows with variable transparency are further improving energy conservation and expanding functionality of buildings. Thus, technologies exist for making buildings more sustainable, but their implementation is lacking. Legislation to move forward with low loss windows that will lead to zero-emission buildings with additional technology improvements are being considered in several countries, which would surely help the UN's goal of sustainable cities.

The technologies for storing energy using glass are relatively less developed. The examples include photobioreactors, supercapacitors, and solid-state batteries. The economic viability only of the first technology, which stores energy in microalgae via photosynthesis has been demonstrated, and it is ready to be commercialized at scale. It is an attractive approach to manufacture biofuel, as it also reduces greenhouse gases. The reactor system requires transparent tubes that are: (a) chemically stable in saltwater and can be cleaned with commercial chemicals; (b) have a smooth surface and regular shape; and (c) be stable against ultraviolet wavelengths. Thin borosilicate glass tubes are shown to meet these requirements, even outperform polymer alternatives over their life (>50 years).

Sustainable cities and communities

Glass is required for the sustainability of cities and communities in multiple ways. Its importance in achieving zero emission buildings for sustainable cities was mentioned above. In addition, it offers the best solution for disposing of toxic wastes that would make communities unsustainable. At the end of their usefulness many high-tech products end up as highly toxic wastes, which may be classified as either chemically or radioactively toxic. The former results from microelectronic devices or as sewage sludge, whereas the latter is produced with low level radioactivity by medical facilities or with very high radioactivity by nuclear power plants and military installations. In all cases, the goal is to prevent them from getting back into the community infrastructure. They must be converted into a solid waste form that would immobilize toxic components, be chemically durable under high temperature and pressure in an aqueous

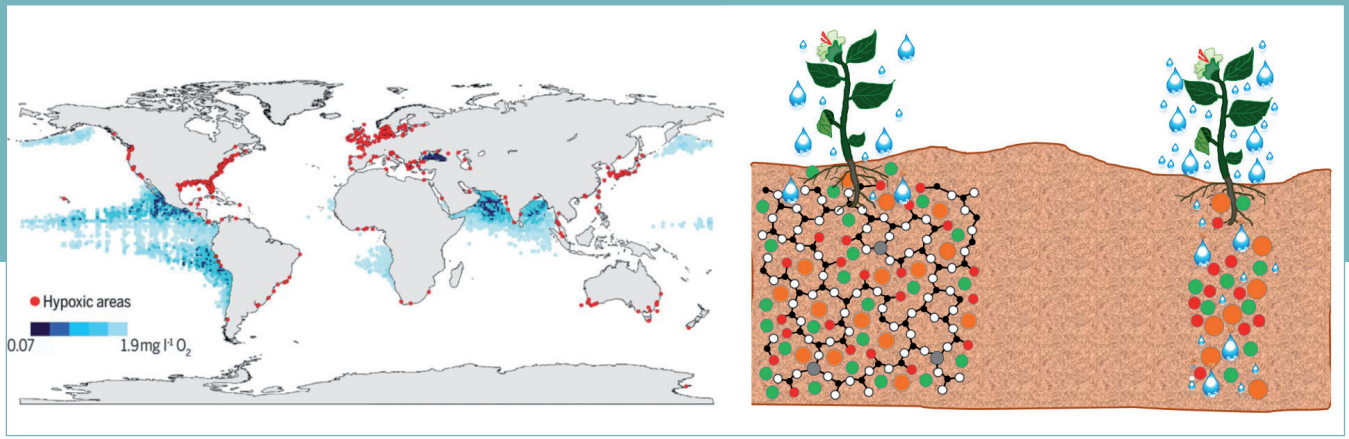


Figure 12.16. a) High concentrations of phosphorus and nitrogen produces eutrophication of oceans, b) glassy fertilizers release nutrients at convenient rates.
Source: © IYOG archive.

environment, incorporate high volumes of the waste, and tolerate radiation damage if radioactive. The most reliable solution for disposing of such wastes is to convert them to a stable vitreous solid by melting with appropriately designed soda lime silicate, borosilicate, or basaltic glass compositions. Interestingly, some of the vitrified chemical waste prepared in this way can be recycled as a building material!

The extensive application of water-soluble fertilizers to the soil is gradually leading to very high concentrations of phosphorus and nitrogen in streams, rivers, ultimately in the ocean, causing eutrophication or excessive algae growth there. Already, marine life in large coastal areas (~ million km^2) has been destroyed. A solution for this massive challenge of sustainable agricultural practices is the development of glassy fertilizers which release nutrients at a rate that plants need. Preliminary results are encouraging, and they demonstrate the versatility of glass for addressing even the emerging problems of sustainability.

Mitigation of causes of climate change

An opportunity to mitigate causes of climate change is in the manufacturing of glass itself, which requires temperatures above 1500 °C. Panelist Eric Muijsenberg summarized proposed developments in furnace design such as all electric units (Chapter 7, 'Welcome to the Glass Age'). During 2022, proof of concept has been demonstrated at several sites internationally and thousands of tons of glass with a zero-carbon footprint have been melted successfully. Chapter 8 of 'Welcome to the Glass Age' concerned sustainable production and the IYOG through work with Schools and adults has stimulated a push for recycling glass, which can be remanufactured without producing CO_2 or NOx gases, while using less energy. Excellent examples were in the Philippines (Chapter 4.15), India (Chapter 4.17) and Hungary (Chapter 4.14.2) Additional public campaigns and legislation will be needed, especially in sparsely populated countries, to recycle a greater fraction of glass containers and R&D is needed to develop technology for recycling high-tech products such as displays that include toxic elements.



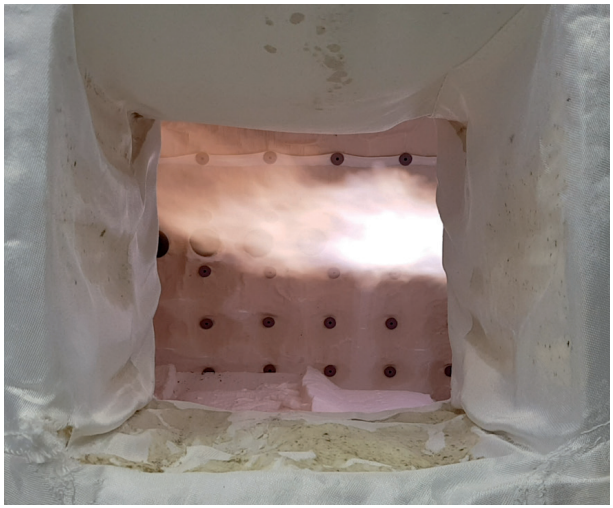


Figure 12.17. a) Oil combustion in typical float furnace today (left). b) Demonstration of viable clean hydrogen combustion for glass melting (right).
Source: © IYOG archive.

12.2.5. Good health and well-being

This panel was led by Julian Jones (online), Urmilla Jokhu-Sowell and Teresa Medici with Katy Devlin and Andrew Page. Their report follows.

Glass in health

The many and varied applications of Glass in Health were reviewed in detail in Chapter 3 of the 'Welcome to the Glass Age' booklet written by panelist Julian Jones and D. Brauer. Such unexpected Uses of Glass were widely adopted during 2022, for example as themes in the Manga comics created in Brazil, the Glass Map designed in Japan, or as themes in online lectures.

The special optical properties, hardness, chemical inertness and biocompatibility led to the first direct use of glass in human well-being when eye prosthetics were introduced in 1579. The same characteristics with considerable innovation have led to the present-day dental implants. Nearly half the global population benefits from eyeglasses, with new specialty glasses helping the people with color recognition deficiency. Antibacterial glass surfaces help control the spread of bacteria in hospitals. Glass windows with optimized lighting in buildings improve the mental health of the inhabitants. Glass microspheres loaded with radioactivity are being used to deliver radiation directly to the malignant tissue while minimizing undesirable damage to the surrounding

normal tissue. These are the passive uses of glass benefiting human health, where it does not affect any biological processes within the body.

A more far-reaching impact of glass on health was recognized in the 1970s with the invention of Bioglass that bonded to human tissue and stimulated bone growth. Glass, with its exceptional ability to allow large variations in composition and structure, provides controlled release of ions when placed inside the body, which stimulate regeneration of tissue at the gene level. Furthermore, the surface of these bioactive glasses adsorbs proteins and modifies their structure to stimulate cell response. As a result, silicate glass bio-scaffolds have been designed and successfully proven to regenerate hard tissues like bones and teeth, while gradually dissolving away in the body as the natural tissue forms in its place. Subsequently, beneficial effects of bioactive glass have been demonstrated also in soft tissue regeneration. For example, borate glass fiber gauges have been shown to accelerate healing of old wounds in diabetic patients. At present much remains to be understood about the bioactive aspects of glass and its full potential for treating diseases.

Glass Protects

Glass used in buildings contributes to daylighting and views, thermal comfort, noise mitigation, safety and security, indoor air quality and ventilation. Many studies show that access to daylighting and quality views provides better learning, faster healing, higher productivity, and higher real estate value. Specifically, students achieve 5-14% higher test scores and learn 20-26% faster when classrooms have access to daylighting. Workers in daylit office buildings are 18% more productive and retail sales increase 15-40% in daylit storefronts. Office workers with a view of the outdoors have 10-25% better mental function and memory and can process information faster than their colleagues without views of the outside. For surgical patients in hospital rooms with outside views, there is a 22% decrease in pain medication and their hospital stays are 8.5% shorter than those patients in rooms without a view.

Glass is often featured in biophilic design, based on the concept that humans desire to be connected to and surrounded by nature. Glass facilitates views of nature outside and allows light to enter to support plants or trees growing inside the building. Biophilic design supports cognitive function, physical health, and psychological well-being. It contributes to improved mental health, focus, happiness, reduced depression, and improved sleep.

Glass brings light into homes and public buildings, while keeping the weather out. High-performance, energy-efficient window systems can



Figure 12.18. Cotton-like Glass fibers for healing of chronic wounds.
Source: © IYOG archive.





Figure 12.19a, b. Daylighting and quality views provide better learning, faster healing, higher productivity, and higher real estate value.
Source: NGA.

dramatically improve occupant comfort. Optimized window design can reduce energy consumption in our homes by 10-50%. In commercial buildings, well-designed window systems can reduce costs for lighting, heating, and cooling by 10-40%.

The World Health Organization lists noise as one of its top three pollutants along with air and water pollution. Noise can cause short- and long-term health problems such as sleep disturbance, cardiovascular effects, hearing impairment, and affect our ability to learn and perform at work. Properly designed and retrofit windows and doors help reduce sound transmission up to 90%.

Protective glazing systems can save lives during natural disasters through hurricane-resistant glazing, fire resistant glazing, seismic-resistant glazing, and flood-protection window systems. In active shooter events, forced-entry-resistant windows and doors can be the first line of defense, slowing down an attacker, allowing more time for building occupants to enact emergency plans and for first responders to arrive.

Humans spend about 90% of their time indoors. Indoor concentrations of pollutants are often 2-5 times higher than typical outdoor concentrations. Air pollutants are linked to adverse health effects such as irritation, fatigue, respiratory diseases, heart disease, and cancer. Conscious material selection and proper building ventilation can help prevent "sick building syndrome." Glass is part of the solution to improve indoor air quality. Operable windows can be included in building design strategies for natural ventilation. Natural ventilation uses pressure differences to move fresh air through buildings. Fresh air is needed to alleviate odors, provide oxygen for respiration and to increase thermal comfort.

Museums and well-being

Teresa Medici spoke on the role that museums play in well-being. Chapter 6 (Museums) offers a more complete analysis while here her remarks are summarized. She argued that while Culture and Art are only mentioned explicitly once in the UN list of Sustainable Development Goals, nevertheless cultural activity can enable sustainable development in many fields and indeed Culture and Art are essential for the achievement of all Goals. She highlighted key UN targets:

- SDG 3: to ensure healthy lives and promote well-being; for all at all ages,
- SDG 4: to ensure inclusive, equitable, quality education and promote lifelong learning opportunities,
- SDG 11: cities and settlements: to make human settlements inclusive, safe, resilient, and sustainable,

- SDG 16: Governance, peace, and justice: to ensure social inclusivity.

Cultural service spaces foster information, knowledge, experiences, arts, creativity, and a perspective from the past to the present and so towards the future. They can create opportunities to build a more sustainable society, more resilient cities, and promote dialogue, equality, equity, and well-being. Museums have a strategic role, preserving the heritage of humanity for learning and enjoyment. In museums with glass collections, art, science, archaeology, history, and social sciences meet. Glass objects spanning history, works of art, and glass for everyday use are displayed with specialized glassware for industry and science. Museums describe raw materials and production, telling the stories of those who made and used them; they promote lifelong learning through programs for young and old.

So, IYOG Seed Funding supported projects using glass art to increase inclusion, diversity, innovation and collaboration in the communities: Project FIRE Firebird Community Arts', US encouraged social inclusion of those involved in gun crime; The Glass Lab exhibition, UK involved mostly children of primary school age; the ZUJAJ workshops, Amman, Jordan focused on unemployed youth, Fired Up! celebrated Southern African Glass Art; a glass sculpture project in Leeds, offered opportunities to a disadvantaged community (Chapters 3 and 6).



Figure 12.20. Qingdao International Glass Medium Art Exhibition.
Source: © IYOG archive.

Indeed IYOG acted as a catalyst for new glass experiences involving communities and museums worldwide: For example a) the 7 Glass Wonders project (Chapter 7); b) the 1st biennial glass art exhibition in IberoAmerica including a fashion show (Chapter 4.6.2), c) May the glass be with you: 365 audio-visuals with glass as the

protagonist on the web on December 31, 2022, one for each day of the International Year of Glass, and d) still in progress is a Virtual Glass Museum. Exhibitions took place in Qingdao Municipal Art Museum, China; "From Bohemia to Buenos Aires", Argentina, Museo del Ladrillo (where an item of non-perishable food was payment); "Glass. Italian jewelry between 1800 and 1900", Casalmaggiore, Italy and many other venues.

Several events had the specific aim of endorsing young artists. For example, the Italian Glass Weeks Festival, Italy, Milan and Venice, included '*under 35*' glass artists exhibiting in a special area. Similarly, the Tokyo Closing Conference sponsored several Future Generation Speakers (Chapter 3 and 10).

An imaginative project from the French RO generated an online atlas of sites to visit with important technical, artistic and scientific connections (*les Routes du Verre*).

The IYOG fostered encounter and collaboration among professional from very different fields, helping in creating international networks of artists, historians, archaeologists, professional of museums, scientists, glassworkers, companies. So, several interdisciplinary conferences explored the possibilities of glass as a creative and innovative medium in art, art history, architecture and building, archaeology, and the sciences: For example:



Figure 12.21. Work of Art created by Glass Artist Natalie Taylor entitled 'Wildfire' and placed outside in the NY compound for a month as a reminder of the consequences of Global Warning.
Source: © IYOG archive.

Figure 12.22. Debriefing event attendants at UN-NY gathered around Natalie Taylor's Wildfire Sculpture.
Source: © IYOG archive.



- Le verre l'art et la matière. Les artist verriers s'exposent a l'Institute de Phisique du Globe de Paris, Université de Paris Cité
- Glass Today A Bridge to The Future, Marinha Grande, Portugal
- GLASS: Vision Reflection Imagination, Online Conference, IYOG RO16 (for South-East Asia, Australia and New Zealand)
- Celebrating the Birth of English and Irish Crystal Drinking Glass, 1640-1702, V &A Museum, London

In conclusion, glass has been a required component of products and technologies that can directly help achieve UN's goals of *good health and well-being* (#3), *affordable and clean energy* (#7), *sustainable cities and communities* (#11), and *combating climate change* (#13). Efforts are underway to develop new technologies that will accelerate the progress toward these goals, but public support, legislations, incentivizing policies, and initial investments by governments will be needed for their successful implementation.

12.2.7. Closing the event

Prof. Durán drew the event to a close at 12.30pm. Her inspiring closing presentation formally thanked: a) the people whose insights created the concept of a Year of Glass, a vision that has left a lasting imprint, b) the many more whose energies saw it through, a long list as this volume testifies and the support of the many sponsors listed within these pages!

The UN Ceremony was streamed live and a recording remains available online from the UN web site.

As we left the ECOSOC room, with Prof Valladores challenge and Prof Duran's message ringing in our ears, we had a little more to do before we finally completed the day/the year.

We moved out into the cold winter air to see and dedicate the Work of Art created by Glass Artist Natalie Taylor entitled 'Wildfire' that had been placed outside but in the NY compound for a month as a reminder of the consequences of Global Warning and the tasks ahead.

As we began our farewells to the many colleagues who were leaving, those of us who could returned to the Hotel

RIU Plaza New York Times Square for a buffet lunch, where many off-the-cuff congratulatory speeches followed, thanking both the local and international contributors to the day's events.

IYOG2022 events still hadn't quite finished and several of those present had to return to the airport to participate in activities elsewhere. Those remaining enjoyed a final networking opportunity.

12.3. It does not end there…

After running a magic year 2022, with thousands of activities and events demonstrating the power and potential of the worldwide glass community, it is time to think over the meaning of the IYOG, what we have achieved and how we can continue working. Summarising, we can say:

- Breadth of coverage: amazing
- Level of interest: amazing
- Legacy projects: what comes next?

The experience of this huge and so diverse project showed that giving people a free hand created a hotbed which generated an incredible range of innovative ideas; and many have been extremely effective over a wide range of different goals.

There is no doubt that the event itself suffered initially because of COVID restrictions over the world, but it also gained enormously. Firstly, because it was many months before life returned to normal and so personal timetables were more flexible and the opportunity to experiment was there. Secondly, because populations around the world were desperate to communicate with each other after many months of social isolation. Consequently, people responded enthusiastically to all calls and events.

After overcoming the pandemic, people refer to a new normality. Many things have changed; the power of glass fibres and Internet permit us to communicate without the same pressure to travel, removing significant time and cost limitations. This has also the potential for provide change in the educational field. Our classes/research teams do not all have to be in the same room. Constraints imposed by natural borders and language are weakened. This can enrich teaching by providing access to the best communicators and through student-student interactions.

Similarly, we can now in principle create, share, and analyse more complex databases, covering wider areas of investigation. In this respect, AI is already having a noticeable influence that can only expand. However, we should study its impact on the creation processes, protecting the intellectual property and original work of scientists, technologists, and artists.

The power of transformation by the tools we have leads to other reflections. The greater our capacity to influence and transform nature and society, the more is the responsibility of those who generate knowledge. Hence, the imperative need for dialogue between science, technology, social sciences, and art with their differing perspectives of human universal knowledge. We assume this responsibility.

The whole glass field has advanced in 2022 through networking, by beginning to build a new culture - a transverse, solid culture, where industrial associations promoted education, art was born from recycled glass, and scientists and technologists explained how to pursue and achieve the challenges of sustainability and social justice by using glass. Boundaries between academia, industry and art disappeared, all becoming citizens with a common goal, that of working and building together. This new culture, based on critical thinking, is the only way that allows us to be truly responsible for our evolution and to become competent citizens in cohesive and fairer societies.

Our last and main message to the United Nations links to the last question of Prof. Valladares: Is humanity ready for glass? We confirm to the UN the willingness and commitment of the Glass Community to continue its activities. Some will develop optical fibres and networks to reach the farthest

places and most vulnerable populations; others will produce biomaterials, design new low carbon manufacturing processes and assist in green energy production. Yet others will continue to promote Education, education, education!! And fight to reinforce Equality, equality, equality!! Glass Artists will enrich our Culture, creating effective tools for our well-being.

However, this is not enough. To face effectively the challenges of climate change and sustainability we need international legislation and agreements to be approved and respected. We need to convert recommendations into obligations. International institutions, from the United Nations to European Union, ASEAN and BRICS+ alliances must act together to adopt, establish and respect the treaties on sustainability and climate change challenges, limits and goals.

In the glass field, joint action by the glass industry, R&D and art-world with international and national governments is crucial, involving citizens as actors and recipients. We have demonstrated the power of glass to transform cities and societies, to communicate with people across the world, to build a more sustainable and fairer world, built on glass.

We can proudly announce that we are living in the Age of Glass! a message that we hope will spread like wildfire.

References

[1] Özer Zeybek, Yasin Onuralp Özkılıç, J.D, Memduh Karalar, Ali İhsan Çelik, Shaker Qaidi, Jawad Ahmad, Dumitru Doru Burduhos-Nergis and Diana Petronela Burduhos-Nergis. *2022. Influence of Replacing Cement*, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9658567/

[2] Blanc, W.; Ballato, J. and Ferrari, M. (2023): "Glass for photonics", *The European Physical Journal Plus, 138*(858), https://link.springer.com/article/10.1140/epjp/s13360-023-04473-5.

[3] Furszyfer Del Rio, D. *et al.* (2022): "Decarbonizing the glass industry: A critical and systematic review of developments, sociotechnical systems and policy options", *Renewable and Sustainable Energy Reviews,* 155, 111885, https://www.sciencedirect.com/science/article/abs/pii/S1364032121011527?via%3Dihub.

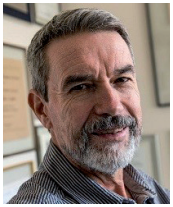
About the authors



Dr. Alicia Durán
Obtained a degree in Physics from the National University of Córdoba in Argentina and a PhD in Physical Sciences from the UAM. She developed her professional career at the Institute of Ceramics and Glass of the Spanish Research Council (CSIC). As a Research Professor of CSIC she was responsible for the GlaSS group (http://glass.icv.csic.es) and generated more than 280 publications in WOK (H index of 50). She was President of the International Commission on Glass (ICG) between 2018-2021 and during her tenure led an application to the General Assembly of the United Nations for the International Year of Glass 2022, approved on May 18th 2021; subsequently she chaired the organizing committee. Among many accolades, she received the Phoenix Award from the international glass industry, being named Glass Person of the Year 2019. In 2022, she was endowed with the Otto Schott Award (OSA) and the ICG's President Award, also becoming honorary Liveryman of the UK Glass Sellers Company. In 2023 she was honored with a Diploma from the Senate of Argentina and also received the Fray International Sustainability Award.



Prof. John M. Parker
Academic career began at Boston Grammar School. He left in 1964 as Parry Gold Medalist and with a Scholarship to Cambridge, to study Natural Sciences. There he specialized in Mineralogy; graduating with a first class MA, followed by a PhD and 2 years as a post-doc. Next a lectureship in Sheffield beckoned (1972), focusing on glasses; he has since published 200 papers and books on various aspects of the subject. For 12 years he was also responsible for student admissions to the materials and biomaterials courses, then became course director; he helped develop new Aerospace Materials and Biomedical Engineering degrees. He assisted for several years with the administration of part-time MSc courses for glass industry employees. In 2009 John received a Service Excellence Award, by student nomination and also retired, becoming Professor Emeritus. He still teaches, curates the glass collection in the Turner Museum and talks to numerous visiting Societies. He is an honorary member of the SGT, the DGG and an honorary Liveryman of the Glass Sellers Company. For over 20 years he worked with the ICG, receiving their Turner prize and President's award. He has taught at 20 International ICG Schools in China, France and India Recently he has been immersed in the 2022 UN International Year of Glass which has limited the time available for his hobby of gardening!



Prof. Edgar Dutra Zanotto
Has been a Professor of Materials Science and Engineering at UFSCar since 1977. His work focuses on crystallization kinetics and properties of glasses and glass-ceramics. He and his group aim to understand and improve or develop nucleation and growth models of crystals in glasses, kinetics and mechanisms of crystallization, correlations with molecular structure, diffusion processes, sintering with concurrent crystallization, relaxation, and properties of glasses and glass-ceramics. They are also working on AI methods to predict properties and develop new glasses. Zanotto has published approximately 450 articles in journals and conference proceedings, 30 book chapters, and filed 30 patents on these topics. For these activities, he has received 59 awards, including seven of the most prestigious glass research related awards.

Professor Zanotto is an editor of the Journal of Non-crystalline Solids and a board member of 10 other materials science and engineering journals. He is a member of the World Academy of

Ceramics, The World Academy of Sciences (TWAS), Brazilian Academy of Sciences, Brazilian Academy of Engineering, São Paulo State Academy of Sciences, and a Fellow of the Fulbright Foundation, Society of Glass Technology UK, American Ceramic Society, and the Brazilian Ceramic Society. He is a council member of the International Commission on Glass (ICG), the International Ceramic Federation, and the FunGlass Institute. He chaired 6 of the most important international congresses on glass and served as a scientific committee member of approximately 50 other congresses. He has given over 160 invited lectures and approximately 40 plenary talks at national and international congresses.



Erik Muijsenberg
Is a Mechanical Engineering graduate from the University of Eindhoven, Class of 1990. In the eight years following his graduation, he was employed by the TNO Glass group in Eindhoven, where he focused on furnace modeling and glass melt technology. In 1997, he assumed the role of TNO Glass Department leader.

In 1998, he took on the position of Managing Director at GLASS SERVICE B.V., marking the establishment of the first GLASS SERVICE subsidiary office in Maastricht, the Netherlands. After eleven years, he relocated to the GLASS SERVICE headquarters in the Czech Republic, where he assumed the role of group Vice President. GLASS SERVICE boasts a global presence with over 110 engineers and offices in Czechia, Slovakia, Netherlands, Germany, UK, France, USA, China, and Japan. Notable subsidiaries include FlammaTec, recognized worldwide for combustion systems, and FIC UK, specializing in Electric Melting solutions.

In 1997, Erik was honored with the Otto Schott Award. In 2012, he received the Adolf Dietzel Industry Award from the German Glass Society for his significant contributions to the development and acceptance of glass furnace modeling and optimization in the German glass industry. Recognized as a Fellow member by the British Glass Society in 2014, Erik has actively served as the Vice Chairman and past Chairman of the Technical Committee 21 – Furnace Design & Operations – of the International Commission on Glass (ICG).

As of 2016, Erik has been an ICG Steering Committee member. In 2017, he joined the Phoenix Award Committee and, since 2023, serves as the Vice Chairman of the Phoenix Award Committee. In 2023, he was honored with the N.L. Varshneya Memorial Award in Cambridge, UK, the ICG W.E.S. Turner award at the annual ICG Conference in Hangzhou China and finally the FLOGEN von Klitzing (Nobel Laureate) International engineering Award in Panama City, Panama.

Erik has been a fervent advocate for Industry 4.0, promoting smarter model-based predictive furnace and forehearth control, as well as Carbon emission reductions in the Glass Industry for over two decades.



Patrick Gavaghan
Obtained his Diploma in Business Management, Learning and Development at Plymouth Institute UK, University of Oxford UK and Classical Studies and Archaeology in Barton TAFE Australia added to a Graduate Certificate Action Learning, Education workplace learning.

Patrick's vast experience includes the development and management of multiple projects in recruitment and mentoring in various industries; also establishing and running a Registered Training Organization to operate as an extension to an existing national business. Patrick also has extensive experience in administration of sales and service departments including allocation of personnel in roles and performance requirements; design, development and delivery of Training Programs for specific industries; and broad experience in Project Management.

He has developed and managed many programs for the glass sector, including training and mentoring programs, and the design and development of a 'Master Glazier' program for the industry. He has won many awards for training projects; and is a sought-after keynote speaker for conferences around the world.

In 2019 Patrick was instrumental in GLAAS Inc receiving funding for a 'Launch into Work' program for unemployed youth, and he joined the GLAAS Inc Board the following year, taking on the management of International and National Special Projects, which he continued with distinction until 2023. Patrick was a member of the International Council and the Executive Committee for the International Year of Glass 2022.



Dr. Teresa Medici
Holds an M.A. in Classical Archaeology from the University of Milan, Italy, and a Ph.D. in Archaeology from the University of Coimbra, Portugal. After joining the VICARTE research unit in Lisbon, she conducted original investigations on glass from Italy, Croatia, Spain and Portugal dating from the Roman period to the early 18th century, with a particular focus on Late Medieval and Early Modern archaeological glass in the Iberian Peninsula. Since 2015 she has been back in Italy, working on the accreditation scheme for museums at the Cultural Heritage Department of the Regional Government of Lombardy. She served as Chair of the ICOM Glass IC from 2019 to 2022 and was as a board member of the Italian Committee of the AIHV - Association Internationale pour l'Histoire du Verre for many years. Since 2020 she has been an editorial consultant for the "Journal of Glass Studies". She coordinated the IYOG 2022 Museums, Art, Archaeology and History Group.



Dr. Mathieu Hubert
Started studying Glass in 2006 at the Glass and Ceramic Lab at the University of Rennes 1 (France), where he earned a PhD in 2012 for his work on chalcogenide glasses and glass-ceramics for infrared applications. In 2013, he joined CelSian Glass&Solar in Eindhoven (NL) as a glass scientist/glass technologist, carrying out contract research and consulting work for various industrial glass companies worldwide, as well as teaching course on glass technology. He joined Corning (USA) in 2016, where his work focuses on development of new materials for various consumer electronic applications. Passionate about education and outreach, he is a member of ICG TC23 Education, has been teaching on glass at ICG Summer Schools, and taught industrial glass as an adjunct lecturer at the Corning Community College and at Alfred University. He was a member of the 2022 UN International Year of Glass executive committee, with a focus on Outreach. He is a member of the ICG Coordinating Technical Committee and Outreach committee, as well as board member of the glass industrials association GlassTrend, and the Ceramic and Glass Industry Foundation.



Teresa Palomar
Is Doctor in Chemistry in the Autonoma University of Madrid and Master in Conservation Science in the Pablo de Olavide University (Sevilla). She has developed her scientific career in the Spanish National Research Council (CSIC), the Spanish Centre Foundation of Glass (FCNV) and the Research Unit VICARTE "Glass and Ceramic for the Arts" (Portugal). Currently, she is an assistant researcher in VICARTE. Her scientific career has been focused on the archaeometry and conservation of cultural heritage on glass. She is member of 5 scientific societies, including ICOM-CC Glass and Ceramics and the Corpus Vitrearum, and formed part of the International Steering Committee to promote the International Year of Glass for 2022, being the Spanish representative in the Art, Architecture and Culture group. In 2018, she received the Special Mention in the Young Researcher on Conservation Science Award organized by the Spanish group of the International Institute for Conservation of Historic and Artistic Works.



Lothar Böttcher
Is a South African artist, internationally recognized with numerous accomplishments in the field of glass art as an expressive medium. His masterly works of exceptional craftsmanship and artistic narrative are represented in local and international museum collections, such as the Corning Museum of Glass (USA), Glasmuseum Frauenau (Germany), the International Biennale of Glass Collection (Bulgaria), and the Pretoria Art Museum (South Africa).

Lothar exhibits regularly in group shows, has had several solo exhibitions, and is a recognized curator, strengthening the glass art community and growing the appreciation of the material. Through ongoing projects such as Blow Your Sculpture, Lothar has introduced the magic of glass to other artists, extending the boundaries and possibilities the material offers.

During the United Nations International Year of Glass 2022, he acted as the African regional coordinator for Museums, Art, Architecture, and Archaeology, curating and coordinating "Fired Up!" at the Pretoria Art Museum

in collaboration with the Tshwane University of Technology's Glass Art & Design Department.

He is a member and coordinator of the Lathe Riders, an international cold working collective, bringing the magic of cold work into the spotlight and inspiring a new generation of craftspeople. In 2024 Lothar will be presenting demonstrations with the Lathe Riders at the international Glass Art Society conference in Berlin.



Greg Morris
Has been editor of Glass International and organizer of the Glassman conferences since 2012, specializing in glass packaging. He has organized various conferences related to glass manufacturing focused on subjects such as the Future of Glass, Renewable Energy in Glass Manufacturing and Industry 4.0 in Glass.

Prior to this he spent five years working in newspaper journalism.



Dave Fordham
Recently been appointed Global Engagement Lead at Glass Futures, Dave Fordham has spent his entire career in the glass industry since joining Glass International magazine in 1993. Also working on the Glassman and Glass India series of exhibitions, Dave progressed to Sales Manager by the age of 23 and subsequently co-founded Glass Worldwide in 2005.

In addition to being responsible for the content of every issue and the magazine's associated conferences and exhibitions, Dave's position as a well-known and respected figure at the heart of the international glass community has been cemented by over thirty years of liaising with the industry's major bodies throughout the entire supply chain.

Other activities have included chairing numerous glass conferences such as during GLASSTEC Dusseldorf and GLASSPEX India as well as being a stalwart on numerous global glass award judging panels. Dave is also a proud Liveryman of the Worshipful Company of Glass Sellers of London.



James Dacey
Is a science journalist and content creator. He looks for the stories where science and technology blend with people, economics, and culture. James is based in Madrid, Spain, where he works as a communications specialist for EIT Food, an EU-supported organization with a mission to transform the European food system. He also contributes to publications including Physics World, New Scientist and Eos; and his copyediting work includes projects for the UN Climate Change Conference, Nature Food and The Science Based Targets Network.

James' journey in science communication began with a BSc in Natural Sciences at the University of Birmingham (2002–2005), followed by an MSc in Science Culture & Communication at the University of Bath (2007–2008). He then worked for a decade at IOP Publishing – writing articles, producing videos and podcasts relating to physical science and academic publishing. Since relocating to Spain in 2019, he has increasingly focused on environment and sustainability topics, while fully embracing the Mediterranean climate and diet!



Prof. Hirohito Inoue
Began his University Education at the University of Tokyo in 1978 where he studied for 9 years, obtaining a Doctor of Engineering. From there he moved to Tokyo Metropolitan University for 2 years, and after that to the University of Tokyo. His research interests have covered a wide spectrum, specifically including structure analysis of glass and the development of new glass compositions using container-free processes. He is in his final year in his current position. He became a member of the ICG's TC23: Education in 2007, a member of ICG's Coordinating Technical Committee (CTC) in 2012, chairman of the CTC in 2016, and after spending five years he became Vice President of the ICG in 2021, assuming the Presidency of ICG in August 2024. He was responsible for organizing the Closing Conference held in Tokyo, Japan during the United Nations International Year of Glass.

COLECCIÓN **DIVULGACIÓN**

Celebrating glass, achieving sustainability, inspiring transformation

2022 will go down for many as the year that COVID finally lost its grip on societies around the world and a new reality began to emerge. For those in the Worldwide Glass Community it will be remembered as much because it was the United Nations International Year of Glass, an international celebration around the globe of the richly diverse and sustainable contribution that glass makes to our daily lives. This book reveals the back story of the application to the UN and records the year-long party that followed in countries from every continent. The book is a photographic and written record for all who participated and is a guidebook for others on similar journeys in the future. It encapsulates warm memories, but the authors hope it will also stimulate future action in a world which desperately needs a framework for sustainable living.

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