

edited by
Maria Antonia Barucco, Elti Cattaruzza, Rosa Chiesa

ANTIFRAGILE GLASS

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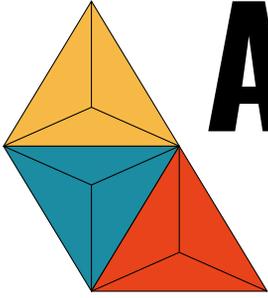
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ANTIFRAGILE GLASS

MARIA ANTONIA BARUCCO, ELTI CATTARUZZA, ROSA CHIESA

The year 2022 is the International Year of Glass, established by the United Nations with Resolution 75/279. Università Iuav di Venezia, Università Ca' Foscari Venezia and the Fondazione dei Musei Civici Veneziani are celebrating 2022 with ANTIFRAGILE GLASS: a conference, an exhibition and a publication, but also, and most of all, a celebration of a material, an ancient art form and an industry in constant evolution.

The objective of the UN is to highlight glass technologies and their potential contribution to addressing the challenges of sustainable development and inclusive societies. With this in mind, ANTIFRAGILE GLASS examines the past and future of glass, so that those who work and study this material can continue to ensure that crises are, to all intents and purposes, new starting points for bold innovations.

For many years, Università Iuav di Venezia, Università Ca' Foscari Venezia and the Fondazione dei Musei Civici Veneziani have been involved in training, research and promotion of the history and innovation of glass. The year 2022 was therefore chosen as the ideal time to establish potential partnerships, to structure the dialogue between the region and academia with new guidelines, to challenge young people to imagine the future, to learn from the past and to describe the current state of the art.

The ANTIFRAGILE GLASS programme was designed to promote opportunities for exchange, interaction and discussion. Developed during a period between the initial resumption of collective life and the outbreak of the war in Ukraine, it is therefore a proudly optimistic, broad and challenging programme. ANTIFRAGILE GLASS is an opportunity for discussion, to envision the future of glass, to meet and discuss the need to respond to crises and work on new projects. ANTIFRAGILE GLASS is an opportunity to reaffirm the interest in continuing, renewing or reinventing the aptitude for innovation that craftspeople, manufacturers and researchers share.

Even the title, ANTIFRAGILE GLASS, affirms these objectives. Nassim Nicholas Taleb has proposed using the adjective "antifragile" to describe a new worldview; indeed, this very adjective is the title of his acclaimed book, published in 2012, in which he emphasises the difference between resilience and antifragility. Those who are resilient stand the test of time and retain their structure, their choices and their goals. Those who are antifragile change over time and with time grow, transform, evolve or regress in alternating phases; this renders them consistent with the present day and often innovative. Research, culture, and glass are antifragile. Antifragile is the property of remaining strong during the fluctuations between authority and checks and balances. Antifragile is the ability to develop new ways of thinking and new products in the constantly changing human, economic, and political environment. Antifragile has a stubborn, challenging and revolutionary character. Antifragile is an attitude that becomes stronger in adversity. The city of Venice must also, now more than ever, persist in becoming fully antifragile.

ANTIFRAGILE GLASS enters into a dialogue with this definition and provides evidence that, throughout history, glass has faced challenges, crises, and innovations by transforming technologies, processes, production methods, shapes and designs, while continuing to enhance the characteristics of the material. Glassmakers, innovators, scientists, artists, entrepreneurs and designers have studied and worked with this material; one that has accompanied mankind in the development of new products since the very dawn of civilisation. The material, its design and its technologies are transformed by fulfilling different functions, affirming some of its characteristics and modifying others, adapting to changing contexts and demonstrating a capacity for innovation.

The history of Murano glass is such an example of antifragility. Many crises have affected this art form; they have exhausted and renewed it, put it to the test, overcome and strengthened it. Antique glass more than a thousand years old is very different to the glass that is created in the kilns of Murano today, but between these two manifestations there exists a strong historical and cultural bond. An antifragile, stubborn, and tenacious culture, in as much as it is willing to rise to the challenge of learning the new and from the new. The characteristics that can be observed in a small but highly-valued geographical area – the island of Murano – are also recognisable in academic research, in science, in art-historical and archival research, in design skills, in business culture, and in the skills of the artists and designers who work with glass. It is for this very reason that glass is antifragile.

And to draw the attention of young people to these issues, to invite them to describe their vision for the future of glass and to emphasise the value of shared work, we organised a residential interdisciplinary workshop entitled VETRO FUTURO, which took the form of a hackathon. Strongly endorsed by Università Ca' Foscari Venezia and organised by Università Iuav di Venezia, VETRO FUTURO was included in the programme of The Italian Glass Weeks 2022. This volume of proceedings presents the outcomes in the form of three posters, material produced by twelve master's degree students from the two Venetian universities. What clearly emerges from these papers is the extraordinary ability of these students to reframe the issues we face as starting points for recognising that these problems represent opportunities and new challenges. With this approach, everything can be reevaluated. With muraNEWABLE, the energy supply issue that is affecting Murano becomes an opportunity to rethink energy sources for sustaining a large territory, while poroVE suggests the recycling of waste glass to exploit its chemical and physical characteristics in order to address the complex problems of drinking water pollution and microplastics; finally, wearGLASS proposes the technology transfer of innovations to the fashion industry, which could enable even the most underused waste (such as discarded plate glass from buildings) to be exploited. In this context, Murano and Venice serve as a laboratory of ideas and a hotbed of experimentation, land and culture: ingenuity and willingness to work together are the qualities that the students lend to the universities they attend and to the proposed outreach to local companies. The

editors of this volume aim to seize this momentum in order to work on glass with an increasingly international, collaborative and inclusive outlook.

A call for papers, an exhibition, a workshop and a publication, but, above all, a place for dialogue: all this serves as an important reminder that we cannot be antifragile alone. Antifragility is a quality that can only be developed through a network of connections and bonds that, although in constant flux, recognise the value of antifragility, and support and benefit from it. When one node or connection in the network fails, others make up for this and develop new skills and aptitudes. Every failure, as well as being the actualisation of a crisis, is an impetus for fresh growth. ANTIFRAGILE GLASS is the result of a working method based on collaboration between many people.

For the support given to this work, sincere and grateful thanks are due to the organisations that supported it: Fondazione Luav, Anteferma Edizioni, the OFFICINA* cultural association and the Regione del Veneto. Without these partners, ANTIFRAGILE GLASS would not be antifragile at all and would lack courage, perseverance and substance. Furthermore, we should not forget the sponsoring bodies, who believed in the value of a wide-ranging and complex project and encouraged its dissemination:

- Italian Committee of IYOG2022 – International Year Of Glass 2022
- CONAI – National Packaging Consortium
- Confindustria Venezia – Metropolitan Area of Venice and Rovigo
- Consorzio Promovetro di Murano
- COREVE – Consorzio Recupero Vetro
- Future Cities Research Hub, School of Architecture and Planning, Waipapa Taumata Rau – University of Auckland
- SITdA – Italian Society of Architectural Technology

The visual identity and, in particular, the logo of ANTIFRAGILE GLASS expresses this variety and diversity in its network of stakeholders: the atoms that make up the tetrahedron structure of silica draw a pattern and constitute the main “ingredients” in the “recipes” of the ordinary glass that is all around us. Silica atoms and three backgrounds, to highlight the three lenses through which we have chosen to investigate glass: science, architecture and design. These are just three among many other potential approaches, questions, perspectives and insights – the first three, and not the only three, points of view that Università Luav di Venezia, Università Ca’ Foscari Venezia and the Fondazione dei Musei Civici Veneziani want to address.

ANTIFRAGILE GLASS is a set of research, teaching and third mission activities that has actively involved teachers and students in a dialogue with the historical, industrial and artistic activity of Venice, the glass capital of yesterday and tomorrow. Both the title and the logo representing the event express the hope that this opportunity for work, discussion and meetings will enable a varied and complex series of activities to be launched to support and enhance the present and possible future of a material that is as innovative as it is ancient.

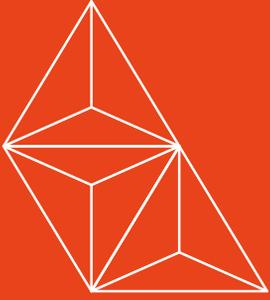
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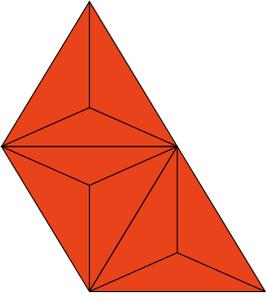
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Glass on stage. The woman of fire Marietta Barovier

MASSIMILIANO CIAMMAICHELLA^A

Starting from an attentive historical recognition of glass manufacture, the paper traces the salient stages of female entrepreneurship in fifteenth Century Murano, focusing on the pioneering figure of Marietta Barovier. The theatrical production, dedicated to her, updates her cultural fundament, knowledges, actions, and life, through a performance in constant dialogue between past and present, in which the stage setting is made up of morphing videos that continuously shape the glass matter.

This experience is part of candidacy dossier for the venetian pearls as UNESCO intangible heritage, to help raise awareness and spread the transmission of know-how, the dissemination of which here is confronted with the theatre democratic space.

^A Department of Architecture and Arts, Università Iuav di Venezia, Venice.

KEYWORDS: DIGITAL SET DESIGN, THEATER, ROSETTA BEAD

Introduction

In the Serenissima history, the fifteenth Century was undoubtedly a Century of fundamental cultural and productive changes that relaunching Murano as undisputed innovation capital in the glassmaking art that began to be such in its transition from mass production, for purely utilitarian purposes, to elite production, aimed at a public that appreciates the aesthetic value and the workmanship finesse. Proof of this is the confirmation decreed in 1441 of the *Fiolèr*¹ professional figure substitution – documented in the thirteenth Century Capitulare – with that of the glass worker, described in the statute of “Mariiegola dell’Arte dei Verierieri da Muran” (Gasparetto, 1988).

In this period, the intervention areas ranged from the construction of large architectural stained-glass windows, as for example happen in the SS. Giovanni e Paolo church in Venice, to the crystal mirrors experimentation, to the empirical and alchemic reworking of tricks, searching for alternative formulas in the coloring of increasingly transparent and homogeneous surfaces, on which further decorations made of enamel paint could be applied.

The raw materials were silica sand, obtained from the hot grinding of quartz-rich pebbles, the most valuable of which came from the Ticino River; then coloring pigments or decoloring agents were added, and finally, melting agent, commonly known as *Allume catino*²: an ash with a high sodium content derivatives from the combustion of littoral plants. The most popular was Syriac (Zecchin, 1997).

Glassworks were generally equipped with three furnaces. The first, also known as the *Calchera*³, had only one chamber and was assigned to melting the above-described components, to produce the *Fritta*⁴, a raw and dense glass with impurities, which was undergo cooling and shattering processes in order to be recast in the second furnace, inside crucibles; it was then poured into the water several times to free it of residual impurities.

Subsequently, blocks for working were produced whose malleable plasticity allowed the extraction of portions to be shaped with blow pipes, tools for cutting and bending. Once the final shape was achieved, it was placed back in the third furnace for work completion (Marascutto and Steiner, 1991).

In this complex sequential procedure, played out on the limits of a challenge between rule and its refinement, alchemical practices were perpetuated to generate artifacts influenced by the tinkling aesthetics, traceable to the durability logics of a fragile and light malleable material.

1 *Fiolèr* or *Fiolara*: Dialect term derived by “fiola”, a narrow-necked liquid vessel.

2 *Allume catino*: commercial potash or potash sub-carbonate, in Murano furnaces its processing involved alchemical purification of soda ashes.

3 *Calchera*: oven with two overlapping chambers. In the lower one, named *Castra*, firewood was placed, and in the upper one, *Fritta* was prepared.

4 *Fritta*: silica and melting agent are mixed at the bottom of the *Calchera*, forming a kind of crumbly, shapeless mound. It constitutes the first phase of the actual fusion.



Fig. 01 *La Donna del Fuoco Marietta Barovier. Pioniera delle perle veneziane.* Direction and dramaturgy: M. Navone, scenic and video staging: M. Ciammaichella, Goldoni Theater, Venice, September 12, 2021.

Glass Innovation and Renaissance

Among the most important protagonists of the fifteenth Century scene, Angelo Barovier is the one who certainly made significant innovations in the field of glassmaking.

As member of one of the historic families of glassmakers, active in Murano since the thirteenth Century, he was trained in the school of San Giovanni Elemosinaro in Rialto, with the mentor, philosopher, and mathematician Paolo dalla Pergola. We learn this from a manuscript document, collected and published by Emmanuele Antonio Cicogna, in which it is stated that the master gave lessons to an "*egregium ex primariis Muriani Angelum nomine*" (Cicogna, 1853, p. 467), especially regarding the compositions and secrets of glass coloring.

Other statements see him as a protagonist in the ideal city of Sforzinda design, described by Antonio di Pietro Averlino, the Filarete – in his *Trattato di architettura* composed between 1451 and 1458 – as a sculptor and goldsmith in the service of Milan duke, whose palace and throne were to be decorated by Barovier with inlays of finest glass.

This shows how this ability to experiment with new compositions, aimed at the invention of crystalline glass, owes it precisely to Angelo Barovier to have exported outside the island first, and later to the world, prestigious products that kicked off the Renaissance of the art of glassmaking, thanks to the success of *Lattimo and Calcedonio* (Zecchin, 1987, II).

The first was milky white, imitating Chinese porcelain, and was obtained by opacifying crystal with lime of lead and tin. *Calcedonio* glass, on the other hand, recalled the veining of agate, onyx, and other gemstones by adding a combination of metallic compounds, such as silver salts, to the mixture. In fact, the term *Lattimo* already appeared in some Murano papers from 1420, but in 1452 Barovier in his furnace had succeeded in producing a transparent glass, immediately named *Crystal*, earning from the Signoria the concession to work it even during the period of the year when inactivity was imposed on the island's furnaces, from mid-August to the end of October (Zecchin, 1976).

The success of crystal, however, was surely the result of empirical research whose purpose was not so much related to a nostalgic return to the fashion of colorless transparency, already produced since the Middle Ages, but rather to the nullification of impurities and imperfections, mainly due to the melting agent and soda ash that compromised the homogeneity effects of glass (Barovier Mentasti, 1982). In general, all these inventions were protected by short-lived patents and at the special request of the glass makers, to secure their economic interests, and then disseminated to other Murano furnaces after an appropriate period of time.

Actualization of Glass Beads

The protagonist of these events died at the age of 55 in 1460, leaving tangible evidence of his work that receives his surname: the *Barovier Cup* made of blown glass, painted with polychrome fused enamels, and dated c. 1460, now housed at the Murano Glass Museum.

The inheritance of the family business then passed to the six sons, among whom Marino stands out for his positions as *Gastaldo* of the glassmakers' art in 1468 and 1482; then there is Giovanni, who manages the furnaces together with Maria, known as Marietta, who guards the secrets of her father's craft in a special notebook he gave her and from which she draws ideas for glass compositions and colorations (Cicogna, 1853).

Not much is known about her, but she probably was born in 1431 because her mother Apollonia, in a notarial deed perhaps signed before childbirth, leaves her an inheritance of 70 ducats as a dowry for her future marriage. However, she will never marry, this seems to suggest a definite choice in devoting herself to her passion for her work and claiming a form of social redemption that sees, at last, a woman at the direction of enterprises made up exclusively of men.

Moreover, her active role as an entrepreneur is also documented by the deeds of Murano's Podestà Francesco Dolfin, dated July 26, 1487, which declare her directing the production of enamel-painted glass, because Doge Agostino Barbarigo granted her the opening of a *Muffola*, a small furnace used for annealing enamels (Levi, 1895).

Other traces of her existence are dated to May 4, 1496, the day on which the inventory of unsold products from the Barovier brothers' furnaces was drawn up, among which appear artifacts in non-blown glass and the famous Rosetta bead, of his own invention (Zecchin, 1987, II).

According to the dates given in the documents that have come down to us, at least for the Century in which she lived, the long-lived and eclectic Marietta would have worked on the Rosetta beads production in the small furnace she opened in 1487, although the term already appears in some documents dating back to 1480; in any case the 1496's inventory refers to the *Oldani*, which are



Fig. 02 Frames of videos on stage for *La Donna del Fuoco Marietta Barovier. Pioniera delle perle veneziane*. M. Clammaichella, 2021.

Fig. 03 *La Donna del Fuoco Marietta Barovier. Pioniera delle perle veneziane*. Direction and dramaturgy: M. Navone, scenic and video staging: M. Clammaichella, Goldoni Theater, Venice, September 12, 2021.

ellipsoidal beads very similar to those still in production today. To make them, a pierced rod contains six layers of colored glass alternating on blue, white, and red in forming five concentric starry, twelve-pointed prisms (Sarpellon, 2003).

The process requires the labor of four or five people and begins with a metal rod being heated by a *Servente* inside a furnace with three crucibles, containing the colors described above.

First, the white dough is taken to be rolled around the rod on an iron plate until the cylindrical shape is obtained, then the *Scagnèr* intervenes by holding a pair of pliers in making a hole along the cylinder axis, which is immediately plunged into the crucible where the blue glass is, so as to form a light layer around the white. The dough retains a workable consistency as it is placed in a mold whose section has the characteristic star profile, and this procedure is repeated three more times, alternating the same number of colors, until the last cobalt blue glass covering is rolled, returning to the primary cylindrical shape. At this point the *Scagnèr* grabs a second iron rod and applies it to the opposite end of the first, delivering them both on the hands of two *Tiradori* who walk in opposite directions in extending the cylinder until the wanted diameter is reached, and then let the glass rods, cut about a meter long, cool on wooden boards (Moretti, 2005).

Among the most complex steps, grinding, which in Marietta's time was done by hand, is a long process of abrasion and polishing designed to give the bead its characteristic ellipsoid shape, making it world-famous in becoming exchange currency. Between truth and legend, in fact, Christopher Columbus is believed to have given Rosetta beads to the American Indians, but it is certain that these were found in India by Vasco de Gama in 1497, in Peru and especially in Africa (Bertagnolli et al., 1991).

The Woman of Fire Marietta Barovier

The outcomes of the research, summarized so far, have flowed into the dramaturgical writing of the play *La Donna del Fuoco Marietta Barovier. Pioniera delle perle veneziane*⁵, which tells the story of this inventor, businesswoman, and active protagonist of innovation in the art of glass (Figure 01).

In a constant dialogue between past and present, the social and productive dynamics of the Murano furnaces are interwoven, paying particular attention to the raw materials and manufacturing processes of yesterday and today: experiments and practices to which Marietta Barovier, undoubtedly, has dedicated much of her life.

5 Production: Arte-Mide, direction and dramaturgy: Massimo Navone, acting conception and interpretation: Chiarastella Seravalle, music and singing: Rachele Colombo, scenic and video staging: Massimiliano Ciammaichella, costume consulting: Carlos Tieppo. The play premiered at the Goldoni Theater in Venice on September 12, 2021, as the final event of The Venice Glass Week fifth edition. The play was also produced thanks to close collaboration with the Glass Bead Art Committee, which is responsible for the glass beads candidacy as a UNESCO intangible heritage.

Thus, guided by the words of an actress – and the musical compositions of a singer with whom she interacts – the spectator is empathetically introduced to the discovery of the alchemical and fascinating world of beads creation, starting with the origins of the elements of which it consists.

The narrative register is confronted with video appearances, variously positioned in the background scenic backdrop, which interact with the dynamics of a diachronic and synchronic becoming. They are enclosed within circular windows to emphasize the images and sounds of the primary element of fire, unveiled through the narrow opening of the mouth of a Murano furnace and captured on video, in its perpetual motion of preparation for the ritual of a work that repeats itself every day and in the rotational movements of the rod with which the fluid mass of glass is begun to be shaped (Figure 02).

But the reference to the geometric figure of the circumference is also meant to be a tribute to the bead, the undisputed protagonist of the performance, and to the profession of beadmakers today. Thus, some photographs, portraying the working processes of Muriel Balensi's works, are re-elaborated with morphing techniques, to reproduce in video the complexity and magic of formal combinations that are enclosed in the universe of colors of the precious spheres.

Generally, morphing applied to two-dimensional figures is that deformation technique created on a sequence of animated images, showing the gradual transition from an initial figure to its transformation, achieved by the *warping*⁶.

In this case, it is a matter of defining a topological correspondence between pairs of photographs, given by the interpolation of recognizable homologous points in both; therefore, the transformations between the source and target images are recorded in video sequences that reveal their effects (Figure 03 to 05).

The only elements of stage decor are a metal frame and a mirror beside which is placed a costume, the one that actress Chiarastella Seravalle wears when she takes us back to fifteenth Century Murano in playing the role of Marietta Barovier. Although not much is known about her private life, she is known to be involved in the *industrial espionage* case with Giorgio di Pietro, nicknamed Ballarin⁷ because of his limping gait.

This Dalmatian laborer was already serving the family furnaces in 1481, because a complaint against Giovanni, son of Angelo Barovier, had been filed for contravening the rule not to hire foreign staff in glassmaking. Yet, chronicles attest that Ballarin himself had stolen the precious book with

⁶ Warping: distortion by deformation.

⁷ *Ballarin*: by Venetian dialect translates to "dancer".

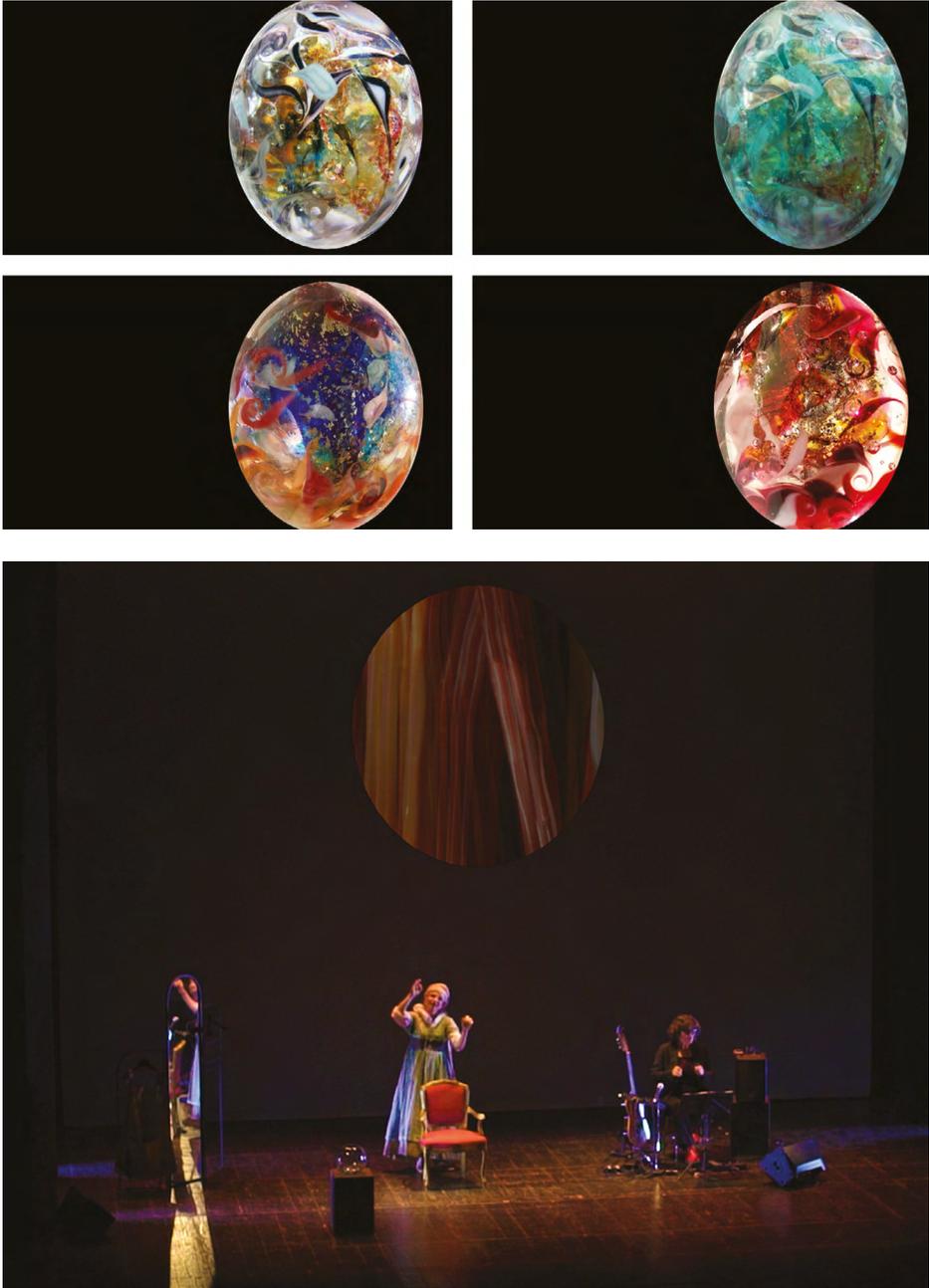


Fig. 04 Frames of Muriel Balensi's beads, morphing in video for *La Donna del Fuoco Marietta Barovier. Pioniera delle perle veneziane*. M. Clammaichella, 2021.

Fig. 05 *La Donna del Fuoco Marietta Barovier. Pioniera delle perle veneziane*. Direction and dramaturgy: M. Navone, scenic and video staging: M. Ciammaichella, Goldoni Theater, Venice, September 12, 2021.

Marietta's notes and recipes, copied them, and in the same year opened a furnace in Venice, which was forbidden because a decree of 1291 ordered all existing ones to demolish and forbade the construction of new ones. The Serenissima, therefore, avoided any risk of fire and transferred all production to Murano.

This time, instead of defending him, it was Giovanni Barovier who denounced Ballarin, who was arrested and immediately released on bail paid by glassmaker Alvise Trevisan. In any case, in 1492 he opened a furnace in Murano, and in the years 1503-1504 he was honored with the title the glass art *Gastaldo* (Zecchin, 1987, I).

With the Split native, Marietta continued to have worked relations, despite the misadventures and betrayal of trust in having the precious recipes stolen from her (Marzo Magno, 2017). The spectacle limits itself to the telling of these events, without drawing any conclusions about possible love affairs, as is evident from reading the novel: *Marietta. A Maid of Venice* (Crawford, 1901).

Conclusions

The performance concludes with a tribute to the extraordinary talent of Marietta Barovier, the first woman who was allowed to open her own furnace and where, in all likelihood, she invented a small artifact that holds secrets and mysteries, concealed even in its same name: *Rosetta*.

To corroborate the hypothesis that it had an Egyptian origin, some Egyptologists have associated the name with the city that lies at the mouth of the Nile, but this theory is completely wrong, because the Rosetta origin, as seen, lies in the Barovier family furnaces in Murano.

Americans, however, also use other denominations such as, for example, Star beads or Chevron (Moretti, 2005), and it seems that the latter term was introduced by antiquarian John Brent, in his essay: *On glass beads with a chevron pattern* (Brent, 1880).

But perhaps the little rose contained other meanings: desert rose, mystical rose, rose cross, rose of life. Alchemies and suppositions that probably contributed to the fortune of this ingenious creation in feeding the earnings of merchants and takings of the Serenissima. An object that, even before becoming body adornment, was used as purchasing currency.

Stories and legends related to this bead multiply, crossing over several centuries to the most distant places on Earth, tangible evidence of the value of a woman who dedicated her life to her passion: the art of glass beads.

In conclusion, antifragility here insists on the fluid material to be worked, the glass, and the invention and strength of a Renaissance pioneer, a woman with a history to be rediscovered.

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