

A Brief Account of Glass in Qing Dynasty China

Bojun Yan

Beijing Institute of Archaeology (Beijing Institute of Cultural Heritage), Beijing, 100078

Abstract: This paper takes glass as its subject. It first outlines its developmental trajectory within China, then focuses on the varieties and manufacturing techniques of Chinese glass during the Qing dynasty, and finally provides an overview of its artistic achievements.

Keywords: Qing dynasty; glass; history and art

DOI:10.12417/3029-2344.25.11.018

1. The History of Glass in China

The earliest glass artifacts in China emerged during the early Western Zhou Dynasty, around the 11th century BCE. At this stage, glass objects were simple in form, primarily consisting of small used as decoration tubes and beads. Their color was limited, mainly to turquoise green and dark green, and they were generally diminutive in size. It was not until the late Spring and Autumn and early Warring States periods that domestically produced glass items began to appear^[1]. By the mid to late Warring States period, a significant number of glass objects, such as "dragonfly-eye" beads, ear ornaments (Dang), Bi discs, and Cong tubes—was served as both personal adornments and ritual implements—were frequently discovered in the Central Plains region. These pieces exhibited a jade-like appearance, leading to their use as substitutes for jade in burials.

During the Han Dynasty, the aesthetic preference for jade-like qualities became even more pronounced. Prior to the Eastern Han, people considered man-made glass to be a gemstone similar to jade, a view corroborated by numerous excavated Han Dynasty glass objects that imitate jade. The Wei, Jin, and Northern and Southern Dynasties period saw the introduction of blown glass from the Western Regions. Its greater transparency distinguished it from jade, shifting away from the tradition of imitating jade by glass. Technological improvements also led to the replacement of the previously dominant lead-barium glass formula with the Western Sodium-Calcium formula.

In the Sui and Tang dynasties, blown glass technology significantly saved labor and increased success rates, producing highly transparent vessels. The items displayed distinct Chinese characteristics on two fronts. Firstly, practical utensils such as egg-shaped vessels, brush holders, and lidded jars established the defining features of China's self-made glass containers. Secondly, items like bead strings and ornaments were often used as Buddhist ritual objects, fostering the production of indigenous Buddhist glassware.

By the Song Dynasty, the glass formula shifted to a high-lead composition without barium. As Du Wan recorded in his *Cloud Forest Stone Manual*: "In the Luo River near the Western Capital (Luoyang), many bluish-white are found in the water, some with multicolored streaks. Taking the whitest among them, adding lead, and combining with various medicinal substances, it can be fired into glass, called artificial jade."^[2] Su Dongpo also wrote in his poem *Medicine Jade Cup*. "Melting lead, boiling white stone, / Making jade is but self-deception; / Carving and shaping it into a wine cup, / Modelled after Dingzhou porcelain."^[3] Within the context of interment practices, glass objects were primarily used as reliquary containers and offerings. By the Southern Song, advancements in thermoplastic techniques led to greater variety. One category included artistic glass in forms imitating plants and animals, served as decorative displays. Another category featured small glass jewelry like earrings, beads, hairpins, and pendants in sky-blue and white, which became quite popular.

The use of domestically produced glass became more active during the Yuan Dynasty compared to the Southern Song and Jin periods, with most unearthed pieces found in northern regions. Primary forms included glass beads and hairpins, mostly is monochromatic, such as blue, white, red, green, or black. These pieces exhibited an opaque, jade-like effect, different from the increasingly transparent appearance of blown glass.

In the Ming Dynasty, glass was commonly called "Yaoyu" , denoting its jade-imitating nature. Its most notable feature is the high consistency between its design and jade products, especially decorative items such as white-jade-imitating pendants, double-earrings, and hairpins. According to Ming sumptuary regulations, officials of the fourth rank and below were permitted to wear only gold and "Yaoyu" pendants. Ming "Yaoyu" was virtually indistinguishable from true jade in both design and carving technique. Patterns predominantly featured auspicious motifs like flowers, birds, cranes, deer, and mythological figures, often executed with openwork, engraving, and other techniques, resulting in crisp lines and sharp, precise workmanship.

During the Qing Dynasty, Beijing also became a central hub for glass production, with its products commonly known as "Beijing material" (Jingliao). The establishment of the Glass Workshop under the Imperial Household Department during the Kangxi reign, supported by the emperor and incorporating European techniques introduced by Western missionaries, led to the rapid development of colored glass. "According to incomplete statistics, the Kangxi period already saw varieties including monochromatic glass, painted enamel glass, overlay glass, and engraved glass." The range of colors for monochromatic opaque glass exceeded thirty. *Notes from Yan Mountain (Yanshan Zaji)* also describes eight glassmaking techniques: dripping, molding, threading, casting, kneading/combining, spot-coloring, blowing, and engraving.^[3] Thus, Chinese glassmaking reached a peak in both technological sophistication and variety, marking a period of great prosperity.

2. Types of Glassware

2.1 Monochromatic Glass

Among Qing Dynasty glassware, monochromatic glass constituted the most extensively produced category. This type refers to vessels formed—either by blowing or molding—from glass with single color. It was primarily valued for its elegant form, crystalline texture, and purity of hue. Most pieces were left undecorated, with only a minority featuring additional colors applied at the shoulder or rim. Monochromatic glass can be classified into three subtypes: transparent, translucent, and opaque.

Opaque glass was termed Nie glass. "Nie" implies a cloudy, grayish opacity. In its production, "*fluorine was employed as an opacifier—a practice unique in the world at that time...*" Different coloring agents were subsequently added to achieve various hues. "*The Qing Dynasty also developed distinctive methods for producing opaque yellow and red glass by utilizing elements such as potassium and lead as coloring agents.*"^[4] Some agents were quite costly; for instance, red glass was produced using gold as a coloring agent. Yellow, was regarded as a symbol of imperial authority, was fired with iron oxide as the colorant. The blue shades observed in three excavated glass hairpins, for example, were achieved with copper oxide, in addition different blues could employ different agents—cobalt oxide, for instance, yields a deep blue.

Monochromatic glassware from the Kangxi reign marks the inception of Qing glass production, surviving examples are exceedingly rare. By the Yongzheng period, it remained the mainstream product, with the Nie color palette further enriched. Opaque, grayish tones such as "opaque white (Nie bai), opaque yellow (Nie huang), and opaque red (Nie hong)" . This trend was driven by a revival of the practice of imitating jade by glass, leading to a series of opaque or translucent jade-like colors, including agate red, jadeite green, and amber yellow. Concurrently, boundaries between craft categories have become blurred, and techniques increasingly cross-fertilization. Glassmaking began to emulate forms from traditional art forms like jade carving, carved lacquer, and Xuande-style censors, while also experimenting with decorative combinations with materials such as enamel.

During the Qianlong era, the glassblowing techniques reached a higher level. Moving beyond the small-scale objects of previous eras, large vessels like vases and beakers (Gu) began to be produced. By the 17th year of Qianlong (1752), the existing large kilns at the glassworks could no longer meet demand, leading to the construction of new, dedicated kilns for large glassware. In terms of forms, innovation flourished beyond the traditional trio of censors, vases, and boxes, as well as large altar sets (Wugong).besides new shapes emerged, such as double-tube

vases, wrapped-bundle vases, olive-shaped vases, plantain-leaf vases, paper-mallet vases, backgammon-piece vases, double-happiness character vases, fish-form vases, hexagonal vases, pomegranate-flower vases, and lingzhi-mushroom flower vases. The color range expanded to over thirty distinct shades, including tridacna white, sky blue, sapphire blue, peacock blue, realgar yellow, chicken-fat yellow, soft yellow, pea green, powder pink, purplish red, cowpea red, black-tea brown, and grape purple. The transparent colors rivaled gemstones in brilliance, while the opaque ones possessed a soft luster akin to white jade, achieving a level of verisimilitude that could easily deceive the eye.

2.2 Overlay Glass

The overlay glass decorative technique emerged during the Kangxi period and became mainstream in the Qianlong era, with the earliest extant examples also dating from the Qianlong reign. The Qing scholar Zhao Zhiqian wrote in his work 《Yong Lu Xian Jie》: "Overlaid colors include red and blue, and there is also combined overlay known as two-color, three-color, four-color, or five-color, or layered overlay, with carving of exquisite perfection. Those made during the Kangxi period are simple and archaic in form, their radiance brilliant and dazzling like rare jewels. After Qianlong, skillful craftsmen attained painting-like effects, far surpassing Zhan Cheng; where their tools reached, the fineness entered into the hair's breadth, and the touch reveals edges." This passage records the beauty of the overlay glass body's texture and the three-dimensional quality of its ornamentation, while also contrasting the different styles of Kangxi and Qianlong overlay glass, demonstrating the maturity of Qing dynasty overlay glass craftsmanship.

In terms of production, there were two primary techniques for creating overlay glass. Both started with a monochromatic glass body (Tai). The first method involved overlaying glass of another color onto the surface of the body. After cooling, designs were carved into the outer layer using jade-working methods, creating a contrast in color and pattern between the outer layer and the base glass. This was the main method used during the Qianlong period. The second method involved applying molten colored glass rods directly onto the body in the desired pattern, followed by light polishing. The production of overlay glassware was challenging, as artisans needed precise control over the expansion coefficients of both the body and the outer layer; otherwise, the entire piece risked cracking or shattering.

Regarding color schemes, the 《Qing Archives》 record combinations such as yellow overlaid on red, green on red, beige on red, black on red, red on green, blue on green, red on blue, russet on blue, sky blue on sapphire blue, cowpea red on sky blue, and green on soy brown. Among these, the "white ground with colored overlay" (bai shou cai), subdivided into red, blue, green, or yellow overlays on a white body, constituted the mainstream product line. Overlay could also be categorized into single-color overlay and multi-color overlay. Palace workshops primarily focused on the former (single-color overlay on a white ground, i.e., "white receiving color"), while non-imperial production predominantly featured the latter, known as "combined overlay" (jian tao), where two or more colors were overlaid on a single-colored glass body. This led to two distinct stylistic characteristics: official (court) manufacture and non-official (folk) manufacture.

In terms of decoration, overlay glassware represents a composite craft combining glass-forming techniques with carving artistry. Its carving techniques drew from and interacted with contemporary carving methods used for lacquer, jade, ivory, and horn. Overlay pieces with added carving are termed "carved overlay" (ke hua tao liao), while those without carving are called "plain overlay" (sutao). During the Qianlong period, carved overlay enjoyed great popularity. These pieces were exported worldwide through imperial gifts to foreign dignitaries and commercial trade. At the time, the carving process employed jade-working technology, using tools like grinding wheels (tuozi), pull drills (lazuan), and chisels (tingzi) for initial rough grinding, followed by finer grinding with copper wheels and polishing with wooden wheels. By the Daoguang period, mechanized carving/polishing machines were already in use. The finished products display both the harmonious beauty of different color combinations and the

three-dimensional beauty of relief carving.

2.3 Marvered Glass

The term "marvered glass" is not the designation found in the Qing Archives, but it has been consistently used to this day. This technique formally emerged during the Yongzheng reign and is often discussed alongside "latticinio glass" or "filigree glass," which was produced at the Imperial Workshops during the Qianlong period with reference to Western glassware and with direct participation by Western craftsmen. Both types utilize the properties of glass that allow for deformation and fusion during its molten and setting stages. The former (marvered glass) bears reign marks only from the Yongzheng and Qianlong periods, though its production continued into the late Qing dynasty. The latter (latticinio glass) has no extant marked pieces and appears to have been made exclusively during the Qianlong reign. This type of glass is characterized by a thin body composed of colorless transparent glass and white glass, featuring fine, uniform, and smoothly rotating patterns, giving it a unique style among Qing dynasty glassware.

Generally, two techniques were employed: the "cored" technique and the "coreless" technique. In the cored technique, a single-colored glass blank was first formed by blowing. Then, partially molten rods of other colored glasses were applied to its surface while rotating, creating patterns by marvering. The coreless technique involved simultaneously blowing two or several colors of glass together. If colors were intended to be used symmetrically, the gather was rotated consistently in one direction—either from bottom to top or top to bottom—at a fixed speed and angle during blowing, resulting in regular, patterned striations. To achieve irregular banded or cloud-like patterns, the rotation speed could be randomly varied or the direction changed during the process. Colors could also be combined freely, producing an unpredictable and ever-changing visual effect.

4. Artistic Characteristics

4.1 Ornate and Diverse Decorative Techniques

Decorative patterns more fully demonstrate the designer's knowledge and innovative capabilities, while also offering a more direct reflection of the cultural connotations embedded within an object. During the Qing dynasty, glassware exhibited a great variety of forms and an array of decorative motifs, achieving innovation through the fusion of historical inspiration and Western influences. With the exception of the patterns in marvered glass, which are created by utilizing the thermoplastic properties of the glass itself, all other decorations incorporate a combination of various techniques.

As previously mentioned, overlay glass was often adorned with motifs such as phoenixes, peaches and bats (tao fu wen), dragons amidst clouds (yun long wen), knotted-wrapper patterns (fu xi wen), lotus petal designs (lian ban wen), bats and clouds (yun fu wen), floral patterns (hua hui wen), and interlocking floral scrolls (chan zhi hua hui wen). These patterns were arranged skillfully and executed with clean, precise carving.

Painted enamel glass represents a typical glass type of the Qianlong era, exemplifying the fusion of China's traditional craftsmanship with Western enamel materials. Its emphasis lies in exquisite, luxurious, and intricately detailed ornamentation.

4.2 Pure and Brilliant Color Expression

From extant artifacts, Qing dynasty glassware achieved unprecedented levels at color saturation, transparency, gloss, as well as fineness of craftsmanship, diversity of techniques, and variety of decoration. On one hand, the classification of color was extensive; for instance, the pea-green (dou lü) category alone comprised seven or eight distinct shades. These colors not only reflected the confidence and grandeur of the imperial era through their bright and pure hues, but the greatly enhanced transparency also demonstrated the masterful use of clarifying agents in glass production. On the other hand, the subtle and precise control over color reveals meticulous spirit in the proportional formulation of colorants.

For example, a comparison between the Pic1 "pea-green glass plain straight-necked vase with Guangxu mark" (Cultural Relics No. 故 00106351-4/6, cited from the Palace Museum website) and Pic2 the "light green glass plain residue vessel with Guangxu mark" (Cultural Relics No. 故 00106528-7/9, cited from the Palace Museum website) shows that the pea-green contains a yellow element, leaning toward a warmer tone, while the light green is relatively cooler with the addition of blue elements. At the same time, the interplay between colors is particularly striking. Whether in single-layer or multi-layer overlay pieces, harmonious color combinations enhance the visual theme of the objects.



Pic1



Pic2

4.3 Smooth and Lustrous Surface Texture

The texture of an object is determined by a combination of factors and is one of the key elements influencing its overall presentation. For glassware, the primary determinants of texture are material properties and processing techniques.

Material properties refer to the luster and sheen resulting from the optical characteristics of the glass itself. In terms of processing techniques, both hot-working and cold-working methods are involved. The influence of hot-working lies mainly in the relationship between the composition formula and the inherent properties of the glass material. Cold-working includes techniques such as carving and polishing, which can be applied as secondary processes to endow the object with desired aesthetic qualities—such as a sense of power, solemnity, solidity, or lightness.

5. Conclusion

As a distinct category of craftsmanship, glassmaking in China evolved under the patronage and enthusiasm of the ruling class. Through the introduction of new materials along the Silk Road, the technical contributions of Western missionaries, and the integration of diverse traditional techniques, it ultimately emerged from the Qing court, developing distinct Chinese characteristics in terms of craftsmanship, function, and style.

From a technical perspective, the traditional understanding and initial uses of this artificial material was largely limited by the limitations of indigenous lead-barium glass. The later pursuit of color and transparency during the modern period reflects a synthesis of Chinese and Western techniques. In terms of function, the highly developed and widespread use of materials such as gold, silver, jade, and ceramics meant that the functional exploration and expansion of glassware were more confined to display and decoration. This, however, conversely ensured the quality and innovation of glass products. Stylistically, the imitation of porcelain and jade in glass persisted across different eras. This represented not only an attempt to create functional substitutes for porcelain and jade but also a process through which glass art, originally subject to significant foreign influence, developed and cultivated its own Chinese style.

References:

- [1] Qi Dongfang and Li Yusheng, *Ancient Chinese Material Culture: Glassware*, Beijing: Kaiping Publishing House, 2018, p.27.
- [2] Du, Wan. *Cloud Forest Stone Manual: First Edition*. Beijing: Zhonghua Book Company, 2012, p.17.
- [3] Zhang, Weiyong. *A Discussion on the Name and Reality of Liuli*. *Palace Museum Journal*, no.2(1986), p.69. (Source containing the citation).
- [4] An, Jiayao. *A History of Glassware*. Beijing: Social Sciences Academic Press(China), 2011, p.188.