



LENOX INSTITUTE PRESS

Auburndale, Massachusetts, 02466, USA

**“EVOLUTIONARY PROGRESS IN SCIENCE,
TECHNOLOGY, ENGINEERING, ARTS AND
MATHEMATICS (STEAM)” Series**

**CHINESE CLOISONNE: ARTISTIC
ENAMELWARE FOR EAST-WEST
CULTURE EXCHANGE THROUGH
LAND AND SEA SILK ROADS**

Lawrence K. Wang and Mu-Hao Sung Wang

Citation: Lawrence K. Wang and Mu-Hao Sung Wang (2023). *Chinese cloisonné : artistic enamelware for east-west culture exchange through land and sea silk roads*. In: "Evolutionary Progress in Science, Technology, Engineering, Arts and Mathematics", Lawrence K. Wang and Hung-ping Tsao (editors). Vol. 5, No. 11A, 5(11A), November 20, 2023, 38 pp. Lenox Institute Press, MA, USA. Lenox.Institute@gmail.com; <https://doi.org/10.17613/aakj-ph96>

CHINESE CLOISONNE: ARTISTIC ENAMELWARE FOR
EAST-WEST CULTURE EXCHANGE THROUGH LAND AND SEA SILK ROADS

Lawrence K. Wang and Mu-Hao Sung Wang

ABSTRACT

Chinese cloisonné is beautiful enamelware produced with the combined human knowledge of science, technology, engineering, arts and mathematics (STEAM). It decorates our humanity connected by the Silk Roads. The cloisonné technology originated in the West (Middle East and Europe) and spread to the East (China) during China's Yuan Dynasty (1271-1368). Then Chinese craftsmen perfected it in their Ming Dynasty (1368-1644) and Qing Dynasty (1644-1912). Chinese cloisonné are still made and highly valued today, and have become the standard by which to measure the quality and appraise the beauty of cloisonné world-wide. This STEAM product ranks as one of China's major contributions to the world's fine arts. Both the Republic of China (ROC; 1912-present) and the People's Republic of China (PRC; 1949-present) inherit the same Chinese culture including the cloisonné technology. PRC just held its third Belt and Road Forum (BRF) in Beijing, October 17-18, 2023. PRC President Xi Jinping gave Chinese cloisonné as a State Guest Gift to the 130 foreign leaders who attended the BRF. This publication reviews the historical and technological developments of Chinese cloisonné and introduces the technical information from both the PRC China Highlights in Beijing, and the ROC Government Information Office in Taipei.

KEYWORDS:

Chinese cloisonné, Enamelware, Science Technology Engineering Arts and Mathematics (STEAM), Silk Road, Land Silk Road, Sea Silk Road, Humanity, Republic of China (ROC), People's Republic of China (PRC) , Belt and Road Forum (BRF), History, Technology, Arts, PRC China Highlights, Beijing, ROC Government Information Office, Taipei, Taiwan, Jewelry, Fine Arts, Hobby, Memoir.

TABLE OF CONTENTS

ABSTRACT

KEYWORDS

SECTIONS

1. INTRODUCTION

1.1 Cloisonne

1.2 Summary

2. HISTORICAL DEVELOPMENT: HUMANITY CONNECTIONS OF ANCIENT SILK ROAD AND MODERN BELT AND ROAD FORUM

3. TECHNOLOGICAL DEVELOPMENT: COMBINATION OF SCIENCE, TECHNOLOGY, ENGINEERING, ARTS AND MATHEMATICS (STEAM)

4. CHINESE CLOISONNE: ARTS OF DECORATIVE ENAMELING IN TAIWAN

GLOSSARY OF CLOISONNE TECHNOLOGY

REFERENCES

APPENDIX: MODERN LESS EXPENSIVE CLOISONNE FOR DAILY USE OR DECORATION

CHINESE CLOISONNE: ARTISTIC ENAMELWARE FOR EAST-WEST CULTURE EXCHANGE THROUGH LAND AND SEA SILK ROADS

1. INTRODUCTION

1.1 Cloisonné

In general, cloisonné is a decorative work or technology in which colored materials (such as enamel, glass, or gemstones) are held in place or separated by metal strips or flattened wire, normally of gold, placed edgewise on a metal backing by soldering. The metal strips or wires are bent to the outline of an artistic design and the resulting cellular spaces of the design, called cloisons (French: “partitions” or “compartments”) are filled with vitreous colored enamel paste with or without gemstones/glass. Finally cloisonné art work is produced at high temperature.

Chinese cloisonné works are a colored decoration made of enamels poured into the divided areas in a design outlined with wire or metal strips which are fused to the surface of an object. They are mostly fused with a special blue enamel as the base color, hence the term for Chinese cloisonné was called Jingtailan (景泰蓝, Jǐngtàilán) after the name of an emperor. In China, enamel is called tángcí 搪瓷.

1.2. Summary

Chinese cloisonné is beautiful enamelware produced with the combined human knowledge of science, technology, engineering, arts and mathematics (STEAM). It decorates our humanity connected by the Silk Roads. The cloisonné technology originated in the West (Middle East and Europe) and spread to the East (China) during China's Yuan Dynasty (1271-1368). Then Chinese craftsmen perfected it in their Ming Dynasty (1368-1644) and Qing Dynasty (1644-1912). Chinese cloisonné are still made and highly valued today. Chinese cloisonné became the standard by which to measure the quality and appraise the beauty of cloisonné world-wide. This ranks as one of China's major contributions to the world's fine arts. Both the Republic of China (ROC; 1912-present) and the People's Republic of China (PRC; 1949-present) inherit the same Chinese culture including the cloisonné technology. PRC just held its third Belt and Road Forum (BRF) in Beijing , October 17-18, 2023. PRC President Xi Jinping gave Chinese cloisonné as a State Guest Gift to the 130 foreign leaders who attended the BRF. This publication reviews the historical and technological developments of Chinese cloisonné [1-14] and introduces the technical information from the PRC China Highlights [3] and the ROC Government Information Office in Taipei, Taiwan. [13]

2. HISTORICAL DEVELOPMENT: HUMANITY CONNECTIONS OF ANCIENT SILK ROAD AND MODERN BELT AND ROAD FORUM

The Islamic world in the Middle East originally developed the cloisonné technology and the art works. It spread to the Byzantine Empire and from there along the Silk Road to China in the 12–14th centuries as early as China's Yuan Dynasty (1271-1368) when Mongolian conquered almost entire Asia and Europe.

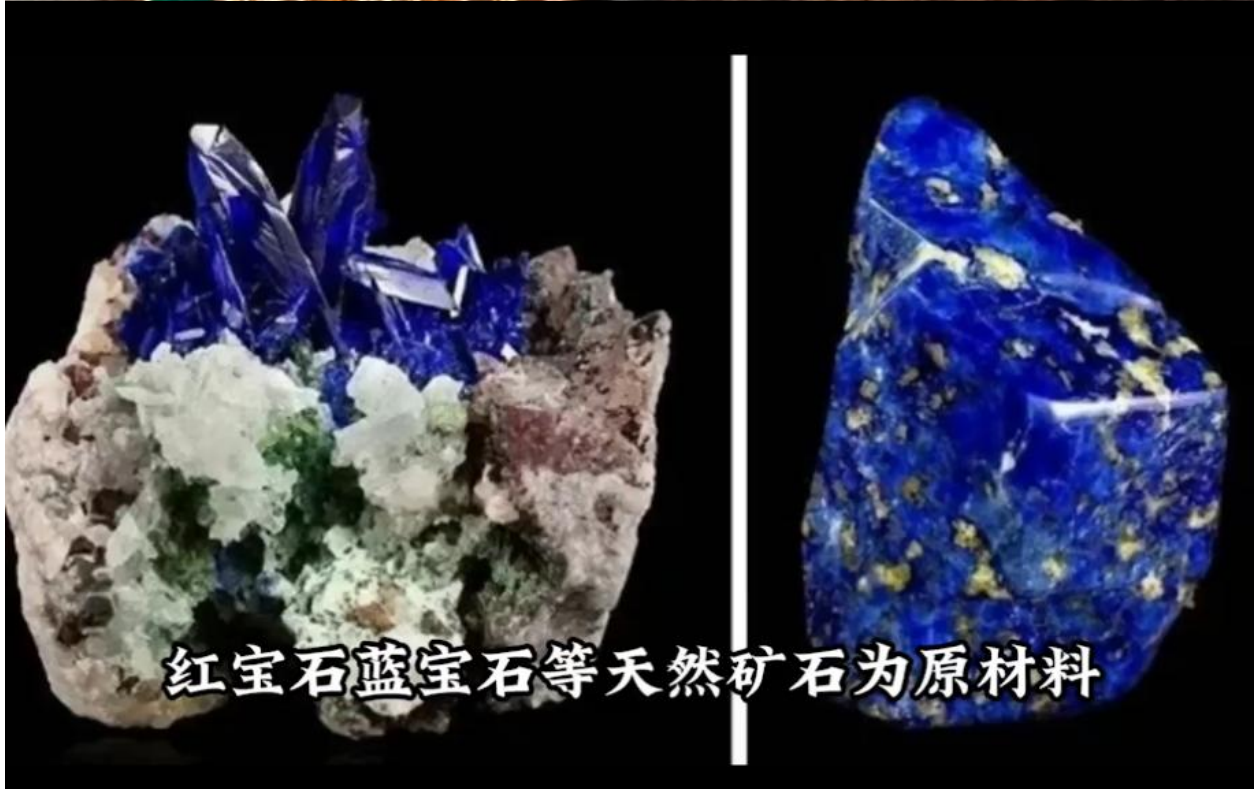
The most elaborate and highly valued Chinese pieces were produced in China's Ming Dynasty (1368-1644), especially the reigns of the Xuande Emperor and Jingtai Emperor (1450–57). Chinese cloisonné is probably the most well known and ubiquitous. One of the most important factors in dating antique Chinese cloisonné is the style. Chinese cloisonné jewelry, vases, and other decorative items were spread back to the Islamic world, Europe and Africa through both the Land Silk Road and the Sea Silk Road in Ming and Qing Dynasties. They now represent the standard by which to measure the quality and appraise the beauty of cloisonné world-wide and are one of China's major contributions to the world's fine arts. [1-5].

The Silk Roads were the most enduring business and trade routes in human history that connected China, Middle East, Europe, and Africa, and were used for over 1500 years. The names of Silk Roads were taken from the prized Chinese silk products that exported from the East (China) to the West (Middle East, Europe and Africa). Wang [14] introduces the circulation coins used for trade on ancient Land and Sea Silk Roads. The silver and copper circulation coins used for trade on ancient Land Silk Road were engraved with both Chinese and Arabic characters, while the circulation coins used for trade on Sea Silk Road (Maritime Silk Road, or Ocean Silk Road) were engraved with both Chinese and English [14].

Chinese cloisonné are still made and highly valued today. Both the Republic of China (ROC; 1912-present) and the People's Republic of China (PRC; 1949-present) inherit the same Chinese culture including the Chinese cloisonné technology.

PRC just held its third Belt and Road Forum (BRF) in Beijing , October 17-18, 2023. PRC President Xi Jinping gave Chinese cloisonné as a State Guest Gift to the 130 foreign leaders who attended the BRF. The PRC initiated Belt and Road is meant to be the modern Land and Sea Silk Roads connecting Asia, Europe and Africa. The beauty and production process of Chinese cloisonné can be understood from the following seven figures (Source: PRC government).









Source: The government of the People's Republic of China (PRC), October, 2023. (Figures 1-7)

Cloisonné from the Ming Dynasty tended to have a more formal, classical style, while cloisonné from the Qing Dynasty (1644-1912) was often more decorative and ornate.

Chinese cloisonné of the 19th century or modern years [the Republic of China (1912-present) and the People's Republic of China (1949-present)] can be far more common, less expensive for commoners' daily use or decoration (see Appendix) Of course, just like any works of fine arts, a Chinese cloisonné can be extremely expensive if it is made of sapphire, emerald and gold, and produced by a famous artist.

In much Chinese *cloisonné* blue is usually the predominant color, and the Chinese name for the technology, *Jingtai-Lan*. *Jingtai* and *Lan* refer to the Emperor Jingtai of Ming Dynasty and blue color, respectively.

The high quality Chinese *cloisonné* uses heavy bronze or brass bodies, its wires are soldered. The low quality Chinese *cloisonné* uses much lighter copper vessels, and its wires are glued on before firing. The enamels compositions and the pigments change with time.

3. TECHNOLOGICAL DEVELOPMENT: COMBINATION OF SCIENCE, TECHNOLOGY, ENGINEERING, ARTS AND MATHEMATICS (STEAM)

3.1 Dashi-ware or Muslim-ware Technology

In the Middle East during 12th century (China's Yung Dynasty, Year 1271-1368), Arabic and Byzantine artisans applied powdered mineral materials, small gems such as garnet that are heat resistant, gold leaf or other inclusions to metal surfaces and then melted glass onto them at high temperatures to produce a colored mosaics and decorated metal objects with durable coating. Different mineral materials with different proportions were used to produce different colored coatings. [3]

3.2 Ming Dynasty Cloisonné Technology

Enamelware craftsmen in the Ming Empire (1368-1644) made enamelware by firing powdered minerals into durable enamel. During the reign of Emperor Jingtai (1449-1457), Chinese cloisonné reached a high level of beauty and craftsmanship. It was called "Jingtailan" (or Jingtai blue) because the enamelware that was made during his reign was typically blue. Some cloisonné antique experts and collectors say that the cloisonné that was made during the middle of the Ming era, in the Jingtai period and afterwards, was the best ever made in the world. [3]

Using white porcelain as the substrate material was a major innovation in Ming Dynasty. It combined their skill with making the translucent, light, and strong white porcelain that had been highly prized abroad for many centuries with the Western technique of decorating with cloisonné

artwork. Porcelain withstood the high heat firing needed to produce the layers of glass enamel. Beautiful white and blue porcelain pieces with fine cloisonné artwork were highly prized. [3]

3.3 Qing Dynasty Cloisonné Technology

Fine cloisonné wares were also fashioned in the Qing Empire (1664-1911). Gold objects decorated with cloisonné artwork were highly valued by the World although antique collectors and cloisonné experts generally consider the Qing dynasty's cloisonné quality was less than the cloisonné products from the Ming dynasty. [3]

3.4 Modern Republic Era Cloisonné Technology

Cloisonné decorated objects are still made in both mainland China and Taiwan. Now, highly advanced chemical and mineral technology allows the artwork to be very colorful and perfect. With modern technology, artistic craftspeople typically decorate with a broad range of bright colors and not the typical blue of the Ming Dynasty. Bronze or copper vases and other decorative objects are produced by craftspeople in factories and crafts shops.

In summation, today Chinese cloisonné enamelware is made by embedding small pieces of material such as flecks of gold or powdered mineral in enamel. Enamel is a layer of glass melted onto a surface. Craftsmen may apply many thin layers of enamel with embedded material firing (heating) each layer to coat an object. If the process is done well, the result can be a strikingly colorful and even sparkling hard surface with translucent depth that looks unusual compared to simple painted ceramics or lacquer ware. Modern craftspeople in the Republic era may create

cloisonné artwork on metal objects such as brass or bronze vases, kettles, or other objects, or on porcelain vessels. China Highlights of the People's Republic of China (PRC) has provided a video on Facebook showing how a beautiful cloisonné art work is produced. [3]

The following four figures partially summarize the cloisonné manufacturing process (<https://m.facebook.com/ChinaHighlights/videos/chinese-cloisonn%C3%A9-beautiful-ancient-enamelware/3675801192442488/>).

Additional technical information regarding the technological development of cloisonné around the world can be found from the literature [2-13]. Cloisonne is a world's heritage which belongs to everyone on both sides of the Silk Roads.









Source: People's Republic of China (PRC), China Highlights [3] --

<https://m.facebook.com/ChinaHighlights/videos/chinese-cloisonn%C3%A9-beautiful-ancient-enamelware/3675801192442488/>

4. CHINESE CLOISONNE: ARTS OF DECORATIVE ENAMELING IN TAIWAN

The people of the Republic of China (1912-1949 in mainland China; and 1949-present in Taiwan) certainly have inherited the Chinese culture including the technological arts of cloisonné decorative enameling from Ming and Qing dynasties.

In 1997, the Government Information Office of the Republic of China (ROC) published a book series entitled, “Traditional Chinese Culture in Taiwan” in which the art of cloisonné decorative enameling was introduced. [13]. ROC has preserved and further enlightened Chinese culture. This section introduces the ROC technical information concerning Chinese cloisonne.



藍

Cloisonné

The Art of Decorative Enameling

Photo Courtesy of National Palace Museum



A cloisonné unicorn dating
from the 17th century.

The Art of Decorative Enameling

Cloisonné, also known as cloisonné enamel, is the decorative art of applying enamel of all colors to the surface of a copper or bronze object which is then fired to become a bright and colorful work of art. This artistic technique was transmitted to China from the West and reached its peak of perfection as a result of the concerted efforts of Chinese artisans. Chinese cloisonné thereupon became the standard by which to measure the quality and appraise the beauty of cloisonné world-wide. This ranks as one of China's major contributions to the world's fine arts.

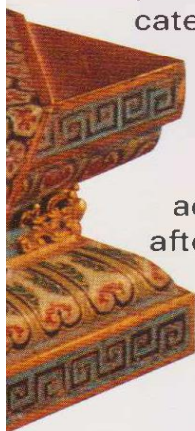
The technique for cloisonné enameling was passed onto China by missionaries from central Asia sometime in the early to mid-14th century. After mastering the skill of manufacturing enamel products, Chinese constantly improved and enhanced this special technique, making it a distinctly Chinese art. During the mid-15th century reign of Ming Emperor Ching T'ai, cloisonné production was extremely prosperous—many cloisonné works of the most delicate quality were produced. These works were mostly fused with a kind of special blue enamel as the base color, hence the term for cloisonné in Chinese: *ching-t'ai-lan* ("Ching-t'ai Blue").

The main reason that such stunning achievements were possible in so short a time after cloisonné technique had been transmitted to China was that the Chinese nation of the time possessed excellent conditions for developing cloisonné enameling art—it already had metallurgical technology, such



Photo Courtesy of National Palace Museum

The cloisonné petrel candle stand made during the mid 18th century.



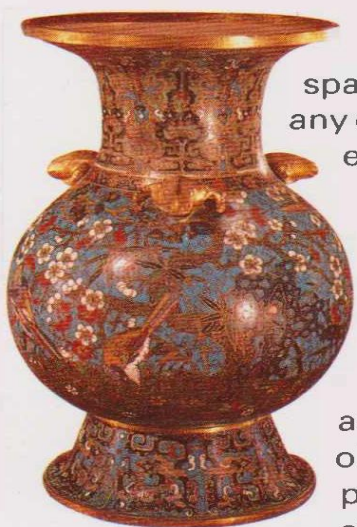
as bronze casting; glass and glaze production techniques were well-known; and how to accurately control the firing temperature was already understood. Another reason was that the enamel was as soft and smooth as jade, as glittering as jewelry, and as delicate as china—satisfying many sorts of Chinese likings.

The general method for making cloisonné involved first soldering brass wires to the surface of a copper object to form a pattern or illustration, then, according to the requirements of each pattern, colored enamels were filled in.

Enamel was made by melting different materials such as red lead, boric acid borate, and glass powder together to become an opaque or translucent glistening substance. A variety of oxidized metals are added, and the substance then changed into enamels of different colors, or enamel coloring. After the melted enamel cooled and became solid, it was then ground into powder and mixed with water prior to the filling in process.

After the spaces delineated by brass wires on the copper object were filled in with enamel paste, the object was then fired. After every firing, the enamel would contract, producing an uneven surface. It was then necessary to fill in the uneven places with enamel paste of the same color many times over. This procedure had to be repeated many times until every filled-in space became thoroughly smooth without any depressions. Only then was the firing process complete.

Enamelware that had been fired then needed to have its surface polished smooth so that the soldered brass wire pattern and the enamel substance were melded into one. Finally, the exposed brass wires between parts of the patterns as well as the rim and the bottom of an object, to which enamel had not been applied, were gold plated. Thus, a work of cloisonné art was finished.



A wine vessel made with wire-inlay technique dating from the 16th century.



Photo Courtesy of National Palace Museum

A cloisonné tea pot made during the mid 18th century.



A robust and solid piece of cloisonné with fresh and glossy colors.

An exquisite piece of cloisonné must have colors that are moist and glossy, fresh and bright, a body that is substantive and sturdy, a wire inlay that is neat and well-proportioned, and gold plating that glitters. Its delicate appearance and splendid patterns should emit a classical warmth that rivets the gaze, and leaves one too infatuated to part with it.

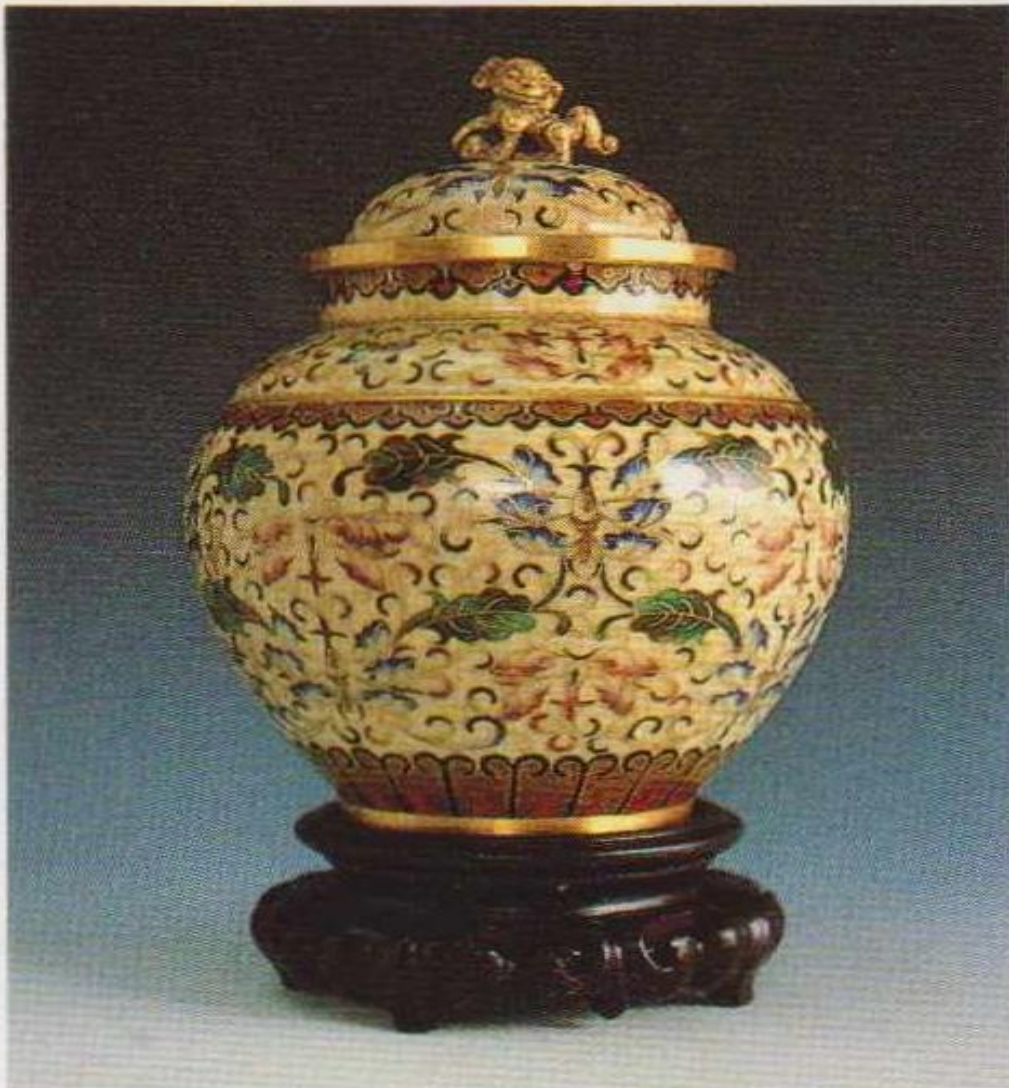
In recent years, this kind of traditional art work has once again drawn public notice and is being highly valued in the ROC on Taiwan. Many people are using modern machines and industrial technologies, and fusing them with artistic creativity, to produce a variety of cloisonné ornaments, art works, and household utensils that are elegant beyond compare. This has allowed the integration into modern life of these kinds of traditional art works that possess elegant, classical sentiment, in order to embellish and enrich the very substance of our daily living. It has also allowed the torch of traditional art to be passed on and burn brightly.



Cloisonné products.



Despite the complex process involved production, cloisonné is widely used in making ornaments, art works, and household utensils.



**Enamel is as soft and smooth as jade,
as glittering as jewelry,
and as delicate as china.**

Source: The government of the Republic of China (ROC), June 1997.

GLOSSARY OF CLOISONNE TECHNOLOGY [15]

[Reference: Lawrence K. Wang and Mu-Hao Sung Wang (2023). *Chinese cloisonné : artistic enamelware for east-west culture exchange through land and sea silk roads*. In: "Evolutionary Progress in Science, Technology, Engineering, Arts and Mathematics", Lawrence K. Wang and Hung-ping Tsao (editors). Vol. 5, No. 11A, 5(11A), November 20, 2023, 38 pp. Lenox Institute Press, MA, USA. Lenox.Institute@gmail.com]

Canton Enamel: Canton enamel is a type of painted enamel on copper that is more closely related to overglaze enamels on Chinese porcelain, or enamelled glass. This is painted on freehand and so does not use partitions to hold the colors separate. Chinese *cloisonné* is sometimes confused with Canton enamel.

Chinese Cloisonné: Chinese cloisonné works are a colored decoration made of enamels poured into the divided areas in a design outlined with wire or metal strips which are fused to the surface of an object. They are mostly fused with a special blue enamel as the base color, hence the term for Chinese cloisonné was called Jingtailan (景泰蓝, Jǐngtàilán) after the name of an emperor. In China, enamel is called tángcí 搪瓷.

Cloisonné : (a) “*Cloisonné* is a French word for “cell”, where thin wires are applied to form raised barriers, which contain different areas of enamel applied above the original metal form; (b) *It is a metalworking technology involving the use of a multi-step enamel process to produce jewelry, vases, and other decorative items;* (c) The objects produced by this cloisonné process are also called *cloisonné*; (d) Cloisonné is a decorative work or technology in which colored

materials (such as enamel, glass, or gemstones) are held in place or separated by metal strips or flattened wire, normally of gold, placed edgewise on a metal backing by soldering. The metal strips or wires are bent to the outline of an artistic design and the resulting cellular spaces of the design, called cloisons (French: “partitions” or “compartments”) are filled with vitreous colored enamel paste with or without gemstones/glass. Finally cloisonné art work is fired and produced at high temperature.

Jingtai-Lan (景泰蓝, Jǐngtàilán): It is **Chinese cloisonné** work which is mostly fused with a special blue enamel as the base color. Jingtai and Lan stand for Emperor Jingtai of Ming Dynasty and blue color, respectively.

REFERENCES

1. Editor (2023) *Cloisonne* , *Wikipedia*, <https://en.wikipedia.org/wiki/Cloisonn%C3%A9>
2. Editor Nena (2017), *Collections: Cloisonne*, *Nnenasnotes*, February 2, 2017; <https://nenasnotes.com/2017/02/02/collections-cloisonne/>
3. Gavin (2021). Chinese Cloisonné: Beautiful Ancient Enamelware. *China Highlights*, August 23, 2021. <https://m.facebook.com/ChinaHighlights/videos/chinese-cloisonn%C3%A9-beautiful-ancient-enamelware/3675801192442488/>
4. Dana Norris, Thomas Delbey (2023) , *The influence of Qing glass technology on Qianlong and Jiaqing painted enamel copperwares*, *Journal of Cultural Heritage*, 10.1016/j.culher.2023.03.008, 61, (160-167).
5. Dana Norris, Dennis Braekmans, Andrew Shortland (2022). *Emulation and technological adaptation in late 18th-century cloisonné-style Chinese painted enamels*. January 23, 2022. <https://onlinelibrary.wiley.com/doi/full/10.1111/arcm.12757>
6. J. Henderson, M. Tregear, N. Wood (1989). The technology of sixteenth- and seventeenth-century chinese *cloisonné* enamels, *Open Access Publication*, <https://doi.org/10.1111/j.1475-4754.1989.tb01009.x>

7. J.-L. Yi, (1985). *The technology of ancient Chinese glass in Bo-Shan around the fourteenth century*, unpublished paper presented at the International Conference on Chinese Glass, Beijing, People's Republic of China.
8. V. V. Vargin, (1967), *Technology of enamels*, Maclaren and Sons Ltd., London . UK.
9. L. Widauer, B. Pichler, A. Vendl, W. P. Bauer, M. Grasserbauer, , A. Nikiforov, P. Dolezel, (1984), Werkstoff-funtersuchungen an cloisonné-arbeiten aus China, in *Weiner Berichte über Naturwissenschaft in der Kunst* (eds. A. Vendl and B. Pichler), 1, 60–73, Vienna, Austria.
10. A. E. Werner, and M. Bimson, (1963), *Some opacifying agents in oriental glass*, *Proceedings of the VI international congress on glass: advances in glass technology* (eds. F. R. Matson and G. E. Rindone), 303–5, Plenum Press, New York, USA
11. Burcu KIRMIZI, Philippe Colomban, Béatrice Quette (2010). *On-site analysis of Chinese Cloisonné enamels from fifteenth to nineteenth centuries*. Open Access Publication, <https://doi.org/10.1002/jrs.2516>
12. Vocabulary.com Editor (2023). *Cloisonne*. *Vocabulary.com Dictionary*, <https://www.vocabulary.com/dictionary/cloisonne>. Accessed 25 Oct. 2023.

13. ROC Government Information Office (1997). *Traditional Chinese Culture in Taiwan: Cloisonne*, Republic of China (ROC).

14. Lawrence K. Wang (2023). *Chinese & Taiwanese Histories Recorded by Circulation Coins*; In: "*Evolutionary Progress in Science, Technology, Engineering, Arts, and Mathematics (STEAM)*", Lawrence K. Wang and Hung-ping Tsao (editors). Volume 5, Number 10B, October 26, 2023; 5(10B), 90 pages, . Lenox Institute Press, MA, USA. <https://doi.org/10.17613/gfnr-v592>

15. Lawrence K. Wang and Mu-Hao Sung Wang (2023). *Chinese cloisonné : artistic enamelware for east-west culture exchange through land and sea silk roads*. In: "*Evolutionary Progress in Science, Technology, Engineering, Arts and Mathematics*", Lawrence K. Wang and Hung-ping Tsao (editors). Vol. 5, No. 11A, 5(11A), November 20, 2023, 38 pp. Lenox Institute Press, MA, USA.; <https://doi.org/10.17613/aakj-ph96>

APPENDIX: MODERN LESS EXPENSIVE CLOISONNE FOR DAILY USE OR DECORATION









