TRANSFORMATION OF SIX LEAVES GLAZE TO CONTEMPORARY CERAMIC BASES ON THE TAOISM CHARACTERISTICS

By

Mr. Feng SHANXIN

A Thesis Submitted in Partial Fulfillment of the Requirements

for Doctor of Philosophy DESIGN ARTS (INTERNATIONAL PROGRAM)

Graduate School, Silpakorn University

Academic Year 2020

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โดย

Mr.FENG Shanxin

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Title	Transformation of Six Leaves Glaze to Contemporary Ceramic Bases on the Taoism Characteristics
By	Feng SHANXIN
Field of Study	DESIGN ARTS (INTERNATIONAL PROGRAM)
Advisor	Sone Simatrang

Graduate School Silpakorn University in Partial Fulfillment of the Requirements for the Doctor of Philosophy

Dean of graduate school

(Associate Professor Jurairat Nunthanid, Ph.D.)

Approved by

Chair person

(VEERAWAT SIRIVESMAS)

Advisor

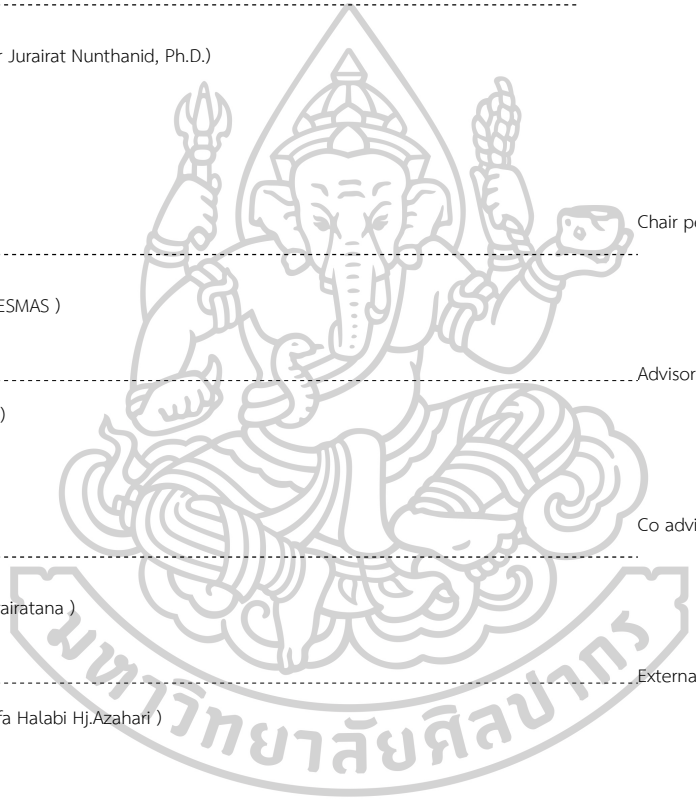
(Sone Simatrang)

Co advisor

(Eakachat Joneurairatana)

External Examiner

(Professor Mustaffa Halabi Hj.Azahari)



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MR. FENG SHANXIN : TRANSFORMATION OF SIX LEAVES GLAZE TO CONTEMPORARY CERAMIC BASES ON THE TAOISM CHARACTERISTICS THESIS ADVISOR : SONE SIMATRANG

Wood-Leaf Glaze originated in the Song Dynasty (1100-1300A.D.) and is the pinnacle of Chinese ceramics art, as well as one of the tangible representatives of Chinese culture. The history which has lost for more than 700 years. Therefore, the existence of Wood-Leaf Glaze piece is sporadic and expensive. The production of Wood-Leaf Glaze contains a masterful production process and cultural content, and, regrettably, the technology has been lost.

The objective of this research the first is to revitalize the traditional technique of making Wood-Leaf Glaze, The second to integrate Taoist aesthetics such as Yin-Yang into ceramic art creation, The third to produce innovative and contemporary ceramic artworks. The research will contribute to the development of contemporary Chinese ceramics and the preservation and redesign of traditional culture.

In this research, a practice-based design method was applied to improve the glaze of Jizhou kiln Wood-Leaf Glaze at first, increase the stability of the glaze, and improve the output rate. Traditional Wood-Leaf Glaze is finished with a single colour and only one available leaf for firing. Therefore, in the second step, this research developed new glaze colours for Wood-Leaf Glaze and selected more than 80 kinds of leaves for experiments. Identified six kinds of leaves as follows: 1)Linden leaf; 2)Humulus scandens leaf; 3)Poplar leave; 4)Broussonetia papyrifera leaf; 5)Fig leaf and 6)Mulberry leaf, that suitable for firing Wood-Leaf Glaze by comparison. In the third step, based on the results and conclusions of the design experiments, create a contemporary ceramic artwork using the innovative technique of Wood-Leaf Glaze under the guidance of Taoism characteristics.

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Feng SHANXIN

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Chapter 1 Introduction

1.1 Background of the Research

Ancient Chinese ceramic art once had a significant position in the world. It was a treasure sought by aristocrats in western European countries. (Zhemin, 2006) For thousands of years, the ancient Chinese ceramic art has been showing dazzling brilliance, leading the development direction of the world ceramic art. After the development of modern industry, to the Western world has become a post-industrial society, leading to the emergence of postmodern art. "Post-modern art aims to expand artistic language into human body to strengthen its social participation and social criticism function." As a result, conceptual art, installation art, earth art, neo-expressionism and performance art have become widely popular, with the creative forms of misappropriation and collage being the symbolic feature of the postmodern. Art no longer pursues eternal value. Instead, art is perceived as an instantaneous occasion non-repeatable event that disintegrates logical order with its on-the-spot effects.

In 1980s, after China opened its door to reform, the “modern ceramic art” from the West with the characteristics of the “post-modern art” entered China and greatly stimulated the development of Chinese ceramic art. Profound changes have taken place in China's ceramic art. Sculptors took the lead in creating local sculpture styles of ceramic art that gradually evolved into a distinctive style of “Chinese Contemporary ceramic art” that comprehensively integrates the influences from both Europe and the U.S. in the creative process.

Today, China's Contemporary ceramic art continues to develop. However, there are disputes and reflections on its characteristics. Under the influence of Western ceramic art that has been blindly adopted, imitated, digested, and absorbed into the production of Contemporary ceramic art in China, questions arise over the formation of a unique Chinese style and the creative techniques of

Chinese Contemporary ceramic art that became almost indistinguishable from other types of ceramic art. There is a sense of chaos and urgency to define the unique creative characteristics of Chinese ceramic art. (Zhemin, 2006) Many questions surfaced: What is the connotation of Chinese Contemporary ceramic art? What is involved in the aesthetic theory of Chinese Contemporary ceramic art? What kind of thinking and visual angle are used to study the aesthetics of Chinese Contemporary ceramic art? How do we combine Chinese ceramic culture to expand the aesthetic connotation of Chinese Contemporary ceramic art? How do we establish a theory system for Chinese ceramic art? These problems have been puzzling the development of Chinese Contemporary ceramic art. Therefore, this research is inevitably problem-oriented. It seeks to address and clarify some of the confusion and problems of Chinese Contemporary ceramic art, and provide a theoretical foundation for the development of Chinese ceramic art from an aesthetic perspective.

Traditional Chinese porcelain-making process has a healthy artistic life. Nonetheless, with the progress of science and technology, it is gradually diluted or even lost. This research does not simply aim to create a new production method to preserve the traditional Chinese wood-leaf cup firing technology, but also highlight the possibility in which traditional inheritance and modern innovation can be combined to revive the Wood-Leaf Glaze crafts through the use of modern science and technology. At the same time, this study seeks to use the modern design concept to create a ceramic art design that is based on Taoism philosophy.

The Wood-Leaf Glaze in the Song Dynasty(1100-1300A.D.) is the pinnacle of Chinese ceramic technology and material culture. The novelty of the Wood-Leaf Glaze lies in the process in which real leaves are fired in a teacup with the entire leaves and precise veins being preserved. Moreover, the advent of the Southern Song Dynasty Wood-Leaf Glaze represents a collection of the wisdom of the potters in the north and south of the Song Dynasty. However, the firing craftsmanship of the Wood-Leaf Glaze is a complicated process and difficult to execute. Therefore, its existence is relatively scarce. Furthermore, the Wood-Leaf

Glaze craftsmanship has been lost for more than 700 years since the transition from the Song dynasty and Yuan dynasty(1100-1300A.D.).

The Wood-Leaf Glaze is a natural occasion, and its appearance is full of Taoism philosophy. It is known as the enlightenment and regarded as the soul into the cup. It represents Taoism philosophy that presupposes that even when the “flesh” is gone, the “heart” is eternal. (Ames, 2016)

China's Contemporary ceramic art started late. A large number of stylized production techniques made Chinese ceramic art lose its philosophical guidance. The Wood-Leaf Glaze in the Song Dynasty(1100-1300A.D.), which is the combination of cups and real leaves, provides directions for ceramic art designs based on Taoism philosophy. This study introduces Taoism philosophy into ceramic art creation as a foundation behind the design thinking. In the research process a number of design experiments was conducted to find a suitable philosophical theory of ceramic art and complete the final comprehensive design of ceramic art that is based on Taoism.

1.2 Statements of the Problem

Wood-Leaf Glaze is an important carrier of Chinese culture, In the process of inheritance, it has been lost for more than 700 years due to the difficult production process and the single art form. The loss of Wood-Leaf Glaze is regrettable. Therefore, this research attempts to restore and innovate the production process of Wood-Leaf Glaze.

Chinese porcelain lacks a sense of Contemporary design, so it is necessary to establish a new form of Contemporary ceramics.

The leaves are too single in the traditional Wood-Leaf Glaze and do not change, so need to choose to find multiple leaves.

To combine the above to create a Contemporary ceramic art form.

1.3 Objectives of the Research

1.3.1 Exploring the burning techniques of the lost traditional Wood-Leaf Glaze, master its key technologies, and improve the level of craftsmanship.

1.3.2 Discovering contemporary ceramic art design forms and express the artist's own individuality.

1.3.3 Incorporating Taoism characteristics into ceramic design creation, providing an art form for contemporary ceramic art.

1.4 Research Questions

1.4.1 What is the key technology of Wood-Leaf Glaze, what are its main characteristics and current situation?

1.4.2 Why is it necessary to create contemporary ceramic art works with Taoism characteristics based on new production process?

1.4.3 How to find out the combination clay formula and Firing process?

1.4.4 How to apply Taoism characteristics into design works?

1.5 Significant of the Research

This research is conducted to benefit the following;

1.5.1 Great craftsmanship skill. Wood-Leaf Glaze was first produced in Jizhou kilns in Song Dynasty, China. The craftsmanship of Wood-Leaf Glaze is very difficult, and its existence is very rare. Wood-Leaf Glaze contains the Taoism philosophy.

1.5.2 New Wood-Leaf Glaze has extremely high commercial value

and can bring great economic effects.

1.5.3 This research is of high educational value. Can spread traditional ceramic culture.

1.6 Definitions of Term/ Keywords

1.6.1 Modern art in china

Chinese Modern art is guided by borrowing and learning from Western modern art.

1.6.2 Contemporary ceramic art in China

In the development process of contemporary Chinese ceramic art, there are two relatively extreme trends.

1.) Indulge in tradition, unable to jump out of the role of craftsman, and the excellence in craftsmanship reflects the lack of innovation and short-sightedness.

2.) Imitate the Western ceramic art, while ignoring Zhang Xiaoling also has many criticisms of Chinese “contemporary art”. He believes that Chinese contemporary art “lack of beliefs and habits rooted in traditional context and people's survival experience.” (Ames, 2016)

1.6.3 Taoism characteristics

Taoism characteristics is an important part of Chinese wisdom It is based on the philosophy of "Tao". It is believed that beauty and ugliness are relative and can be transformed into each other. The highest philosophical category of “Tao” is “Tao follows nature”.

1.6.4 Wood-Leaf Glaze of 6 kinds of leaves

Not every leaf can make Wood-Leaf Glaze. In the research,80 leaves selection and testing finally six kinds of leaves that can be burned in Wood-Leaf Glaze have been determined through experiments. They are mulberry leaves, linden leaves, poplar leaves, lamella leaves, mulberry leaves, Fig leaves. There will be more leaves to be tested.

1.7 The Overview of The Thesis

The overall thesis is comprised of 5 Chapters. Chapter 1 is focused on the introduction and backgrounds of the research, it is included the introduction and backgrounds of the research, the statements of the problems, objectives, keywords, limitations and delimitations and the significance of the research. Chapter 2 is focused on the literature on the Wood-Leaf Glaze history, Tao philosophy as the subject of the research. Chapter 3 is focused on the research Some data collection is employed by Experimental, Observation and Comparative research approaches in the process of designing an experiment Chapter 4 are emphasized on the discussions of findings of the first and second phase data collection processes. Meanwhile, Chapter 5 is emphasized on the conclusion of the whole research and recommendation of the research and to fulfil the Research Objectives. Suggestions for the future research.

Chapter 2 Literature Review

2.1 Briefly History of Wood-Leaf Glaze in China

In this chapter, the researcher reviews the history of the origins, breakage and the rate of finished products of Wood-Leaf Graze. A review of the association between Chinese tea culture and Wood-Leaf Graze is presented, and the kinds of traditional tea cup-shaped are introduced. The Chinese philosophical theories involved in Wood-Leaf Graze are elaborated.

2.1.1 Origin of Wood-Leaf Glaze

Wood-Leaf Glaze marigolds were an essential component of the Jizhou kiln, but they were not unique to the Jizhou kiln. Jizhou ancient kiln established in the late Tang Dynasty (618-907 A.D.)., flourished in the Song Dynasty (960-1279 A.D.) and declined at the end of the Yuan Dynasty (1271-1368 A.D.), and was named by its location. (Tian, 2013) The kiln's products are exquisite and abundant, especially the black-glazed porcelain (also known as Tianmu glazed porcelain), who's original "Mu Ye Tianmu (Wood-Leaf Glaze)", are well known in China and abroad.

图1：吉州窑黑釉木叶天目碗高，拍卖成交价格估计：HKD 13,000,000-13,000,000，最终成交价格：RMB 14,338,500，拍卖专场：香港伦勃朗国际拍卖有限公司 香港2018魅力东方拍卖会，拍卖成交时间：2018-08-18，尺寸：高6cm；口径15cm。

Figure 1 Name: Wood-Leaf Glaze. Auction price: RMB1,433,8500 Size: 6cm×15cm Hong Kong Brown International Auction Co., Ltd. Auction time: 2018.08.18 Private collection

Source: (https://www.zmkm8.com/article-10555-1.html)

图2:南宋 吉州窑木叶碗，拍卖成交价格估计:HKD 800,000-1,200,000，最终成交价格：RMB 769,688，拍卖专场:佳士得香港有限公司 2015年秋季拍卖会，拍卖成交时间:2015-12-02，尺寸:直径16.3cm。

Figure 2 Name: Wood-Leaf Glaze. Auction price: RMB 769,688 Size: 16.3cm Christie's Hong Kong Limited Auction time: 2015.12.02 Private collection

Source: (https://www.zmkm8.com/article-10555-1.html)

图3:宋 吉州窑木叶盏，拍卖成交价格估计:HKD 300,000-500,000，最终成交价格：RMB 285,678，拍卖专场:保利香港拍卖有限公司 保利香港2015年春季拍卖会，拍卖成交时间: 2015-04-06，尺寸:高4.8cm；直径11cm。

Figure 3 Name: Wood-Leaf Glaze. Auction price: RMB 285,678 Size: 4.8cm×11cm Hong Kong Poly Auction Co., Ltd. Auction time: 2015.04.06 Private collection

(https://www.zmkm8.com/article-10555-1.html)

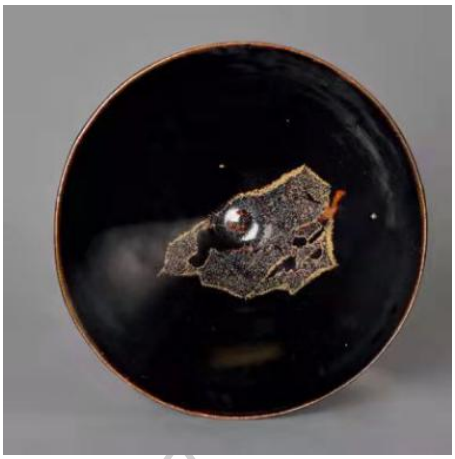


图4:宋 吉州窑木叶斗笠盏，拍卖成交价格估计:HKD 450,000-600,000，最终成交价格：RMB 247,588，拍卖专场:保利香港拍卖有限公司 保利香港2015年春季拍卖会，拍卖成交时间:2015-04-06，尺寸:高5cm；直径15cm。

Figure 4 Name: Wood-Leaf Glaze. Auction price: RMB 769,688 Size: 6cm×16.3cm Hong Kong Poly Auction Co., Ltd. Auction time: 2015.04.06 Private collection

Source: (https://www.zmkm8.com/article-10555-1.html)

图5:宋 吉州窑木叶盏，拍卖成交价格估计: HKD 250,000-350,000，最终成交价格：RMB 233,345，拍卖专场:保利香港拍卖有限公司 保利香港2014年秋季拍卖会，拍卖成交时间:2014-10-07，尺寸:高5cm；直径11.2cm。

Figure 5 Name: Wood-Leaf Glaze. Auction price: RMB 233,345 Size: 5cm×11.2cm Hong Kong Poly Auction Co., Ltd. Auction time: 2015.04.06 Private collection

Source:(https://www.zmkm8.com/article-10555-1.html)

图6:宋 吉州窑木叶盏 , 拍卖成交价格估计:HKD 250,000-350,000,最终成交价格: RMB 238,065, 拍卖专场:保利香港拍卖有限公司 保利香港2015年春季拍卖会, 拍卖成交时间:2015-04-06, 尺寸:高5.5cm;直径11.3cm。

Figure 6 Name: Wood-Leaf Glaze. Auction price: RMB 238,065 Size: 5.5cm×11.3cm Hong Kong Poly Auction Co., Ltd. Auction time: 2015.04.06 Private collection

Source: (https://www.zmkm8.com/article-10555-1.html)

图7:南宋 吉州窑黑釉木叶盏, 拍卖成交价格估计:HKD 100,000-150,000,最终成交价格: RMB 192,138, 拍卖专场:香港蘇富比拍卖有限公司 2018年春季拍卖会, 拍卖成交时间:2018-04-02, 尺寸:10.6cm。

Figure 7 Name: Wood-Leaf Glaze. Auction price: RMB 192,138 Size: 10.06cm Hong Kong Sotheby's Auction Co., Ltd. Auction time: 2018.04.02 private collection

Source: (https://www.zmkm8.com/article-10555-1.html)

图8:南宋 吉州窑木叶盏 ， 拍卖成交价格估计:USD 6,000-8,000，最终成交价格：RMB 256,575, 拍卖专场:佳士得纽约有限公司 2018年9月拍卖会, 拍卖成交时间:2018-09-13, 尺寸:直径10.9cm。

Figure 8 Name: Wood-Leaf Glaze. Auction price: RMB 256,575 Size: 10.9cm Christie's New York Auction Co., Ltd. Auction time: 2018.09.13 Private collection

Source: (A SMALL JIZHOU LEAF-DECORATED BOWL (christies.com))

Through research and study in 2019, the researcher has found that “muyetiehua” (Wood-Leaf marigolds were) also fired in the Cizhou kiln (Cizhou kiln is a treasure of traditional Chinese porcelain making, the most extensive folk kiln system in northern China in ancient times, and a famous folk porcelain kiln) system and in Tianmu Mountain, Zhejiang Province, and some artifacts have been unearthed. However, historically, only the Jizhou kiln in Yonghe Town, Ji'an City, Jiangxi Province, has had a large-scale firing of wood-leaf marigold kilns. In addition to wood-leaf marigolds, all of the Jizhou kiln porcelain includes tortoiseshell and paper-cut applique porcelain.

Cizhou kiln is the most influential folk kiln in northern China. (Jiao & Wei, 2019) The Jizhou kiln is located in Jiangxi province, about 1200 kilometers away from the Cizhou kiln, but the two kilns are closely linked by the relocation of the capital of China's Northern Song Dynasty (960-127A.D.). The advanced porcelain-making techniques of the Cizhou kiln were transferred to the Jizhou kiln as the porcelain workers of the Northern Song Dynasty moved south, which provided the technical feasibility for introducing the “Muyezhang”. From this, it is inferred that Wood-Leaf Glaze's introduction was probably in the early Southern Song Dynasty (1127-1279A.D.).

2.1.2 Wood-Leaf Glaze Is the Way of Chinese Tea Culture

China has a long history of tea culture. Tea had been used as a tribute from ancient times. In the late primitive commune, tea became an item of goods exchange. (W. Bin & Cheng, 2015)

Tea culture was conceived and born along with the emergence of the commodity economy and urban culture formation. Tea culture is an essential part of Chinese cultural education. (W. Bin & Cheng, 2015) Due to the prevalence of tea culture, tea-drinking utensils also occupy a significant position. (Xiaohua, 2010)

Wood-Leaf Glaze was popularized and developed in close relation to the tea culture prevailing in the Song Dynasty. In the history of the development of tea culture, it is essential to mention that during the Tang and Song dynasties, due to the promotion of Taoism and literati, the tea-drinking culture became more and more popular, and the tea-drinking style became more and more sophisticated, and the demand for wooden leaf cups gradually increased. (Yuqi, 2013)

The craft of Wood-Leaf Glaze was manifested from the very beginning as teacups. (W. Bin & Cheng, 2015)

People in Song Dynasty liked to use black porcelain to taste tea, and based on the black color, they studied and used various elements to decorate the solid-colored teacups. Wood-Leaf Glaze is one of the most precious ones, a typical representative of the teacup culture at that time and enriched the Chinese tea culture. (Rongrong, 2002)

2.1.3 The Destruction of the Wood-Leaf Glaze

Why did the Wood-Leaf Glaze end up firing? There are many speculations about this problem which can be analyzed as follows:

One of the primary reasons for the Wood-Leaf Glaze's loss back to

the Chinese civil war of that period. Ceramic artisans were defeated and scattered in the battle against the Yuan army. Consequently, the creation and production of ceramics at the Jizhou kiln, where the Wood-Leaf Glaze was made, was interrupted. (Jiao & Wei, 2019)

Besides, there were in-depth social and economic factors that influenced the demise of Wood-Leaf Glaze. The first reason is that the business tax in the Song Dynasty was too strict. The merchants could not profit, resulting in a decline in trade and commerce during that time. Secondly, according to the history of Chinese porcelain, dynasties' rise and fall dictate the change in royal preferences for ceramics' development direction. Jizhou kiln may be for ordinary people and influenced by the Yuan Dynasty rulers who like white, Jingdezhen porcelain. (Yue, 2016) His preference was favored, and Jizhou kiln was given priority to producing the black glaze porcelain instead of the market demand.

From the point of view of technique. The most fundamental reason for the final firing of Jizhou kiln is that it is difficult to control the firing technique of Wood-Leaf Glaze and the low rate of finished products is difficult to meet the requirements. Other types of porcelain are challenging to cater to the market, which directly leads to the process's loss. (Jiao & Wei, 2019)

From the point of view of commercial value, the high cost resulting from the low rate of finished products made Wood-Leaf Glaze costly, further affecting its attractiveness in the market. As other types of ceramics became popular, Wood-Leaf Glaze gradually disappeared from the mainstream market. (Jiao & Wei, 2019)

2.2 Teacup Culture in China

2.2.1 Brief Introduction of Chinese Tea

The mass firing of black glaze porcelain in Jizhou kiln was closely related to the tea-drinking culture prevailing in The Song Dynasty. The “partridge

patterned calices" and "paper-cut decals" in Jizhou kiln are precious varieties, and the Wood-Leaf Glaze is the rarest. (Jiao & Wei, 2019)

China has a long history of tea culture. During the Tang and Song dynasties, tea-drinking activities became increasingly popular, tea making methods were innovated continuously, and tea-drinking methods became more and more exquisite. Tea culture also reached an unprecedented level. (W. Bin & Cheng, 2015) Literati regarded the way of drinking tea and drinking tea as an elegant matter of self-cultivation, which became the life fashion in Song Dynasty together with four Arts of the Chinese Scholar. (zither, Go, calligraphy, painting)

With the popularity of gambling for tea (A game that is played by experienced tea drinkers and tea buyers to determine if several types of tea that look very ordinary are good teas of high value) in Song Dynasty, the teacup also changed. Not only tea processing requirements but also pay attention to the methods and tools of tea bucket. The cup is popular with tea drinkers because it is easy to observe its foam and color. (Xiaohua, 2010) The black glazed meet the requirements of gambling for tea and reflect the song Dynasty culture's pursuit of simple and straightforward beauty, reflected in the ceramics is the love of single-color glazed ware.

2.2.2 Types of Teacups

A teacup is an appliance for drinking tea. Modern people often call teacups or cups. Its basic shape is a small foot, inclined straight wall, generally smaller than the rice bowl, more significant than the wine glass. Different kinds of tea are used in different teacups. The kinds of teacups are closely related to Chinese tea culture. There are dozens of teacups, such as rabbit milli cup, oil drop cup, obsidian cup, partridge spot and so on. Each teacup carries different manufacturing techniques and cultural connotations. (Rongrong, 2002)

The following are several representative tea sets in Chinese history.

For the signature shapes and sizes, the researcher made a draft drawing of each classic style.

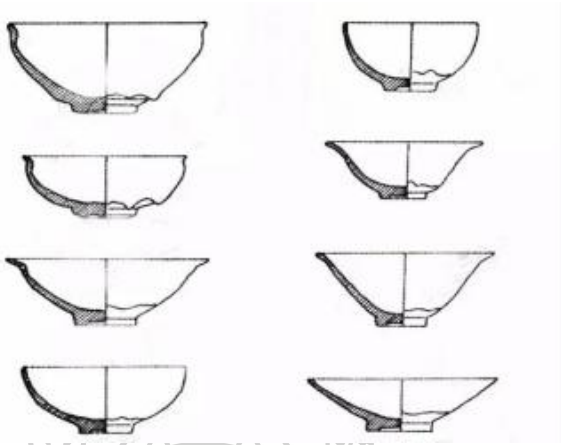


Figure 9 Types of teacups in history of China (Source: Feng Shanxin summarized and drawn in 2021)

2.3 Briefly Philosophy of Taoism Characteristics

2.3.1 Taoism View of Colors

"Five elements, five colors" is a part of an ancient Chinese cultural thought and philosophical system. It has a significant influence on the formation of traditional Chinese color concepts. (Zhenzhen, 2010)

The theory of Yin-Yang and Five Elements is an ancient theory. It has experienced a long historical development before The Warring States Period (475–221 BC) and has a deep historical root. In ancient China, the five elements' thought occupies an absolute dominance in people's thoughts and lives. At that time, people believed that the five elements' theory was "the root of good fortune, the beginning of human relations". (Zhenzhen, 2010) It was the belief followed by all people from the emperor's sacrificial ancestors to the ordinary people. In weddings and funerals, there are elements of Yin-Yang and Five Elements theories in cuisine and other conduct of lives. (Ames, 2016) The Five Elements is the Chinese ideological law and the Chinese belief in the cosmic system. For more than two thousand years, it has been mighty. Each ceramic creation is a collection of the five

elements of gold, wood, water, fire and earth. All of them is an art rich in the five elements. (Jing, Yuan, Xiaoting, & Jun, 2011)

2.3.2 Xuan Colors (Black and White)

Taoism values yin and yang and advocates “Xuan”. “Xuan” color is black and considered superior to all other colors. Taoism ranks black as the first color, (Bin, 2007) above all other colors, and choose black as Tao's symbolic color. The traditional Wood-Leaf Glaze is a black-glazed cup. The historical existence is not accidental, but Taoism thought deeply rooted in the Chinese aesthetic concept.

“Xuan” is not entirely black in theory. “Xuan” as a color is between red and black, a transitional color from red to black. Among all colors, red is the warmest hue, just like a flame. Black is a color that swallows all visible light. It describes the abyss, astronomical black hole that contains mysterious and unfathomable implications. From this, one cannot help but think of the transitional color “Xuan” as the movement of light during “near dusk” that transitions from red to purple and black before being followed by the deep night after dusk. (Tzu, 1997)

Taoism advocates black. Taoism emphasizes the inner, spiritual and substantive beauty, the super-utilitarian purpose, and the non-cognitive law created by art, the aesthetic law. (Jubo, 2013) As a unique ideology, the importance of art is precisely its aesthetic law. Black is the color of the primitive, dark, and inanimate world. The vivid colors of the worldly beauty can only stimulate the senses nut, not real beauty. Therefore, Taoism only regards black as the mystical color worth admiring. From the Taoism thought of “being out of nothing”, the dying of black symbolizes the most primitive color essence and the spiritual phenomenon captured in the simplest color form. (Dezhen, 2014)

Taoism's aesthetic attitude towards black directly affects Chinese ceramics' color aesthetics and establishes ink colors in Chinese ceramic decoration, including China's very famous Cizhou kiln, Jizhou kiln, and Jian kiln. Chinese ceramic

black glaze decoration is integrated with the artist's spirit to create a unique color art form to express the spiritual realm of imagery color, laying the ideological roots and aesthetic foundation for Chinese ceramic decoration. Monochrome black glaze can reflect the concept of simplicity. Laozi emphasized that both the philosophical realm and the artistic realm of tranquility is most appropriately embodied by “Xuan” because “Xuan” can extend to deep silence. At the same time, Taoism pays attention to calm cultivation. Calmness and lightness are related, and the tranquil black glaze does not appear to be calm and dazzling. Therefore, the transformation of rich colors into the calm ink color changes is the philosophical soaring of Chinese ceramic decoration's essence. When coupled with “emptiness” and “simpleness”, it directly points to the universe's foundation. Like the “Yao Bian Tian Mu”, it is full of charm, with black glaze “showing the breath in the chest”. Distinctive personality achieves detachment. It reached it peak in the Song and Yuan dynasties. Chinese ceramic color glaze decoration theory has gradually matured and completed, and Chinese black glaze ceramic art has spread worldwide. (Dezhen, 2014)

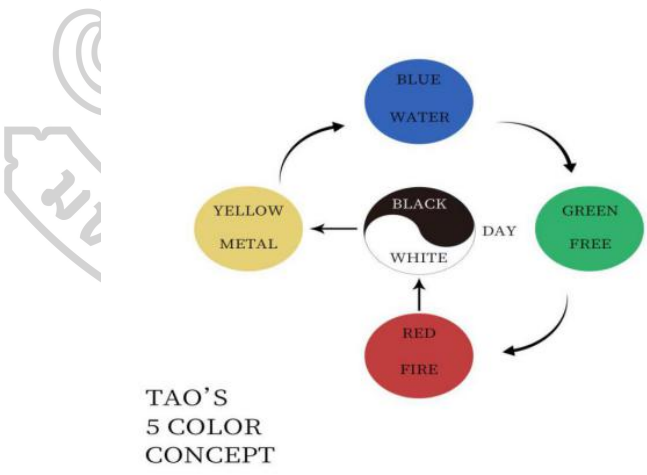


Figure 10 Diagram of the relationship between the five colors of Taoism
(Source: Feng Shanxin drawn in 2020)

2.3.3 The Beauty of Deforming from Tao Te Ching

In Chapter 45 of the Tao Te Ching, there is a treatise on perfection and imperfection. Tao considers that the perfect thing has an imperfection, but its effect still exists; the straightest thing looks as if it is bent, and the most dexterous thing looks as if it is clumsy. It is a warning to think about the form of all things with a critical consciousness. The positive and negative sides can transform into each other; the key is how people look at it and how they think about it. (Tzu, 1997)

All the regrets and deficiencies can also be regarded as a kind of "beauty"; this beauty comes from the natural form without deliberate modification. True beauty, though superficial and clumsy on the surface, is significant and profound. This is the supreme state of Taoism about beauty. The metaphorical beauty that follows its inner development by ignoring its appearance and under the crippled exterior. (Tzu, 1997)

2.3.4 Selected Key Ideas of Taoism Influence the Art Creating Process

Naturalness. In the Taoism view, 'naturalness' is the best expression, and nature has always maintained the most authentic existence. They are truly free, not restricted by orders and norms, and detached from secular society's pollution. They grow, prosper and die. This is the natural order of things which follows the fixed order of the universe. That is, nature is the best advocates of cosmic order. (Wenjing, 2019)

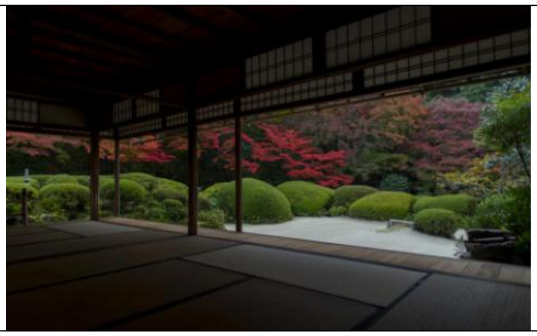


Figure 11 Photo by Patrick Vierthaler on Flickr - Shisen-d Temple

(Source: http://bit.ly/2K673m4)

Only in comprehending nature can people reclaim the childlike nature and build a detached personality, like “Tao”, by acting rashly, not for external service, not for vulgarity, and realizing the actual value of life. Only in this way can human nature be harmonious, nature can be harmonious, society can be harmonious, and everything in the universe can be harmonious. (Tzu, 1997)

The Taoism aesthetic ideal of “advocating nature” puts aside the secular utilitarian attitude. (Tzu, 1997) It is an aesthetic extension of its political “inaction” thought. The concept of “Nature” reveals the inherent characteristics of artworks, and represents the highest standard of ancient Chinese artistic creation. It has a profound impact on Chinese classical aesthetics. The creation of Chinese Wood-Leaf “Tian Mu” cup emphasizes natural authenticity and prefers simple elegance and humbleness. This is the embodiment of the aesthetic ideal of “advocating nature”.

Taoism aesthetics believes that to realize the true meaning of “Tao”, achieve absolute spiritual freedom, and realize the artistic realm of life, an aesthetic mind of “emptiness to tranquility” is needed. (Tao H, 2006)

An empty mind, ethereal thoughts, and flying imagination contain the characteristics of aesthetic freedom. In this spiritual wandering, the subject mentalizes, spiritualizes, poetizes, and beautifies the real world, thereby achieving infinite freedom of the soul and rising to the realm of “most beautiful”. The so-called “most beautiful” realm is the simple realm of harmony between man and nature, the blending of subject and object, the unity of nature and man, and the unity of things and self. The Taoism aesthetic mindset of “emptiness leads to tranquility” is a necessary condition for realizing Taoism's aesthetic ideal of “advocating nature” and achieving a simple “Tao” state. It is also a necessary mentality for realizing the true meaning of nature in ceramics aesthetic activities. It is an ancient Chinese ceramic art creation. It is also a description of the psychological state of the ceramic artistic creation in ancient China. A description of a mental state. (Yue, 2016)

The theory that mans is an integral part of nature. Taoism aesthetics believes that people must fully understand the mystery of the universe and sympathize with all things. They need to be equal with things, become one, stand on the standpoint of things, determine their position, and think about their existence. Taoism aesthetic thinking is an aesthetic way of thinking of “oneness of heaven and humanity”. (Tao H, 2006)

The thinking mode of “oneness of heaven and humanity” contains profound aesthetic implications. The state it reaches is a state of heaven and earth where everything is unified, and state of the art with a high degree of freedom. In this state, the subject returns to the state of innocent self, appreciates the universe's vast order, feels gratitude and awe for this order, and achieves an ideal poetic life with great aesthetic significance. In the Taoism aesthetic system, “Tao” is always the core concept. When creating aesthetics, “Tao” is the ultimate goal, and “Technology” is only a tool and means to achieve “Tao”. (Tao H, 2006) Therefore, Taoism aesthetics advocates the idea of “Using Tao to approach technology”.

The aesthetic creation theory of Taoism aesthetics, “Use Tao to approach technology”, pays attention to the understanding and expression of “Tao” in aesthetic creation, and tries to eliminate the traces of artificial carving, which has a profound impact on the creation of ceramic art in later generations, and the pursuit of ancient (Yue, 2016). Chinese ceramic art in today's world. The concept of “although humans make it, it was made as if by heaven” reflects a deep understanding of the aesthetic creation theory of “Use Tao to approach technology”.

The concept of “getting one's meaning and forgetting words” in Taoism aesthetics reveals the particular state of aesthetic feelings. In aesthetic activities, the subject materializes in the object with a quiet and clear mind. The heart and the object communicate and resonate, to obtain the aesthetic enjoyment and entertainment of body and mind. (Xingyu, 2018) This kind of aesthetic enjoyment can only be appreciated and cannot be said. It is the aesthetic feeling of “getting one's meaning and forgetting words”, which comes from the artistic

expression style of “incomplete words” advocated by Taoism aesthetics.

The artistic expression style of Taoism aesthetics of “incomplete words” and the theory of aesthetic feelings of “getting one's meaning and forgetting words” have deeply influenced China's aesthetic creation and aesthetic appreciation activities for thousands of years. The ancient Chinese aesthetic thinking mode emphasizes intuition and insight and slight rational analysis. Chinese classical art advocates simplicity, emptiness, nihility, and suggestion. It emphasizes charm but not appearance, and emphasizes virtuality without rewriting reality. Affected by this kind of thinking, Chinese people prefer the aesthetic taste of implicit metaphors. (Yue, 2016)

In terms of the aesthetics of traditional ceramics, the simple form has been the main expression of ceramic art for thousands of years. The artistic conception is the persistent pursuit of ceramic art and the highest level of ceramic art creation.

Figure 12 The Picture of Five elements of Taoism

(Source: www.yjmxchina.com)

The “five-color” aesthetic is a derivative of the theory of Yin-Yang and Five Elements. China established the five-color system for more than 2,000 years ago. This system does predate not only Western civilization but also has rich cultural connotations. The five colors were widely popular from the Western Zhou Dynasty

to the Spring and Autumn Period and the Warring States Period. About two thousand years ago, there were many records about “five color” in ancient Chinese classical texts. In the Western Zhou Dynasty, people put forward the color concepts of “sacred color” and “average color”. The ancient people discovered in the practice of color mixing that only the most essential elements of five colors - cyan, red, yellow, white, and black - are the purest colors. It is impossible to get those five colors by mixing any colors, but other colors can be obtained by mixing the five colors. Therefore, in the colorful world, the five colors are regarded as festive colors, and only the five colors are the original colors of colors. They are related to cultural concepts and connect with other things as a symbolic means to compare, extend, and expand. Therefore, in China, it can be said that the relations between color, physiology, and psychology started from these five colors and gradually developed from there. The discovery of sacred colors and the distinction between sacred colors and average colors reveal the basic laws of color science and have laid the foundation for ancient Chinese five-color views and aesthetic thoughts. The “five-color” system is the most representative component of China's traditional color culture. It is also an essential phenomenon of Chinese color aesthetics. After the pre-Qin period, when a hundred schools of thought contended, the concept of color became more mature. (Siyao, 2017)

The “S” shape of the Tai Chi diagram curve represents the harmony between human and nature. The harmony between nature and architecture, the unity of light and dark, and the complementarity of movement and stillness seem to be contained in this shape. This aesthetic understanding is applied to the layout of many traditional settlements in South China.

The Yuan Building, a representative of traditional Chinese architecture, is a combination of straight and curved, with a circular outer circle and a square ancestral memorial site at the Centre of the axis, interpreting “heaven and earth” with the overall layout, and “straight” and “curved” between the Fang Building and the Yuan Building (Figure 12). The contrast between the Fang Building and the Yuan Building is also “straight” and “curved”. The Ming Hall of the Tang

Dynasty, an important symbol of ritual and law in ancient times, also adopted a similar aesthetic setting. (Sicheng L, 2016)

Figure 13 The Yuan Building in Fujian, China, Source: Fujian Pictorial. (Source: https://kuaibao.qq.com/s/20191203A09DET00)

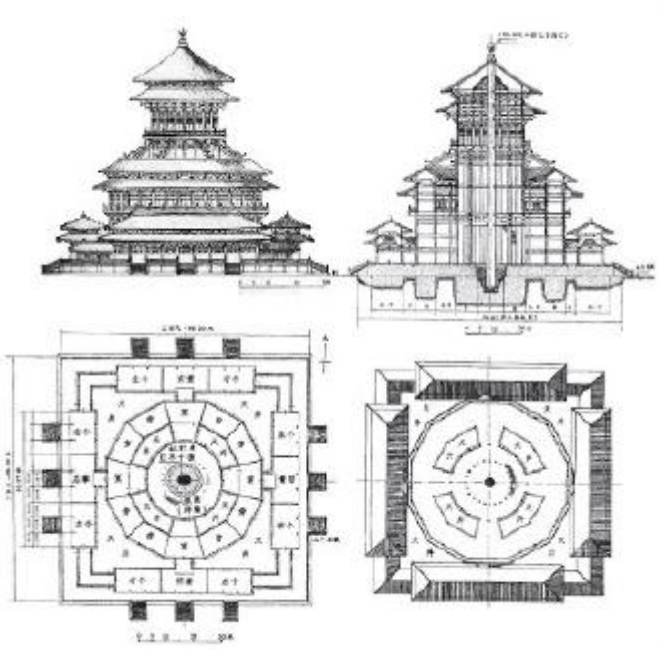


Figure 14 Reproduced Picture of The Ming Hall of the Tang Dynasty, (Source: Hand-drawn by Liang Sicheng, History of Chinese Architecture pp235)

The beauty of context is an essential part of the Taoism aesthetic concept. The search for the beauty contained in nature is all about creating an intriguing “mood”. (Ames, 2016)

Chinese landscape painting focuses on describing intangible

elements, pursuing the “mood” of turning the intangible into the tangible. In traditional landscape painting, the “white space” is used to depict the sky, water and light, and the “white space” that runs through the whole painting is like a “breath” that runs through the picture. Throughout the painting, the “white space” is like a “breath” that flows through the picture and brings out the flexibility and vividness of the picture. (Z. Bin, 2007)

Figure 15 Fishing alone in the cold river, Ma Yuan (date of birth and death unknown) was a painter of the Southern Song Dynasty(1127-1279A.D.).
(Source https://graph.baidu.com/)

Taoism respects nature and takes nature as beauty. Under the domination of such a concept, when designing the vessels, ancient porcelain artists often focused on integrating the beauty of nature with the vessels' practicality and artistry. (Chunling, 2010) They used plants such as winter melon, watermelon, mallets, oil hammers and other everyday objects as design prototypes in their creations. Taoism has a simple perception of the world as “round heaven and square earth”, so ancient artisans designed the “Yu Zong” (It is a kind of inner round and outer square cylinder type ceramic) ceramic shape, and today we commonly see traditional ceramic vessels such as apple jars, chrysanthemum jars, winter melon jars, and mallet jars, which are based on the reverence and gratitude for the natural. They are based on the idea that everything has a Tao and a sense of gratitude to the

natural and contain naturalness. The “plum vase”, designed with the characteristics of the female body, is also based on Taoism characteristics.

Figure 16 “Yu Zong” Song Dynasty(960-1279A.D.) Ceramic Shapes
(Source https://baike.baidu.com/item/)

Figure 17 Qing Guangxu famille rose flower and bird pattern apple jar, 13 cm high, 14 cm in diameter, and 593 grams in weight. The official kiln made in Jingdezhen in the reign of Guangxu Bingshen 1896
(Source http://www.pinlue.com/article/2018/)

Figure 18 Chrysanthemum jars Produced in the Chenghua period of the Ming Dynasty, 42cm in height, 25cm in diameter and 20.2 in foot diameter

(Source https://www.sohu.com/a/64720525_385458)

Figure 19 Late Qing Winter melon jar, 33-36 cm high, Author: Wang Yishun

(Source http://www.daobi.net/jingpin-2387.html)

Figure 20 Plum vase Late Northern Song Dynasty (960-1127) Yaozhou kiln celadon, 25 cm high, collected by the National Museum of China, Beijing
(Source http://www.daobi.net/jingpin-2387.html)

Figure 21 Mallet jars: Blue and white during the Kangxi period of the Qing Dynasty (1662-1722) 46 cm high, 11.5 cm diameter, 12 cm foot diameter. Collection of the Palace Museum
(Source http://www.pinlue.com/article/2018/02/2503/295589058934.html)

2.4 Ceramic Art in China

2.4.1 Modern Ceramic Art

It has long been Ning Gang's contemporary ceramic art creation's consistent path to absorb nutrients from tradition. It is described in Professor Ning's language as “law tradition, but different from tradition”. In other words, “seek nourishment in traditional art and seek a way out in contemporary art” The belief foundation of Ning Gang's ceramic art creation is based on traditional Chinese ceramic craft and Chinese classical art. He has the courage to innovate in his creation and walked out of contemporary art's creation road. Ning Gang is the representative of modern ceramic art. (Hongwei, W, 2017)

Figure 22 Ning Gang Ceramic Works In 2013, Ning Gang's work “Harmony” was collected by Buckingham Palace
(Source https://m.sohu.com/a/364888163_768320)

Figure 23 Ning Gang: second-level professor, doctoral supervisor, Ph.D., representative of the 13th National People's Congress, Served as the president of Jingdezhen Ceramic University.
(Source https://baike.baidu.com/item/%E5%AE%81%E9%92%A2/6498082?fr=aladdin)

Guo Aihe, the master of Chinese ceramic art and the master of Chinese ceramic design art, represents modern art. For more than 30 years, Guo Aihe has been committed to the research and design of “Luoyang Tri-color” graphic art. Based on traditional Tricolor techniques, he boldly designed, innovated and constructed the Tricolor r, adopting unique glaze and firing techniques, and found a way of innovation to make the Tricolor more brilliant, combining traditional culture and modern art perfectly. (Nan, 2017)

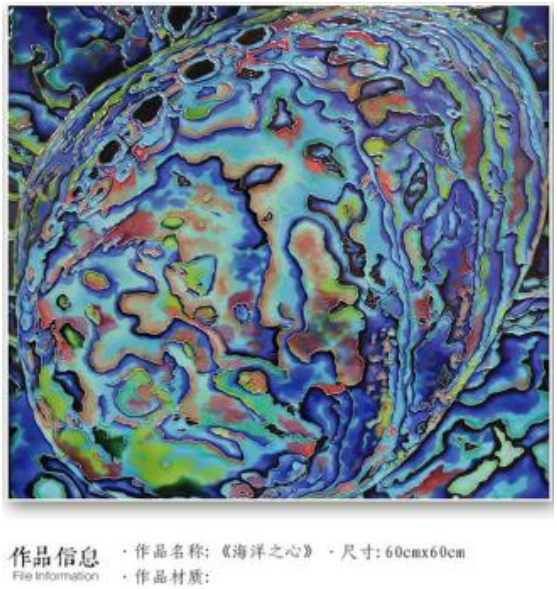


Figure 24 Guo Aihe Ceramic Works Your name of the work "Heart of the Sea" Size 60×60cm Personal collection

(Source https://item-paimai.taobao.com/pmp_item/40211271611.htm?s=pmp_detail)

Figure 25 Guo Aihe: Born in Luoyang in 1964, he is a master of Chinese ceramic art and director of Luoyang Sancai Art Museum.

(Source https://baike.baidu.com/item/%E9%83%AD%E7%88%B1%0129851?fr=aladdin

Tong Zhengang's recent work is a successful practice of

contemporary ceramic grammar. Ceramics have experienced the shaping of craftsmanship in a long history. As a medium, it is difficult to discard the “decorative” that it has.

How to use such ancient material to create unique contemporary artwork? Tong Zhengang answered. Tong Zhengang's ceramic works are as thin as paper, crisp like a pancake, white as milk. The unintentional burning is part of the work. He has carried out the essence of the thin tire technology in his skills, but he abandoned and converted the technological attributes of ceramics in terms of concept. Through the proper presentation of human greed, a picture of a savage, fresh and mixed desire appears in front of the eyes. The characteristics of hard and fragile

Ceramics metaphorize modern people's fascination and uneasiness about the matter. These works were burned in Jingdezhen, but the artist successfully escaped from the traditional experience and back to the tradition itself, correctly presenting the re-creation and transcendence of porcelain materials. (Resources come from: https://tongzhengang.artron.net/exhibit)

Figure 26 Tong Zhengang: born in Xinjiang in 1959, member of the Beijing branch of the Chinese Artists Association
https://baike.baidu.com/item/%E7%AB%A5%E6%8C%AF%E5%88%9A/6637702?fr=aladdin

Figure 27 Tong Zhengang's artwork: Painted in 2019 Work size: 120×60cm Personal collection

(Source http://m-news.artron.net/news/20200627/n1343404.html)

Figure 28 Zhang Rongjin, a native of Jingdezhen, Jiangxi, China. Professional painter of ceramic art. Now he is the He teaches at Guangdong Art School. Source https://baike.baidu.com/item/%E5%BC%A0%E8%8D%A3%E8%BF%9B/1997026?fr=aladdin

His works combine “Chinese humor” with Western modern painting art, and the abstraction, exaggeration and deformation techniques of Western modern art are skillfully used in his ceramic creations. Zhang Rongjin was born into a family of ceramic craftsmen in Jingdezhen and is very specialized in Chinese painting and ink expression. Chinese painting and ink's aesthetic structure and aesthetic interest are seamlessly integrated with Western modern painting art, allowing the artist to find the right direction in modern ceramic art. (Studies, 2018)

Figure 29 Zhang Rongjin Ceramic Works Personal Collection Size: 83×83cm (Source https://www.sohu.com/a/277508125_520448)

2.4.2 Contemporary Ceramic Art

Facing collision anxiety between Chinese and Western art, many contemporary Chinese artists have tried to find a path to relief. (Xiaolin, 2014) Ceramic artist Bai Ming attempts to demonstrate this cushion state with his contemporary ceramic works. (Art, 2008) The attitude and expression of materiality in traditional Chinese art creation thought to have its unique value compared to the Western. Bai Ming focuses on the choice of materials in his artistic creations due to his many years of experience in ceramic art creation. He allows the materiality of the raw material to be fully revealed. (Xiaoqiang & Front, 2014) His creations are like the first awakening of life. This artistic expression can be seen as a response to the Western art world's efforts and achievements by contemporary Chinese ceramic artists.

Figure 30 Bai Ming, born in September 1965, is a famous contemporary Chinese artist. Professor of Academy of Fine Arts, Tsinghua University.
https://baike.baidu.com/item/%E7%99%BD%E6%98%8E/8800296?fr=aladdin

Figure 31 Title of work: superimposed relationship Year of creation: 2018 Size of the work: 60×8×25cm Material: porcelain Author: Bai Ming Personal collection (Source https://baiming.artron.net/)

Professor Zhu Legeng, skilled in creating ceramic shapes based on natural forms, dares to break through the constraints of traditional ceramic techniques, the spirit of his artistic experimentation makes his ceramic works quite the essence of contemporary art; with a series of ceramic works, he discusses social development, urban architecture, and human emotions, giving a new language and vitality to traditional Chinese ceramics with his own creative concepts and humanistic concerns that are close to nature. (Jialu, 2007)

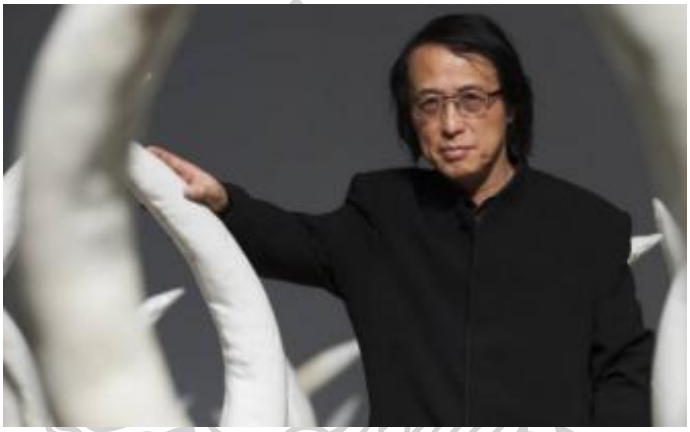


Figure 32 Zhu Legeng, Dean, Professor, Doctoral Supervisor, Art Creation Research Institute, China National Academy of Arts (https://baike.baidu.com/item/%E6%9C%B1%E4%B9%90%E8%80%95/6497965?fr=aladdin)

Figure 33 The name of the work: Zen Creation year: 2016 Work size: 129× 24× 25cm Personal collection

(Source https://graph.baidu.com/thumb/v4/943273327,479416509.jpg)

2.5 Summary of The Chapter

It comes to expect that in the current world today, it becomes more difficult to pass on traditional skills and craftsmanship, most of which are under threat of disappearing. There needs to be an attempt to explore and invent technologies and aesthetics in the perseveration of traditions. China's modern ceramic art started relatively late while modern production techniques make contemporary Chinese ceramic art lose sight of its philosophical root. It becomes imperative to introduce Taoism philosophy into ceramic art creation. Simultaneously, it is necessary to focus on design thinking and set up a large number of design experiments to find a more suitable ceramic art philosophy theory.

Chapter 3 Methodology and process

3.1 Introduction

In this research, the methods of observation, comparison and experiment are used to improve the glaze of Wood-Leaf Glaze in Jizhou kiln to increase the glaze stability and save the production cost.

-Observational method:

The method is used to visually distinguish the clarity and glossiness of the leaf surface to obtain relevant data. Meanwhile, auxiliary tools such as microscopic structure observation are used to directly observe the studied object, so as to obtain more valuable data. The decomposition and observation during the firing stage and the change process of the blade in the kiln show that the leaf blade first turns into ashes, becomes carbonized, and melts into the glaze. In the process of becoming ashes, the blade is very fragile. The flow of cyclone glaze in the kiln could destroy its complete shape. The improved formula is then created from the observation results.

-Comparative method:

The observation and analysis method helps identify the similarities and differences in the research objects and, sort out different types of leaves. look for common mulberry quickly lock is easy to firing Wood-Leaf Glaze specimens for comparative analysis, to find optimal common summarizes experience to guide the contrast the same leaves in the definition of specimens with different color, sum up experience, analysis reason to guide experiments.

-Experimental method:

The experiment is set up and a variety of firing schemes are set up

in advance in the process, so as to obtain multiple sets of experimental data, and identify the optimal scheme. Moreover, the contents of the next group of experiments are calculated and set to carry out the experiment with different experimental materials, such as leaf slime and glaze, so as to obtain the optimal scheme data.

3.2 Design Experiment: Restoration of Traditional Techniques for Wood-Leaf Glaze

3.2.1 Selection of Ceramic Materials

Ceramic materials include clay and glaze. They are mostly natural minerals and used according to a certain proportion and special requirements of each type of materials obtained.

Figure 34 Ceramic material 1

Potassium feldspar: Being aluminosilicate mineral, it is the main constituent of glass phase, and mainly acts on firing temperature and glaze quality.

Talcum: It is a chemical material introduced into the glaze to cool and improve the glaze roughness.

Quartz: It is used to improve the melt temperature viscosity of glaze, reduce the coefficient of thermal expansion, and improve the hardness and wear resistance.

Calcium carbonate: It is an important inorganic mineral. It is decomposed into calcium oxide, which prevents crystallization.

Figure 35 Ceramic material 2

-Kaolin: It is a non-metallic mineral that can improve the suspension performance and viscosity of glaze, improve the whiteness. It is easily thixotropic, and has small coefficient of expansion.

-Red iron powder: FeO is introduced as hair color agent, and the main color is red.

-Zinc oxide: Zinc oxide helps to increase the melt effect. Its firing range is wide, expansion coefficient is small, making it appropriate to improve the toughness of the glaze. After reaching a certain amount it can be whitened and faded.

-Tuzi: it is an important inorganic mineral, native to Ji 'an, Jiangxi province, which has not been clearly defined prior to the study.

3.2.2 Leaf Selection

In addition to the strict requirements on plant species, the firing of Wood-Leaf Glaze has strict requirements on the thickness and the treatment degree of leaves. In order to carry out the research smoothly, experimental seedlings were planted first, and the leaves with thickened, clear veins and dark colors were selected for experiment.

3.2.3 Exploration of Firing Method

Kiln is a necessary equipment for firing Wood-Leaf Glaze. The type and atmosphere of kiln have a great impact on the firing effect of ceramics, so the research process has carried out a comparative experiment on all kilns.

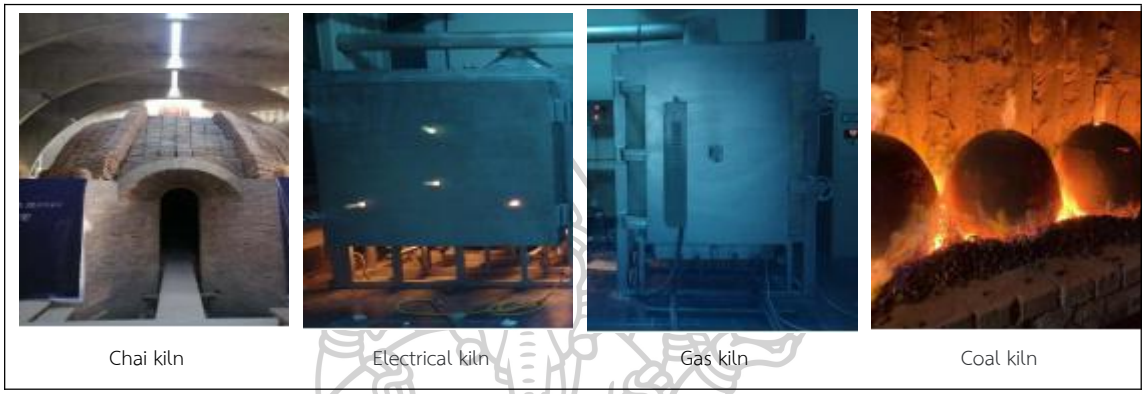


Figure 36 kiln (Photo by Feng Shanxin 2019.5)

The kilns used in the experiment are mainly electric kilns, and the use of gas kiln and Chai(wood) kiln is also part of the research.

Traditional chai kiln uses pine wood firing. Pine wood contains pine resin. The firing process can slowly release the resin which has the moistening effect on ceramics. Fired glaze can implicitly moisten.

Electric kiln firing is the most common and widely used in Today ceramics. The temperature measurement method used in electric kiln firing is generally thermocouple temperature measurement. But in order to ensure the accuracy of the temperature, temperature cone and ring can also be used in the firing process to measure the temperature.

Electric kiln can set and control the firing process through the temperature control instrument, which can efficiently maintain the constant rise of the firing temperature curve. Electric kiln uses electricity as the kinetic energy. Electricity is a clean energy, which has little impact on the environment and meets

the requirements of environmental protection and the conversion of old and new kinetic energy.

Gas kiln uses liquefied petroleum gas as a fuel to firing. Similar to electric kiln, it can use electronic thermometer with pyrometric cone temperature at the same time in order to guarantee the accuracy of the temperature of the kiln temperature, to accurately control the firing curve, to ensure the quality of firing gas kiln sintering temperature can reach 1360 ℃, which is the temperature fundamental equilibrium, and to make the temperature of the body and glaze fully vitrified. Liquefied gas is used as fuel in the gas kiln, which is fired by open fire. As the combustion will consume air, the pressure inside the kiln will change with the outside, and the atmosphere will flow inside the kiln, which will have a certain influence on the works inside the kiln.

After using different types of kiln firing methods, the researcher analyzed the fire effect under different atmosphere. It was found that in oxidizing atmosphere and reducing atmosphere, firing glaze color effect difference is not large, so the glaze to the requirement of the atmosphere is not high. However, for firing Wood-Leaf Glaze, the perfect combination of glaze and leaves is needed to achieve the final results.

3.2.4 Analysis of Key Points of The Wood-Leaf Glaze firing

After analyzing the firing atmosphere, the Researcher found that the atmosphere was not the main factor affecting the firing of Wood-Leaf Glaze. The basic influencing factors of ceramic firing include the composition content, the glaze material, composition of glaze, the ambient temperature and atmosphere of firing. Besides the above factors, there are also more leaf factors in the firing process. After many tests, it was found that the final firing effect of glaze was almost not affected by the blank material, and the color of Raw materials glaze was relatively stable between different environments in the south and the north. Based on the research process, the Researcher continued to select the leaves of different climate species in

different countries for the firing experiment, and finally found that the leaves of mulberry family could ensure the best firing effect. Therefore, in the research experiment, great attention was paid to the selection, processing and preservation of leaves.

In machining process, microwave oven was used to remove moisture from the leaves. The Researcher chose a smooth porcelain plate, placed flat blade in porcelain plates, stacked the blades for 3 to 5 layers, placed the porcelain plate placed the microwave, and set the baking temperature according to the types of blades. For example, baking mulberry leaves would take about 25 minutes During the process of baking it requires a pause in every 5 minutes to open the door and release the vapor inside. The baking continues for 5 minutes before pausing again. These steps are repeated until there was no moisture left in the blade and the leaves present a carbide crispy texture. That indicates that the leaves can be removed. If the blade could be baked dry, it would be the perfect fit in the process of firing. However, if the blade appears to be paste-like or cracking during baking, firing it is likely that there would be the glaze effect or the entire leaf blade crack could condense into golden plant ash glaze marks. The whole process will fail and to reveal the shape of the blade and the vein texture.

With electrical fire in the experimental process, an electric furnace that uses electric heating is a medium body with the electronic thermometer that intuitively displays real-time temperature, making the process convenient and quick. However, there is a temperature difference of ±60℃ due to the electric couple itself. In order to ensure the accuracy of the temperature, the Researcher chose to use at the same time thermocouple as mediators of electronic thermometers and pyrometric cone curve of sintering temperature. The temperature measurement record after experimental data contrast found that the different influence on the effect of sintering temperature on Wood-Leaf light fire was large. However, Wood-Leaf light stable firing temperature can curve and determine the sintering temperature range between (1228 -1235).

During the firing experiments, the Researcher found in the different firing atmospheres such as in the gas kiln the fuel combustion would produce gas flow, the leaves placed on the surface of the calving body would be moved by the airflow during the naked firing, which would lead to the failure or unsatisfactory firing effect. While due to the furnace used in electric furnace is electric furnace filament or silicon carbon rod, air flow is relatively small, but also will be affected by some. To solve this problem, the Researcher chose to use the ancient Saggers to maintain the Wood-Leaf Glaze body and the leaves on the fire experiments. After experimenting with different firing atmospheres and with Saggers cup, it was found that the rate of finished products of firing effect was greatly improved under different atmospheres. It can be concluded that the temperature and the kiln environment are the key factors affecting the success of the firing.

3.2.5 Introduction of Saggers

Sagger first appeared in south Hunan XiangYin kiln at the end of the Tang dynasty. Sagger spread to all over the country throughout the five dynasties. In the late Tang dynasty period, Sagger build kilns were widely used for building fire. In the northern Song period, to build kilns put good glaze bowl lights in Sagger, to ensure that when the high temperature burn built inside the heat evenly, pollution and influence of impurities for the body will prevent stove, improve the quality of products of firing.

There are mainly two kinds of Saggers used in the firing process of the Wood-Leaf Glaze according to the raw materials from which the Saggers are made. The first kind is the white clay produced in Leping, and the second kind is the zitu clay produced near Yonghe Town. The process of Sagger making is generally carried out outdoors. The method consists of pouring the white clay and the zitu clay on the ground, making them into thin layers and stack them, and using a shovel to cut them one by one, before adding water and kneading evenly. When making the Sagger wall, it requires a number of specially made bamboo slices. Pass them through the thickness of the bamboo slices with a string, then put them upright, and

close the two ends to form a circle. The inner side is fixed with an iron circle, and the outer side is tied with a rope. Then apply the Sagger clay to the outer wall of the ring tube. When it reaches a certain thickness, use a cloth dipped in water to smooth the outside. Then use an iron sheet to trim and shape it. When finished, remove the iron ring inside the ring tube, shrink the ring tube and take it out from the inner surface. Then smooth the inner wall and shape it. After the Sagger wall is finished, move it to another place to let it dry.

When making the bottom of the Sagger, first take a special iron ring with a diameter equal to or slightly larger than the outer diameter of the casket wall, and place the Sagger inside the Sagger. Step on the Sagger so that it evenly fills all parts of the ring. Then put a ball of Sagger clay in the center and pat it tightly. After the bottom of the Sagger is made, let it dry. When the Sagger wall and the Sagger bottom are properly dried, dip the edge of the Sagger wall with the Sagger slurry, sit on the Sagger bottom, and smooth the bonding area.

In this study, the Researcher applied the Saggers in the traditional firing process into the firing of wood brevis capes, which ensures the stability of firing wood brevis capes and greatly promotes the research process.

Traditional Sagger fired ceramics
(1100-1300A.D.)

Traditional Jian Sagger
(1100-1300A.D.)

The Sagger in Long kiln
(1100-1300A.D.)

Figure 37 Saggar

3.2.6 The Re-firing Process of The Traditional Wood-Leaf Glaze

The traditional technique of the Wood-Leaf Glaze has been lost for

nearly 700 years. Wood-Leaf Glaze is part of Chinese material culture and contains complex philosophical principles. In the early stage of the study, the Researcher was attracted to the magic of the Wood-Leaf Glaze, and had a chance to visit the master Weimao Xu in Hangzhou city and Jiguo Zhang in Zibo city and exchanged firing experience and glaze knowledge.

Research location: Jingdezhen

It has a simple leaf texture and the leaf color is green

Leaf blade fuzzy, vein unclear

Figure 38 Firing effect in Jingdezhen (Photo by Feng Shanxin 2019)

Research location: Jinan

Figure 39 Leaves fired at Qilu University of Technology, Jinan, Shandong province. It had poor firing effect. (Photo by Feng Shanxin 2018)

-Naked firing and Sagger firing experiment

Research location: Ji'an Jiangxi

The glaze and body was directly placed in the kiln for firing.

The firing effect is not good, the blade texture is not clear, the blade has a serious crimp.

The rate of finished products is low.

Figure 40 Experimental effect of naked firing (Photo by Feng Shanxin 2018)

-Experimental results of firing in a Sagger:

Place the glaze blank inside the Sagger and fire it into the kiln.

Firing effect blade profile is complete, veins clear.

Leaves intact, no curl phenomenon, veins clear veins

Figure 41 Firing experimental effect of Sagger (Photo by Feng Shanxin 2019)

There are very few research materials that can be referred to in the technical field of the Wood-Leaf Glaze's research. The two experts only provided some guidance from time to time. The significance of promoting Konoha's material technology research is not significant. The progress was once blocked.

Out of the Researcher’s interest in Wood-Leaf Glaze and his desire to learn about the firing technology of the Wood-Leaf Glaze, the Researcher went to Yonghe Town, Ji 'an city, Jiangxi Province to investigate and study the origin of Wood-Leaf Glaze.

Jizhou kiln is located in the middle of Jiangxi province Yonghe town. It was used in the five dynasties since the late Tang dynasty. It was developed in the northern Song dynasty. In the Yuan dynasty Jizhou kiln late decline in Zen Buddhism and Confucian culture as the main connotation of LuLing culture edify, produces ceramics has different writers artistically and free from vulgarity beauty of the Zen, combined with the Song and Yuan is of highly developed commodity economy and ordinary worldly winds of impregnation. Jizhou kiln period thus became the most representative and most creative folk kilns in the history of ancient Chinese ceramics.

Under the influence of Confucianism and the economy in the Song and Yuan dynasties, Jizhou kiln is well known for producing distinctive crafts such as the unique mulberry leaf cup, the unique Louhua, Daimao as well as the plain and elegant glaze painting crafts.

With the purpose to improve the production process of Wood-Leaf Glaze, the Researcher found Mingbiao Hu, a teacher who studies the firing of Wood-Leaf Glaze in Jiangxi province and the staff of Jizhou Ceramics Research Institute. With their help and after more than a month of research experiment, a successful firing process was discovered. It could make a new Wood-Leaf Glaze formula. However, at the beginning of the experiment stage, the rate of finished products was still as low as 10% to 20%.

Merely learning and mastering the existing technologies in the

production process was just a step in the overall research process. To get more research results, the Researcher must get more results in process technology. Therefore, after careful consideration, the Researcher finally determined the research goals and research directions as follows:

- Reduce energy consumption and increase the rate of finished products of firing the Wood-Leaf Glaze.

- Conduct an innovative research on Wood-Leaf Glaze that breaks from of the limit of traditional Konoha.

- Carry out a research on different varieties of Wood-Leaf Glaze that expand from the traditional Wood-Leaf Glaze that only uses mulberry leaves.

- Carry out a research on the functions of Wood-Leaf Glaze, so that the use of Wood-Leaf Glaze can have health benefits.

Table 1 Formula and heating curve of Wood-Leaf Glaze of Jizhou kiln are as follows

potassium feldspar	calcium carbonate	talcum	kaolin	quartz	rouge	zinc oxide	Grey soil
50%	10%	5%	7%	15%	6-8%	2%	13-15%

Table 2 Heating curve in Ji'an city

Stage	Temperature	Time
1	30°C	40 min
2	100°C	40 min
3	200°C	60 min
4	300°C	60 min
5	420°C	60 min
6	570°C	60 min
7	770°C	60 min
8	1070°C	60 min
9	1280°C	20 min
10	1280°C	0 min

The research process of re-firing the Wood-Leaf Glaze with mulberry leaves and arborescent in Jian was very tortuous and met with multiple failures. However, from the researcher's exchanges with many craftsmen, the researcher learned that since the 1980s, governments at all levels have funded many experts and scholars to conduct research with the goal to re-burn the Wood-Leaf Glaze. Nonetheless, the results from those researches were not significant and did not seem to establish any applicable knowledge.

- Naked firing and Sagger firing experiment

Research location: Ji'an 'an, Jiangxi province

Figure 42 Study process of Wood-Leaf Glaze with Mulberry leaves (Photo by Feng Shanxin 2018)

- Experimental results of firing Sagger

Research location: Ji'an, Jiangxi province.

Figure 43 Calyx bulb made of mulberry leaves in Jian (Photo by Feng Shanxin 2018)

Research location: Jinan, Shandong province.

Mulberry leaf, wood, clear leaf texture

Figure 44 Wood-Leaf Glaze with mulberry leaf fired in Jinan (Photo by Feng Shanxin 2020)

The method of controlling variables to conduct experiments Was used to ensure the accuracy of the research. All quantifications need to be strictly controlled. For example, in using the same kiln to conduct experiments, the first step of the experiment was completed in Ji'an. Then the kiln needed to be transported to Jinanfor further use and study. The research uses the same temperature rise curve and the same seasonal leaves are used. After rigorous experiments, more accurate experimental results were obtained. The firing results of the same leaves in different provincial environments are different, as shown in the figure.

Failure cases of blade fired

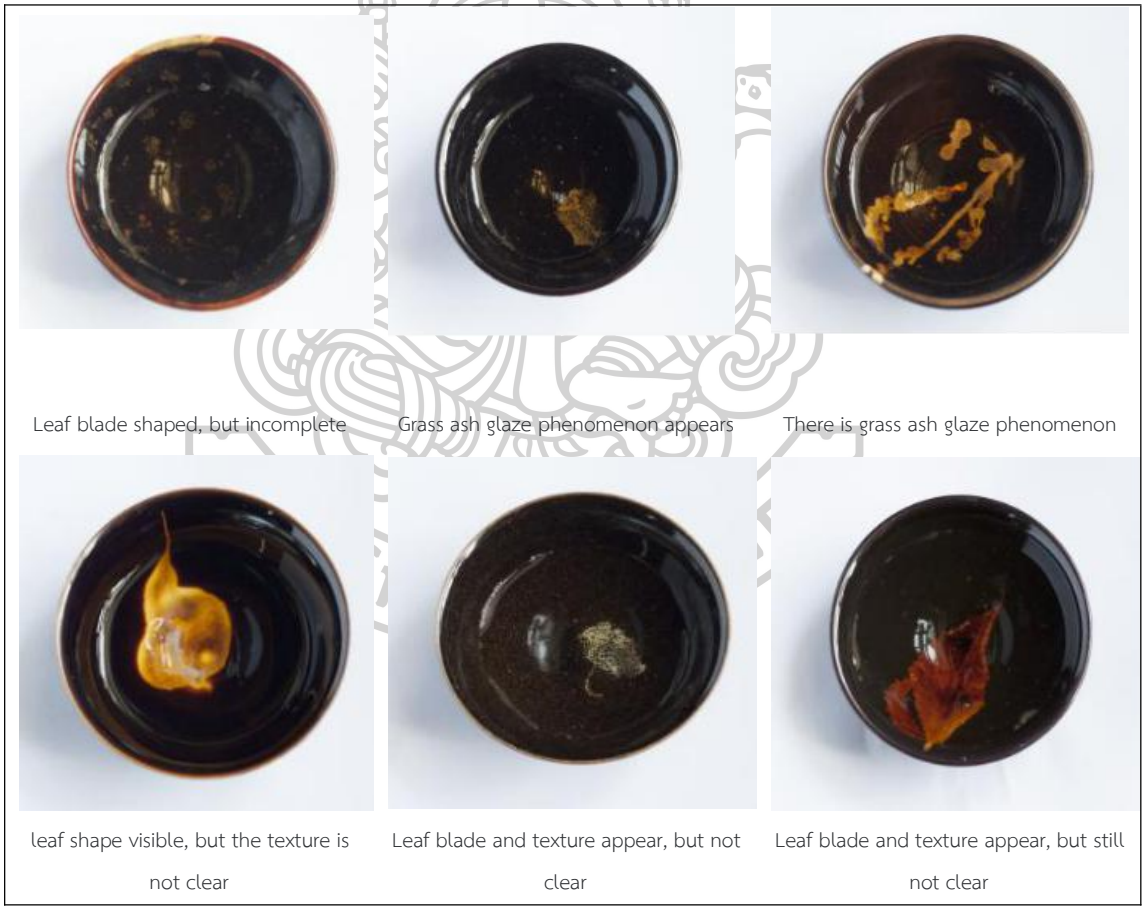


Figure 45 Failure cases of firing (Photo by Feng Shanxin 2018)

Glaze firing problem:

Figure 46 Glaze firing problems (Photo by Feng Shanxin 2018)

In order to improve the rate of finished products, the researcher relied on the literature material and technology to gradually improve the process. After the further study of wood-leaf glaze, the researcher finally determined that the materials in the north could improve the glaze while the south could transform wood-leaf glaze using a new type of glaze raw material in the north. From all parts of Shandong mulberry leaves could be used to burn in various trial experiments. The researcher continuously adjusted the glaze composition ratio according to the fire

situation of heating curves and sintering temperature. With careful control and adjustment, the rate of finished products finally went up to 80%.

Table 3 The glaze formula for the initial adjustment is (%)

Feldspar	Quartz	Tuzi	Red soil	Iron powder	Erhui	Torax	Body soil
39%	5%	21%	4%	5%	12%	6%	8%

In the research process, 768 glaze recipes have been tried. A total of more than 600 kilns have been fired, and more than 20,000 pieces of products have been fired. In the early stages there were a high probability of failures. However, the rate of finished products finally increased from 2% to 80%.

Figure 47 There were about 1,000 failed wood leaf calices. (Photo by Feng Shanxin 2018)

In the process of glaze preparation, the ball mill used for mixing and grinding glaze broke down due to the increased amount of glaze preparation and the increased workload.

Figure 48 The ball mill tank was broken when the glaze was prepared for grinding and mixing. (Photo by Feng Shanxin 2018)

Table 4 Final glaze recipe as follows

Kaolin	Xianghui	Iron powder	Potassium feldspar	Quartz	Erhui	talcum
12%	10%	10%	39%	9%	12%	8%

The subjects of the research mainly focused on China, but also considered samples from Thailand, Indonesia, and Italy. In the research process, the researcher travelled to various regions at home and abroad, such as China's Jiangxi province Jingdezhen, Dunhuang, Jinan and other places for leaf collection. In the process of research experiment, the firing process was conducted in different regions and seasons, using different specimens of leaves with varying degrees of thickness. The experiment results were observed and recorded, and a series of conclusions were drawn.

At first, the collection of leaves was mainly concentrated in Ji 'an and surrounding towns where Wood-Leaf Glazes were created and fired. Mulberry leaves were mainly collected in consideration of local climate, soil and other environmental factors that may affect the leaves. Moreover, using mulberry leaves as decoration was most common in traditional Wood-Leaf Glazes. Later, the scope of leaf collection was expanded to the whole country. Different varieties of leaves were tried in the firing process. Studies showed that mulberry plants such as figs, Labrador seedlings, hops had the best firing effect. In addition, the leaves of Bodhi of the Rutaceae family were fired successfully as well as the leaf of bodhicitta legume of Rutaceae, Bauhinia, Aceraceae, adiantum, Fokienia hodginsii, armour of the leguminous family.

During the experiment, it was found that the ginkgo leaves, pumpkin leaves, and walnut leaves were not suitable for firing into Wood-Leaf Glaze. After firing, the golden solidification was left at the bottom of the bowl, while the leaf cannot retain its shape. After the experiment, the researcher picked foreign mulberry plants and found that the finished products could still be fired successfully.

In the early stage of the research on Wood-Leaf Glaze, the understanding of the Wood-Leaf Glaze was still limited, causing the initial firing attempts to fail repeatedly. The most typical Wood-Leaf Glaze of Jizhou kiln are decorated with mulberry leaves. Therefore, the research and experiment in the early stage tried to fire such Wood-Leaf Glaze as the main line. At the beginning of the research experiment, mulberry leaves were mostly collected in Jinan, Shandong province, the glaze was made of black gold glaze of Zibo in Shandong province, and the clay body was made by throwing, and fired in a gas kiln. However, due to the lack of mastery of firing methods and glaze recipes, many attempts have failed. After many tests, the researcher listed all the problems he encountered and went to Jingdezhen, the capital of Porcelain, with a purpose to carry out a field investigation on the firing technology of Wood-Leaf Glaze. However, the firing method of Wood-Leaf Glaze is a commercial secret and Local potters who make Wood-Leaf Glazes refuse to disclose the firing technology and the glaze formula of Wood-Leaf Glaze.

In the process of this research, the researcher revisited Jingdezhen to gather information on various record glaze formulas, and collect mulberry leaves. He eventually chose to use the formula that was similar to Wood-Leaf Glaze black glaze of Jingdezhen that is usually sharply glaze at the bottom and the body. He also selected the greenware from Jingdezhen, in Jingdezhen public gas kiln firing experiments. The image below depicted the accidental fire in the process of firing experiment with leaf trace.

No leaf shape or texture at all | Grass wood ash spots on glaze, no leaf characteristics | visible leaf shape

Figure 49 Public kiln experiment (Photo by Feng Shanxin 2018)

- Kiln transformation

Reduce the temperature difference in the kiln

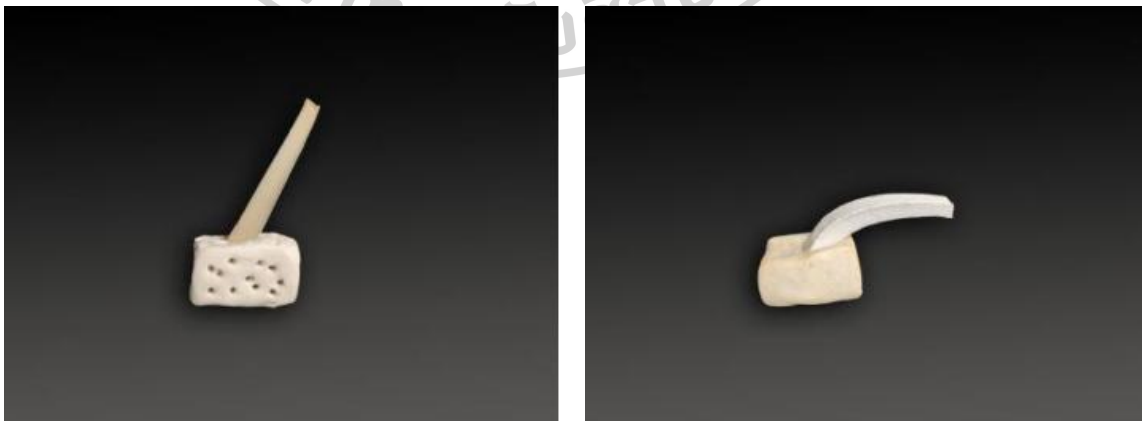
In order to ensure that the fire temperature was constant and to reduce temperature differences between different kilns, the internal furnace heating device of electric furnace is reformed throughout the experiment to compare between different kiln firing conditions. Inside the kiln, kiln silk is used in planning layout. Kiln wire inlay inside the kiln wall to reduce uneven heating of the furnace fire between different kilns which can solve the issue of the low rate of finished products. At the same time, reducing the temperature difference in the kiln can keep the temperature curve rising steadily at high temperature, ensuring the fusion between glaze and blade and forming an excellent firing effect.

- Temperature measuring cone

The temperature measuring cone is a high-precision ceramic firing temperature indicator. The temperature measuring cone can determine when the firing has been completed, whether the kiln provides enough heat to ensure the maturation of the ceramics, whether there is a temperature difference in the kiln, or whether there is a problem in the firing process. The equivalent temperature of the temperature measuring cone is the integrated value of the firing time at a constant sintering temperature. Different sizes of temperature measuring cones have different constant equivalent temperatures. It is directly reflected in the degree of curvature of the cone. It is important to note that the equivalent temperature of the temperature measuring cone is not a single temperature value, nor a single time value, but a combination of temperature and time. The temperature measuring cone can be effectively used to indicate the correct equivalent temperature of the fired product. It will monitor the temperature difference of various parts in the kiln. The cone is intuitive and memorable. It can provide a basis for the control of the equivalent temperature of the sintered product and the quality analysis and improvement while also retaining a basis for the product firing process. It is the most

intuitive indicator to monitor the aging temperature of kiln sintered ceramic products, electric porcelain products, and refractory materials. With the development of modern technology, there are more advanced methods for temperature monitoring such as thermocouples. However, there are still differences between them. For the firing temperature, there is a difference between the point and the space; for the firing process, there is a difference between the instant and the whole time. Modern kilns are equipped with high-tech testing instruments to produce better products, and temperature measuring cones are indispensable.

Ancient thermometric cones(1100-1300A.D.)



Modern thermometric cones(1100-1300A.D.)

Figure 50 Temperature cones (Photo by Feng Shanxin 2018)

Furnace renovation equipment:

The kiln reconstruction consists of key components such asrelay protector, control panel, kiln wire, air switch, and leakage protector.

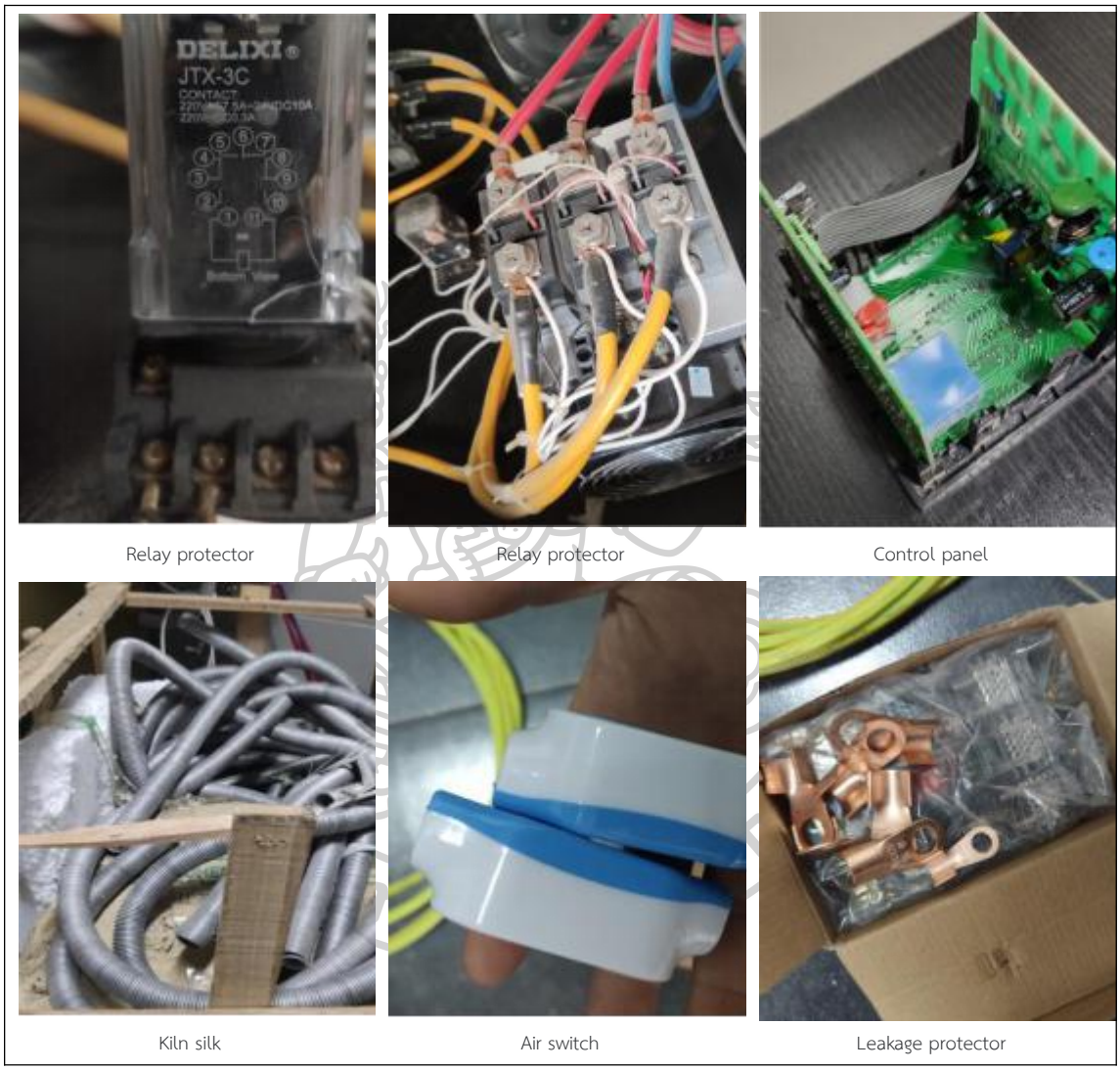


Figure 51 Components for Kiln renovation (Photo by Feng Shanxin 2020)

- Reduce gas flow in the furnace

In this research process, the researcher put aside using Sagger to increase the firing rate of finished products and looked for the problems in the kiln. One of the issues found in multiple experiments was that the kiln was not completely closed, causing the gas flow that leads to heat loss and migration especially in the glaze molten state. When leaf blades combined with glaze at high temperature state that has a gas flow issue, it would compromise the kiln firing effect. To prevent the gas flow that may be one of the reasons behind the low rate of finished products, the researcher set out to transform the kiln into a longitudinal kiln in order to reduce the transverse gas flow in the kiln, prevent the occurrence of too much cross convection and wind direction, and solve the problem of the low yielding rate of finished product due to the gas flow in the kiln.

- Reduce thermocouple temperature difference

Now, the most used kiln temperature measuring device is thermocouple. It is used as a mediator of the heat energy into electricity, showing electronic temperature probe. This approach has the advantage of being direct and convenient. However, there is also a temperature difference of ±60 ℃. In a high temperature condition, it is not accurate. In this research, the temperature measuring cone and ring are used to measure and control the temperature during firing. The three temperature measuring devices are used to calibrate the thermocouple temperature difference through many experiments, to minimize the accuracy of temperature range, and to ensure the accuracy of temperature measurement.

- Temperature control accuracy

Different temperature cones and temperature rings with different labels are placed in different positions in the kiln to accurately measure the time to reach different temperature points, so as to ensure the accuracy of temperature curve and the rate of finished products during firing.

Gas kiln

Electrical kiln

Figure 52 Kilns (Photo by Feng Shanxin 2018)

The first step: after matching glaze, glaze test.

Test pieces in the glaze improvement process.

Glaze plates for trials

Experimenting with firing glaze of different proportions

Firing effect of glaze with different proportions

Firing effect of glaze with different proportions

Figure 53 Sample 1 (Photo by Feng Shanxin 2018)

Select the glaze formula with normal glaze firing effect, place the blade for firing, and test the compatibility of glaze and blade.

Test sheet 1 of glaze with poor effect:

Glaze leaf outline and vein texture is not obvious.

Blade shape and glaze combination is not ideal.

The blade profile is not obvious.

The blade contour and vein texture are not obvious.

Figure 54 Sample 2 (Photo by Feng Shanxin 2018)

Glaze test Sheet 2 with poor effect:

No obvious blade profile.

There is blade contour, vein texture effect is poor.

Blade profile not obvious.

There is blade contour, vein texture not obvious.

Figure 55 Specimen 3 (Photo by Feng Shanxin 2018)

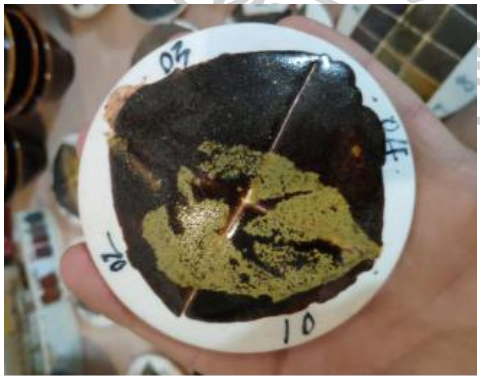
The compatibility between leaves and glaze was selected to test the contrast between leaves and glaze.

The firing effect of the blade on the dark glaze is obvious.

The effect of glaze color is obvious.

Glaze deep leaf firing effect is better.

The blade profile and vein texture are shallow.



The leaf profile is clear, but the vein texture is not clear enough.

The color development of deep glaze is relatively clear.

Figure 56 Specimen 4 (Photo by Feng Shanxin 2018)

In glaze test firing, the test piece with darker glaze color has a higher degree of fusion with the leaves, and the contour of the leaves has a clearer definition of veins.

3.2.7 Design Experiment Results

In the process of research and experiment, the researcher innovated and developed more mature firing methods, converted them into academic achievements, and applied for a series of invention patents. The initial application direction was devoted to the innovation of wood-leaf glaze or “A preparation method of ceramic glaze based on leaves”. After the success of the application for a patent for the national invention patent, and the application of international patent is also successful. The patent is based on the preparation of ceramic glaze of leaves instead of the traditional method with leaf shape, glaze. The method requires a simple operation, stable and reliable fire condition, and strong maneuverability. The selectivity of bottom glaze color is more diverse than the glaze with metallic preparation method which also produces the heavy metal toxicity. On the contrary, the new method can reach consumption level standard while the color stability is improved significantly. It yields a high rate of finished products, and can be used for celadon decoration and ceramic decoration or painting.

Through a series of materials and preparation methods, the rate of finished products of improved Wood-Leaf Glaze was increased from the traditional 2% to 80% of the research results.

The formula of Wood-Leaf Glaze: 20.5%-21.5%SiO2, 10.5%-11.5%P_2O_3, 0.2%Fe_2O_3, 11.5%-12.5%Al_2O_3, 1.5%-2.5%Cr_2O_3, 0.5%MnO 7.5%-8.5%MgO, 39.5%-40.5%CaO, 5%-6%K_2O

3.3 Design Experiment: Wood-Leaf Glaze Innovation

3.3.1 Leaf Collection and Treatment

The leaves collected from different countries were vacuum treated and brought back to China for experiments.

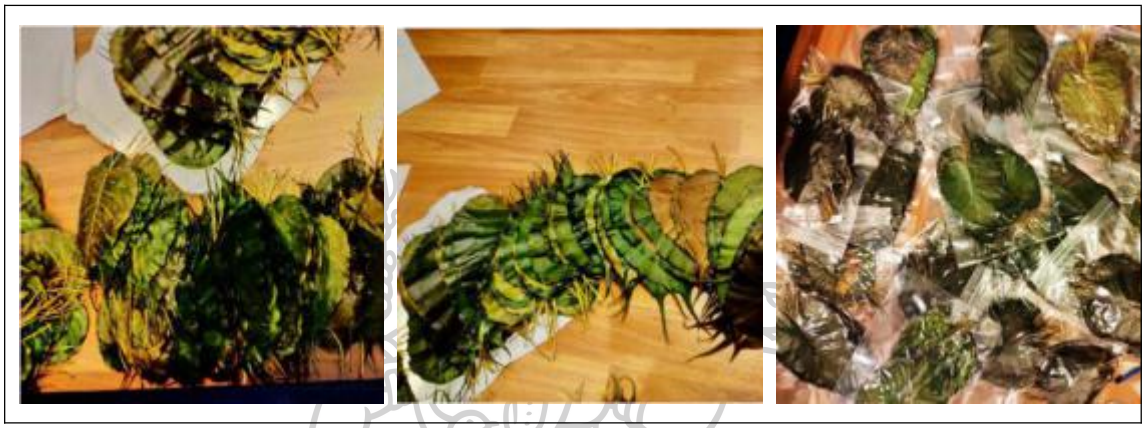


Figure 57 Collected leaves (Photo by Feng Shanxin 2019)

Prior to this, there were data records indicating that in order to make the Wood-Leaf Glaze, strong alkalis, strong acids or chemical substances were used to process and burn the leaves. The researcher conducted experiments in accordance with the literature, and the results showed that the rate of finished products was not significantly improved. At the same time, it was found that the chemicals used can be harmful to the human body and corrode leaves remained after high temperature firing.

The first step is to thoroughly clean the leaves to get rid of dust accumulating on the surface of the leaves. Dust is undoubtedly an unstable quote for firing. Therefore, the cleaning process is important as it will ensure better final firing effects.

		
Cleaned off dust and impurities on the leaves	Used porcelain plates to layer the blades for baking	Saved after vacuum treatment to prevent moisture and moth

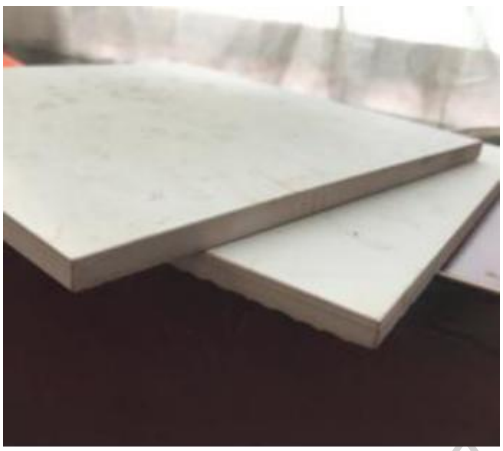
Figure 58 Cleaning leaves (Photo by Wang Yong 2019)

The first process to carbonize leaves with absorbent paper.

	
Laid tissue paper on the surface of the plate and placed the leaves on the surface of the tissue paper	After placing the leaves, put tissue paper on the surface of the leaves
	
Placed a plate on the upper layer to press the leaves, wrapped with tissue paper to prevent the leaves from wrinkling and corners during the baking process	After the process was completed, the tissue paper contained a lot of water discharged by the leaves which was not yet dry, and that would hinder the roasting of the leaves
	
The roasted leaves were wrinkled due to the gap between the tissue paper and the plate, and the roasting effect was not ideal.	There were certain safety hazards in using tissue paper to wrap roasted leaves. Too long roasting time caused the leaves and tissue paper to stick out.

Figure 59 Use absorbent paper to carbonize the leaves (Photo by Wang Yong 2018)

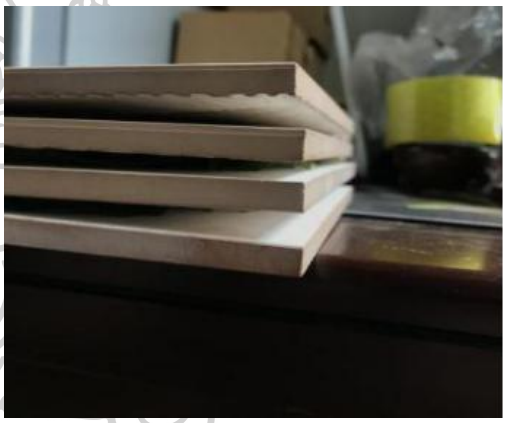
The use of water-absorbing board does change the rate of finished products. However, when the leaves are carbonized, the board will be simultaneously carbonized and often cause heavy smoke in laboratory. Based on this problem, the researcher replaced it with a low-temperature ceramic board. The smoke problem was solved. However, the low-temperature ceramic board will break after two or three times of repeated heating, resulting in a very high cost. Changing the low-temperature ceramic board to a high-temperature ceramic board will greatly reduce the water absorption, making it difficult to complete the experiment. Based on this problem, the researcher conducted an analysis and research, and decided to use ceramic board similar to floor tiles for firing, but only the shape is similar. The rough and bumpy surface of floor tiles can better bond with cement, and the experimental ceramic board increase the water permeability to fully discharge the water. The upper surface of the floor tile is smooth and the ceramic board the researcher researched and designed is finished by a special firing technique. It has no gloss, but it can absorb water and breath and meet the requirements of carbonized leaves. In the actual tests, it will not break even after hundreds of repeated uses.



Specially made water-absorbing board with flat front

Undulating gaps on the reverse side, which can remove moisture from it during baking

Laid the blades flat on the front of the board without creasing



Stacked up to 3~5 layers

Baked in the microwave

Baked products effect

Figure 60 Specially made water absorption boards to carbonize leaves (Photo by Wang Yong 2018)

3.3.2 Experiments with different Leaf Types

The researcher collected multiple types of leaves from various parts of China for the experimenting process of this research. The leaves that the researcher collected include palm raspberry leaf, elm leaf, pomelo leaf, ginkgo leaf, bauhinia leaf, fig leaf, adiantum leaf, acer mono leaf, folium mori leaf, buergerianum leaf, linden leaf, hops leaf, pumpkin leaf, Humulus scandens, folium zelkovae leaf, pulmeria leaf, walnut leaf, cerbera manghas, bamboo leaf, broussonetia papyrifera, fokienia hodginsii leaf, and cyress leaf.

							
Popular leaf	Palm raspberry leaf	Elm leaf	Pomelo leaf	Ginkgo leaf	Bauhinia leaf	Fig leaf	Adiantum leaf
							
Acer mono leaf	Folium mori leaf	Buergerianum leaf	Linden leaf	Hops leaf	Pumpkin leaf	Humulus scandens leaf	folium zelkovae leaf
							
Plumeria leaf	Walnut leaf	Cerbera manghas leaf	Broussonetia papyrifera leaf	Fokienia hodginsii leaf	Cyress leaf	Wutong leaf	Eucalyptus leaf

Figure 611 Part of the leaves used in the experiment (Feng Shanxin finishing)

In this thesis, the experiments with linden leaves, lalayang leaves, poplar leaves, broussonetia papyrifera leaves, and fig leaves will be used as an example in the detailed explanation of the practical research process.

- Firing Experiment of Linden Leaves

Linden leaves are prone to curling during the firing process and do not have any leaf texture characteristics. Early experiments were basically unsuccessful. Later, the adjustment of the heating curve gradually increased the rate of finished products. In the later stage of the experiment, the firing of the linden leaves was stable. It could retain clear textures and the rate of finished products was

improved.

Table 5 The recipe of linden leaf glaze

Kaolin	Incense Ash	Iron powder	Potash feldspar	Quartz	Er Hui	Talc
12%	10%	10%	39%	9%	12%	8%

Research process of heating curve of firing Bodhi leaves in research experiment.

Table 6 New leaf experiment 1

Stage	Temperature	Time
1	0°C	40 min
2	100°C	40 min
3	170°C	60 min
4	270°C	60 min
5	420°C	60 min
6	610°C	60 min
7	800°C	60 min
8	1050°C	110 min
9	1230°C	30 min
10	1230°C	0 min

Table 7 New leaf experiment 2

Stage	Temperature	Time
1	0°C	40 min
2	100°C	40 min
3	170°C	60 min
4	270°C	60 min
5	420°C	60 min
6	610°C	60 min
7	800°C	60 min
8	1050°C	110 min
9	1230°C	60 min

The research process of linden leaves required multiple experiments to optimize the finished products that could retain the characteristics of leaves.

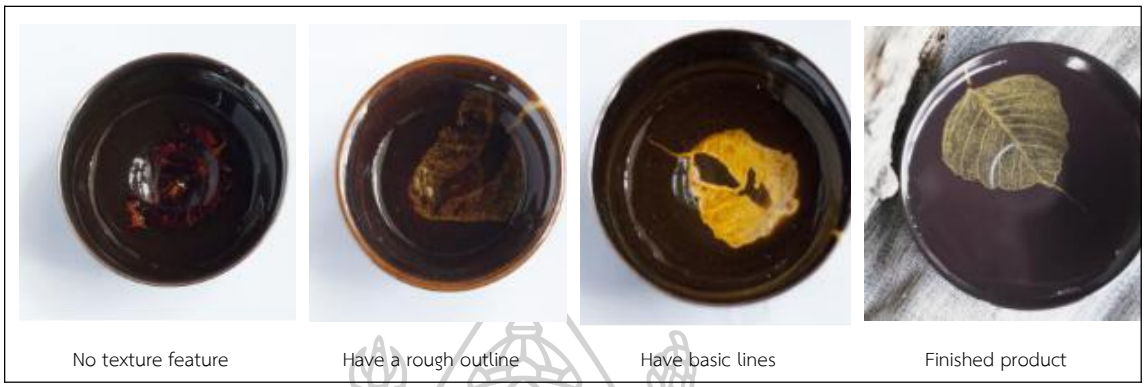


Figure 62 Experiment procedure (Photographed by Feng Shanxin)

The mastery of the firing method of linden leaves is based on multiple experiments and continuous assessment for improved results.

Figure 63 Failure cases (Photographed by Feng Shanxin)

- Firing experiment of Humulus scandens leaves

DAs Humulus scandens leaves are thin, it is very important to select the right leaves and handle the leaves with care. The leaves need to have a dark and thick leaf blade. The researcher collected and fired the Humulus scandens leaves in Jingdezhen, Hangzhou, Jinan, Jining, Qingdao, Weifang and other places. The firing results were relatively successful. The early finished leaf texture layer color was red, blue, and white, and the color tone was not hierarchical. The later improvement of the heating curve made the leaf color rich in the same leaf cup, and the leaf appeared more vivid.

Table 8 The recipe of Humulus scandens leaf glaze

Kaolin	Incense Ash	Iron powder	Potash feldspar	Quartz	Er Hui	Talc
12%	6%	10%	39%	10%	14%	10%

The heating curve of Humulus scandens leaves is as follows.

Table 9 The heating curve of firing Humulus scandens leaves

Stage	Temperature	Time
1	0°C	100 min
2	300°C	30 min
3	300°C	10 min
4	310°C	120 min
5	700°C	30 min
6	710°C	100 min
7	900°C	30 min
8	900°C	40 min
9	1100°C	75 min
10	1230°C	0 min

The research process of Humulus scandens leaves:

Figure 64 Research process of Humulus scandens leaves (Photographed by Feng Shanxin)

Failure cases of Humulus scandens leaves:

Figure 65 Failure cases (Photographed by Feng Shanxin 2018)

- Firing experiment of poplar leaves

The researcher carried out firing experiments on poplar leaves. The main varieties were common white poplar leaves and Dunhuang Populus euphratica leaves. The rate of finished products of Populus euphratica leaves was higher than that of white poplar leaves. In the experiment the same heating curve used with the linden leaves was also used for firing poplar leaves.

Table 10 The recipe of poplar leaf glaze

Kaolin	Incense Ash	Iron powder	Potash feldspar	Quartz	Er Hui	Talc
12%	8%	10%	39%	11%	12%	8%

The heating curve of poplar leaves is as follows.

Table 11 The heating curve of firing poplar leaves

Stage	Temperature	Time
1	0°C	40 min
2	100°C	40 min
3	170°C	60 min
4	270°C	60 min
5	430°C	60 min
6	610°C	60 min
7	800°C	60 min
8	1050°C	60 min
9	1230°C	100 min
10	1230°C	0 min

With southern poplar leaves, the outline of the fired leaves was clear, the veins were detailed and obvious, and the color was blue

With northern poplar leaves, the outline of the fired leaves was clear, the veins were fine and obvious, and the color was blue and purple

Figure 66 The finished product of poplar leaves (Photographed by Feng Shanxin2020)

- Firing experiment of Broussonetia Papyrifera leaves

The researcher collected Broussonetia Papyrifera leaves from various parts of China, mainly in Jinan, Jingdezhen, Jining, and Weifang. The leaves of Broussonetia Papyrifera leaves are thicker and contain more fiber, so the firing conditions are not as harsh as linden leaves, and they are easy to fire and have a high rate of finished products.

Table 12 The recipe of Broussonetia Papyrifera leaf glaze

Kaolin	Incense Ash	Iron powder	Potash feldspar	Quartz	Er Hui	Talc
12%	10%	10%	40%	9%	12%	7%

Table 13 The heating curve of firing broussonetia papyrifera leaves

Stage	Temperature	Time
1	0°C	40 min
2	100°C	40 min
3	170°C	60 min
4	270°C	60 min
5	430°C	60 min
6	610°C	60 min
7	800°C	60 min
8	1050°C	60 min
9	1230°C	100 min
10	1230°C	0 min

The outline of the leaves was clear, and the veins were obvious

The outline of the leaf was complete, exhibiting a clear texture

The leaves were slightly curled but the veins were clear and distinct

Figure 67 The finished products of Broussonetia Papyrifera leaves (Photographed by Feng Shanxin 2019)

- Firing experiment of fig leaves

The firing of fig leaves was relatively stable, but some leaf curling occurred.

The glaze formula is as follows

Table 14 The recipe of fig leaf glaze

Kaolin	Incense Ash	Iron powder	Potash feldspar	Quartz	Er Hui	Talc
12%	10%	9%	39%	9%	13%	8%

Table 15 The heating curve of firing fig leaves

Stage	Temperature	Time
1	0°C	40 min
2	100°C	40 min
3	170°C	60 min
4	270°C	60 min
5	420°C	60 min
6	630°C	60 min
7	800°C	60 min
8	1050°C	60 min
9	1230°C	110 min
10	1230°C	0 min

The display of fig leaf in the Wood-Leaf G

The veins were slightly curled, but the veins were clear | Larger leaf shrinkage | The leaves were intact and the veins were clearly visible

Figure 68 Successful cases (Photographed by Feng Shanxin 2020)

- Blades that failed to fire in the experiment

Bamboo leaves, pumpkin leaves, and walnut leaves are not fired to produce finished products as it can be concluded that Moraceae can be fired more successfully. Leaves such as bamboo leaves contain less fiber, have unclear veins, and are not easy to fire.

The leaves are not fired to produce a texture effect | Clear leaf outline, but unclear vein texture

Figure 69 Failure cases (Photographed by Feng Shanxin 2018)

-Summary

From the firing experiments with different types of leaves it was

found that Moraceae leaves were most successful in the firing process as they could retain leaf profiles and veins after firing.

3.3.3 Selection of leaves in different regions

- Leaves from Thailand

Figure 70 Leaves from Thailand (Feng Shanxin finishing 2019)

Thailand has the tropical monsoon climate. The year is divided into three seasons: hot, rain and dry. The average annual temperature is 24-30℃. The temperature is not lower than 18℃ throughout the year. Although the leaves are evergreen throughout the year, it was found after experimentation that the firing effect of the leaves from June to September was the best.

- Leaves from Indonesia

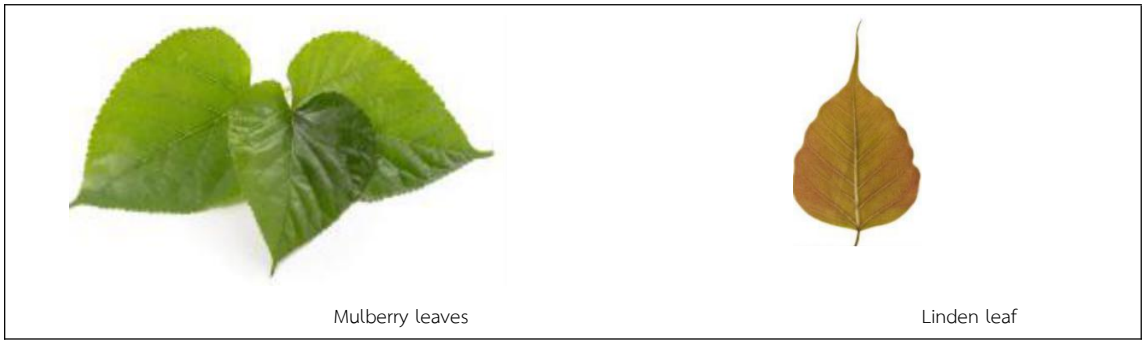


Figure 71 Leaves from Indonesia (Feng Shanxin finishing 2019)

Indonesia has a tropical rain forest climate with an average annual temperature of 25 to 27°C. There is no difference in the four seasons. Due to the climate, the leaves in the area are thickest in the rainy season. Experiments have proved that the firing effect of leaves from Indonesia is the best.

- Leaves from Australia

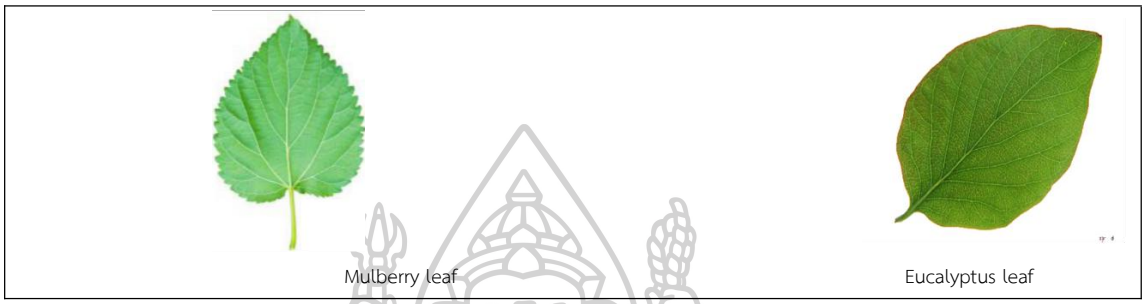


Figure 72 Leaves from Australia (Feng Shanxin finishing 2019)

Northern Australia has the tropical climate as it is close to the equator. It is affected by ocean currents and monsoons and has plenty of rainfall. Due to the influence of the climate, Australia's mulberry leaves are fertile, grow well and have excellent firing effects. Another kind of leaves from Australia that was used in the research was the Eucalyptus leaves. They are the leaves of the Myrtle family plant Eucalyptus globulus. The researcher mainly selected mature leaves, which are lanceolate and sickle-shaped. However, the firing effect was not good.

- Leaves from Italy

Figure 73 Leaves from Italy (Feng Shanxin finishing 2019)

Most areas in Italy have a Mediterranean climate, with hot and dry summers and mild and rainy winters. The mulberry leaves and poplar leaves picked by the researcher from Milan were affected by the climate. The leaves were thin,

and the picking of the leaves required higher seasonality.

The researcher selected representative leaves such as mulberry leaves and linden leaves from different countries, different climates, and different seasons. After conducting experiments, it was found that the firing effect of the same kind of leaves under different growth conditions was the same. But there were differences in the blade firing effect between different seasons. Therefore, it could be concluded that among the reasons that affect the burning of leaves, the seasonal impact is greater than whether or not they are produced in the same area. At the same time, it can be concluded that the leaves of Moraceae have the best firing effects after a variety of firing experiments. The main five firing experiments are detailed in the following.

Firing results of representative leaves of Thailand, Australia, Italy, and Indonesia

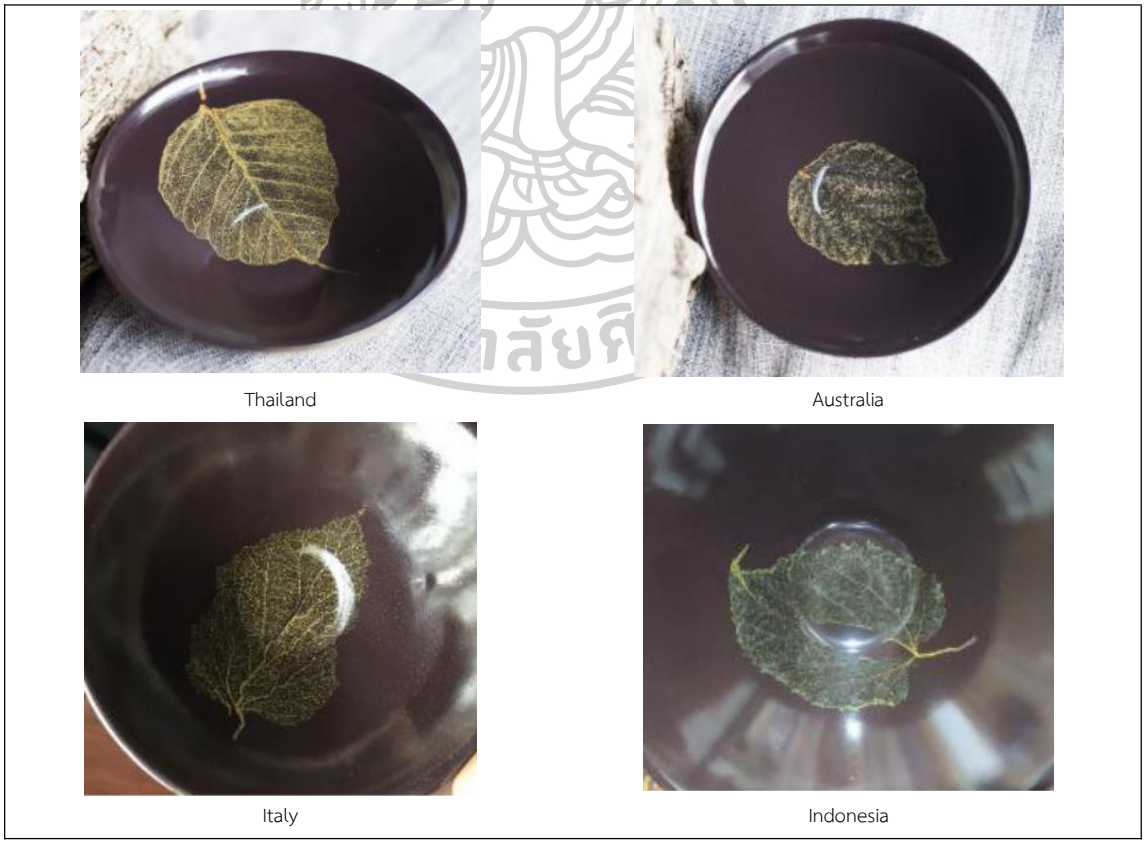
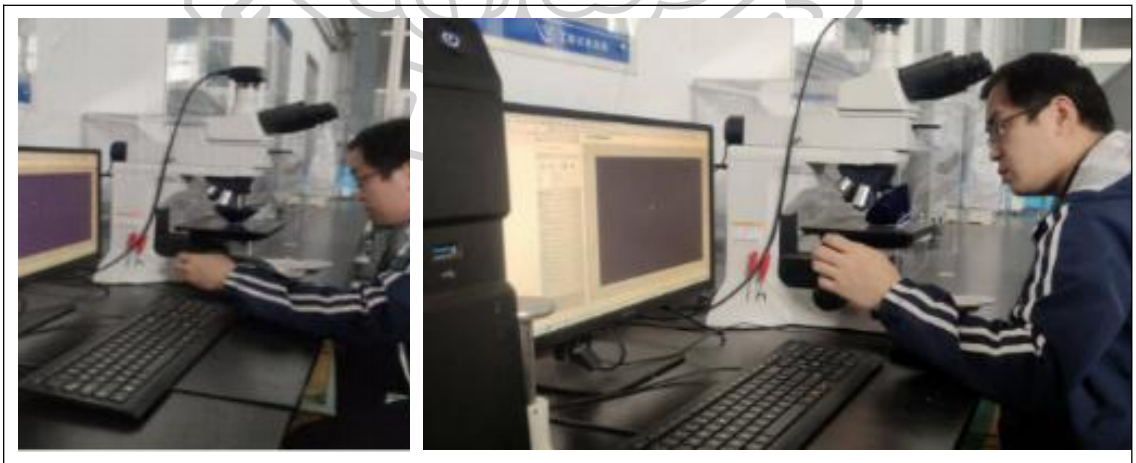


Figure 74 Leaves from different regions (Photographed by Feng Shanxin 2019)

3.3.4 Innovative Firing of Different Colors of The Wood-Leaf Glaze

The black glaze as the base glaze has been passed down for hundreds of years. As an ancient traditional craft, it is still accepted and loved by people in the present time. Inheritance is accompanied by innovation. During the firing process of the Wood-Leaf Glaze, it was accidentally discovered that in different color glazes, the leaves can also be fired to produce similar effects to the traditional Wood-Leaf Glaze, but it still does not fully show the state and characteristics of the Wood-Leaf Glaze. The researcher seized this innovation and studied the different colors of the Wood-Leaf Glaze, and successfully developed a new glaze formula of the Wood-Leaf Glaze and finished it. In order to further understand and explore the mystery of the Wood-Leaf Glaze, the researcher continued to observe and explore the texture, the crystallization phenomenon and glaze layer of the Wood-Leaf Glaze in the finished product with a microscope.

Using a high-power electron microscope to observe the microscopic state of the glaze color to calculate the improvement plan of the glaze



Debug the instrument　　Observe the tiles

Figure 75 Micro experiment (Photographed by Wang Yurong 2019)

The microscopic underglaze state of the blue Wood-Leaf Glaze test piece is as follows:

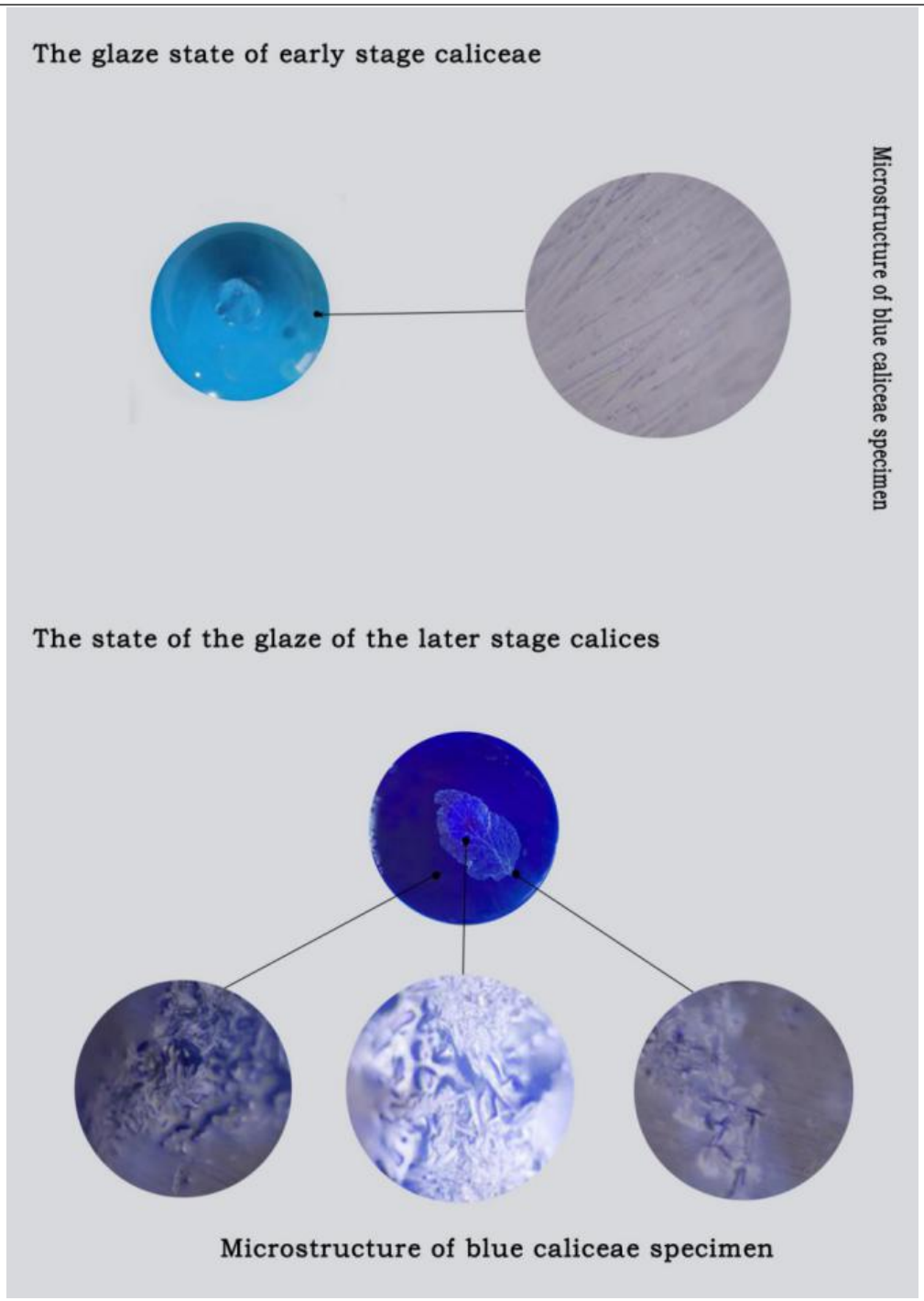


Figure 76 .Microstructure of blue caliceae specimen (Photographed by Feng Shanxin 2019)

The microscopic underglaze state of the red Wood-Leaf Glaze test piece is as follows:

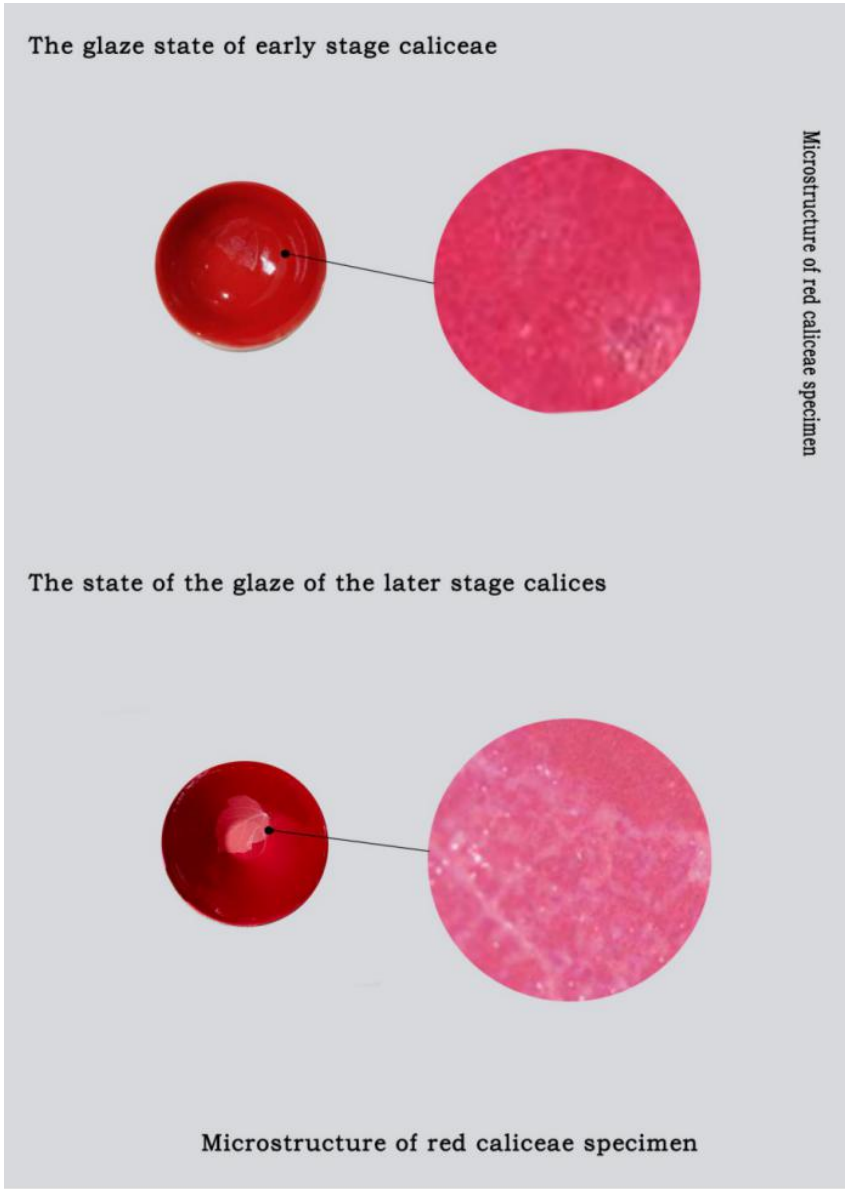


Figure 77 Microstructure of red caliceae specimen (Photographed by Feng Shanxin 2019)

The microscopic underglaze state of the yellow wood leaf cup test piece is as follows:

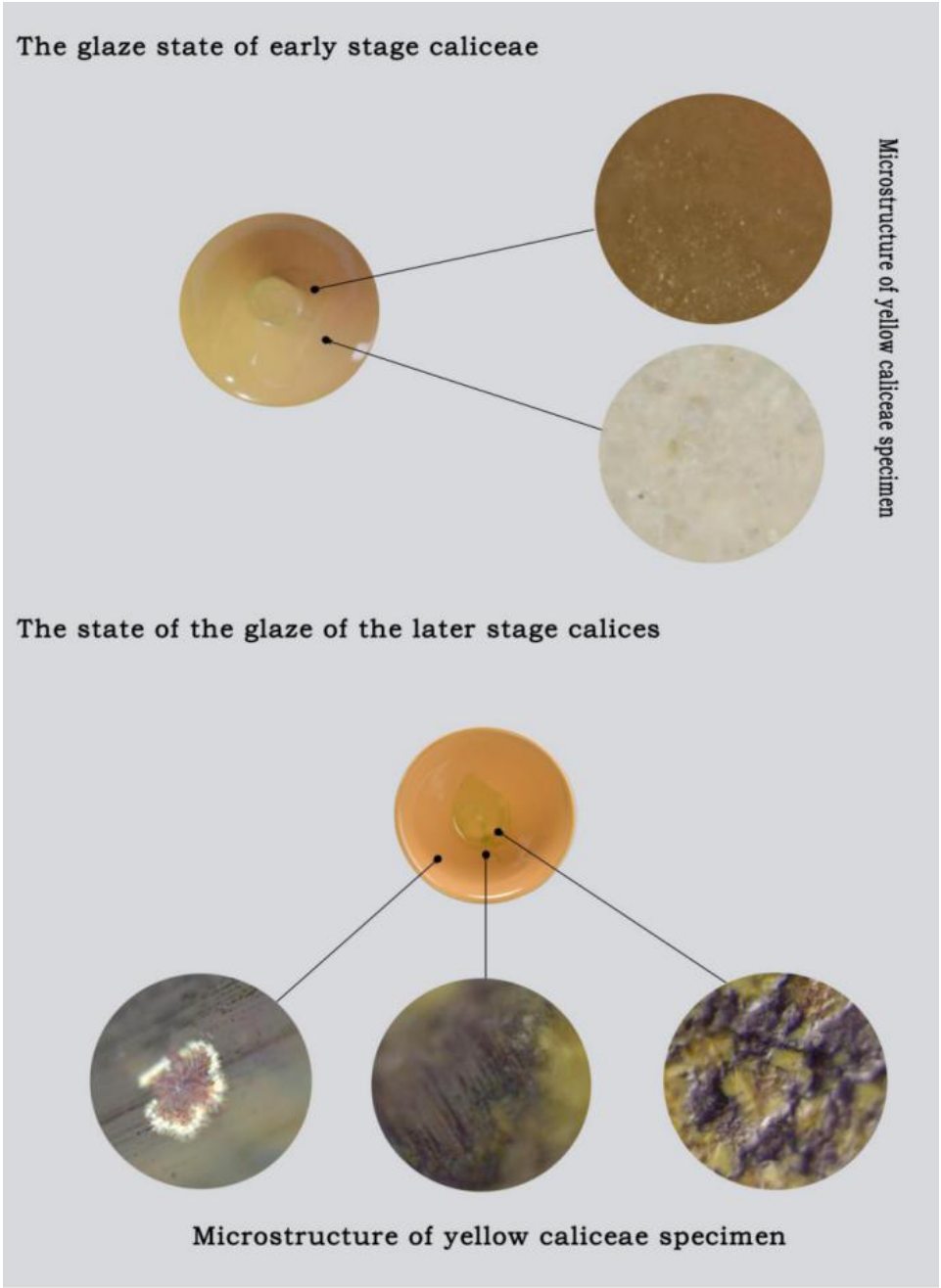


Figure 78 Microstructure of yellow caliceae specimen (Photographed by Feng Shanxin 2018)

- Research on the red Wood-Leaf Glaze

The researcher experimented with different colors in the Wood-Leaf Glaze, and successfully fired the red Wood-Leaf Glaze. This procedure is in the process of being patented: “The production procedure of the red bottom glaze of the Wood-Leaf Glaze and the use of the red bottom glaze.”

Table 16 The formula of the glaze for the red Wood-Leaf Glaze is as follows:

Flux	Feldspar	Kaolin	Quartz	Chalk	Pigment
50%-60%	6%-8%	5%-6%	5%-6%	5%-6%	18%

Table 17 The specific flux needs to be roasted at a certain temperature and mixed with other raw materials for ball milling. The following is the flux content:

Flux: Lead red	Quartz	Borax	Feldspar	Limestone	Kaolin
20%-25%	25%-35%	10%-15%	5%-10%	10%-15%	5%-10%

Table 18 The pigments are:

Pigment: tin oxide	Quartz	Chalk	Red lead	potassium dichromate
40%-50%	15%-25%	25%-30%	3%-5%	1%-5%

Research experiment

Red has a deeply symbolic meaning in Chinese culture. It is the color of worship for many Chinese people. Since the 21st century, with the continuous development of China's economy, the West has paid more attention to Chinese cultural traditions, among them is the significance of “China Red” as a national symbol of China. The research on the roots of "China's Red Worship" phenomenon will be useful in this context.

The Jizhou Wood-Leaf Glaze is combined with “China Red”. In the

research the red glaze was used instead of traditional black glaze to fire Chinese red Wood-Leaf Glaze. Red embodies a great cultural significance in China. It is the color that portrays the most Chinese national characteristics and best reflects the Chinese national spirit and yearning. Compared with traditional Wood-Leaf Glazes, Chinese red Wood-Leaf Glazes are more expressive, more visually conflicting, and able to represent China's profound national culture more effectively.

Figure 79 The research on the red Wood-Leaf Glaze (Photographed by Feng Shanxin 2019)

- Research on the yellow Wood-Leaf Glaze

The researcher explored with firing the yellow Wood-Leaf Glaze, and applied for an invention patent “a yellow base glaze of the Wood-Leaf Glaze and a method for making the Wood-Leaf Glaze by using the yellow bottom glaze”. This patent is currently in the acceptance stage.

Table 19 The formula of the glaze for the yellow Wood-Leaf Glaze is as follows:

Flux	Feldspar	Dolomite	Kaolin	Quartz	Pigment
50%-60%	5%-8%	8%-10%	9%-14%	9%-11%	9%-12%

Table 20 The specific flux needs to be roasted at a certain temperature and mixed with other raw materials for ball milling. The following is the flux content:

Flux: Lead lead	Quartz	Borax	Feldspar	Limestone	Kaolin
25%-35%	20%-30%	10%-20%	10%-15%	5%-10%	1%-5%

Table 21 The pigments are:

Pigment: titanium oxide	Vanadium pentoxide	Zirconium oxide
1%-5%	10%-20%	80%-90%

Research experiment on the yellow Wood-Leaf Glaze:

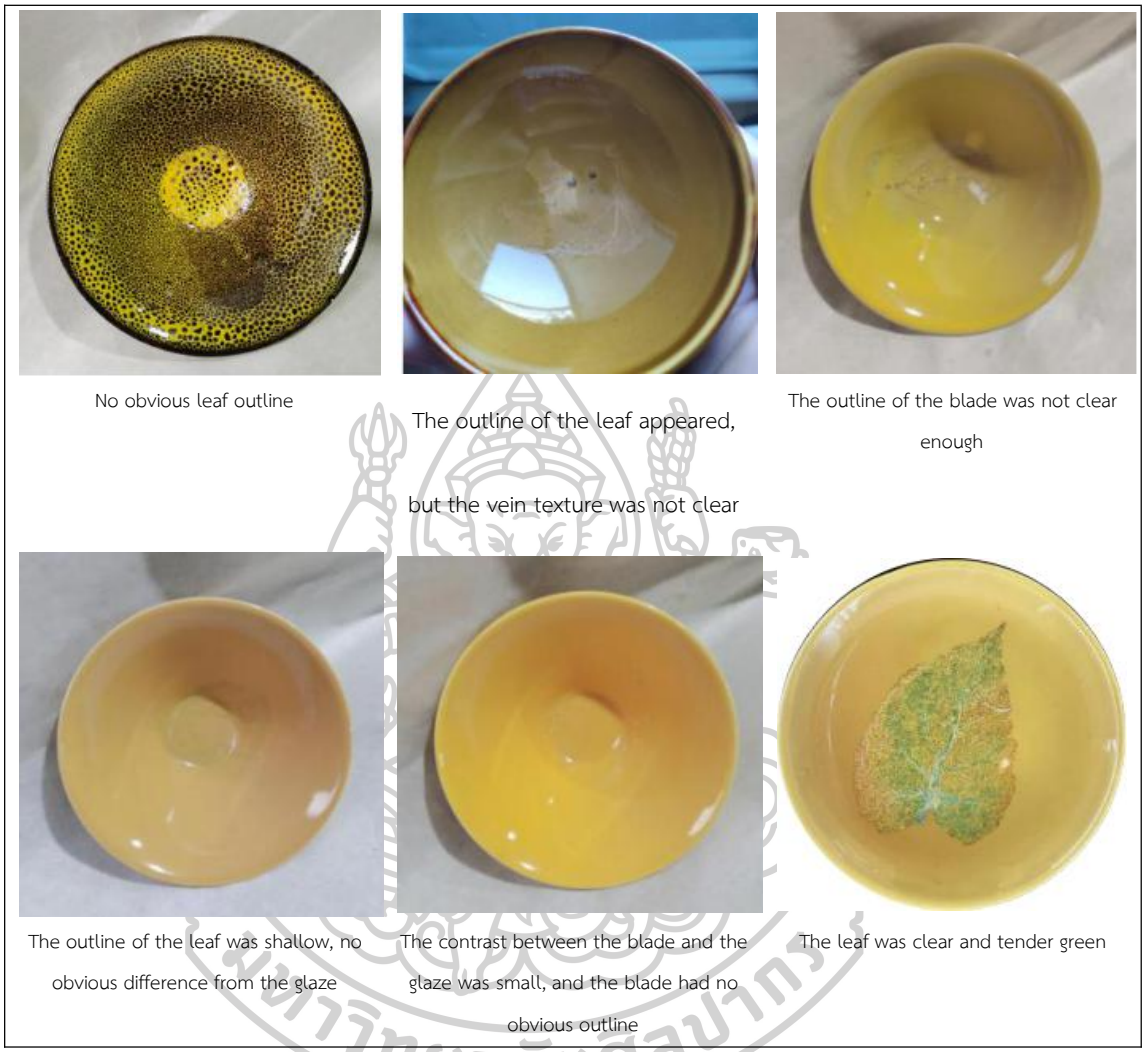


Figure 80 The research on the yellow Wood-Leaf Glaze (Photographed by Feng Shanxin 2019)

- Research on the blue Wood-Leaf Glaze

The researcher experimented with firing the blue Wood-Leaf Glaze, and applied for an invention patent “a blue base glaze of the Wood-Leaf Glaze and a method for making the Wood-Leaf Glaze by using the blue bottom glaze”. This patent is currently in the acceptance stage.

Table 22 The recipe of the blue Wood-Leaf Glaze is:

Flux	chalk	dolomite	barium carbonate	zinc white	Kaolin	quartz	tin oxide	copper oxide	pigment
18%-23%	4%-8%	5%-7%	5%-8%	5%-7%,	10%-15%	25%-35%	5%-10%	1%-3%	0.1%-0.4%

Table 23 The specific flux needs to be roasted at a certain temperature and mixed with other raw materials for ball milling. The following is the flux content:

Flux: Quartz	Borax	Feldspar	Limestone	Kaolin	Soda Ash
20%-25%	15%-25%	10%-20%	10%-20%	5%-15%	10%-15%

The pigments are:

Color material: aluminum hydroxide 80%-90%, zinc white 10%, cobalt oxide 3%-5%

Research experiment on the blue Wood-Leaf Glaze:

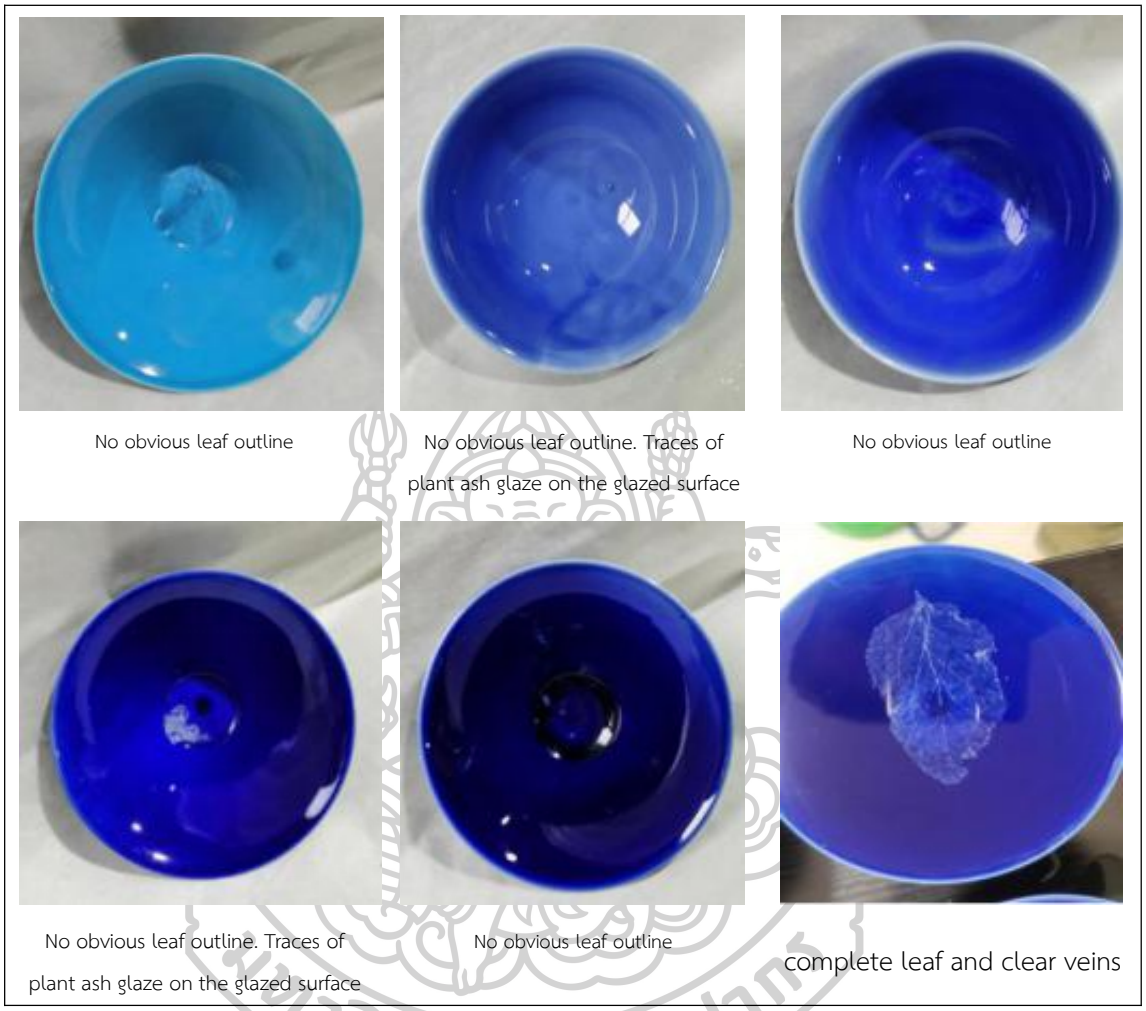


Figure 81 The research on the blue Wood-Leaf Glaze (Photographed by Feng Shanxin 2019)

Compared with the red, yellow, and blue leaves of the Wood-Leaf Glaze, the firing of the green and purple Wood-Leaf Glaze is not as mature. There is still much room for improvement for firing those colors in the later stage.

- Research and experiment of the green Wood-Leaf Glaze

No obvious leaf outline

Figure 82 The research on the green Wood-Leaf Glaze (Photographed by Feng Shanxin 2019)

- Research and experiment of the purple Wood-Leaf Glaze

The outline of the leaves had shrunk greatly, only traces of plant ash glaze appeared

The outline of the leaf appeared, but the vein texture was still unclear

The leaf outline appeared, but the vein texture was still unclear

Incomplete blade

The blade was incomplete and unclear

The outline of the leaf appeared, but the veins were unclear

Figure 83 The research on the purple Wood-Leaf Glaze (Photographed by Feng Shanxin 2019)

3.3.5 Research on Functional Teacups

Part 1: Research on Functional Ceramics

There are many fake Wood-Leaf Glazes in the market today. The texture of the Wood-Leaf Glazes is not real leaves, but the leaves are pressed on the green body before being glaze and fired. Some are on the surface. The leaf shape and texture of the Wood-Leaf Glaze is drawn with a metal glaze and baked at a low temperature. The feilin-printing used Wood-Leaf Glaze uses the technology of feilin-printing to print the vivid leaf texture on the body. Some fake Wood-Leaf Glazes are fired at low temperature, and use chemical raw materials that are harmful to humans.

In recent years there have been high demands for aesthetic products that are functional and good for health. Therefore, ceramic products with functional benefits and artistic beauty become very popular.

Comparative research analysis

Fake Wood-Leaf Glazes currently on the market:

Carved Wood-Leaf Glaze | Electroplating Wood-Leaf Glaze | Low temperature and sticker used Wood-Leaf Glaze | Feilin-printing used Wood-Leaf Glaze

Figure 84 Alternatives to traditional Wood-Leaf Glaze (Feng Shanxin finishing2019)

-Carved Wood-Leaf Glaze

The shape of the leaf is drawn while special tools are used to

depict the vein texture on the body Before glazing and firing. The glaze used in the Wood-Leaf Glaze made in this way is generally a chemical glaze that contains heavy metals which will be precipitated after long-term use and at high temperatures. These chemicals can have adverse effects on the human body.

-Electroplating Wood-Leaf Glaze

The electroplated Wood-Leaf Glaze is a continuation of the process of depicting the Wood-Leaf Glaze. The leaf texture on the Wood-Leaf Glaze is plated with a layer of metal through the electroplating process. This kind of Wood-Leaf Glaze can only be used as an ornamental product and does not have a practical function.

-Low temperature and sticker used in Wood-Leaf Glaze

The low-temperature and sticker Wood-Leaf Glaze is made from printing the leaves and their texture on the body. The original artistic conception of Wood-Leaf Glaze is lost in this kind of production process which violates the principle of Confucianism and Taoism. At the same time, the glaze used in ceramic appliances that are fired at low temperature fired contains chemical components that are not suitable for daily use. Heavy metals such as lead will be precipitated after long-term use, which will cause harm to the human body.

-Feilin-printing used Wood-Leaf Glaze

The technology of feilin-printing Wood-Leaf Glaze is to make a picture of the leaves through a computer, and print the picture on the glaze surface of the ceramic cup using infrared rays through a laser typesetting machine, before applying a potion to maintain the color. It can only be used as an ornament and has no functional purpose.

With the rapid development of the global economy, people's living standards have gradually improved. People have begun to pay attention to food

safety and health. In this context, the requirement for water quality also increases.

With such objective in mind, the researcher began to work on ceramic functional cups. On the one hand, through the improvement of the Wood-Leaf Glaze base material and glaze formula, the formation of the open texture, the integrity and stability of the firing of Wood-Leaf Glaze and the veins can be guaranteed. At the same time, it ensures the precipitation of the active ingredients in the tire material, and the effect of water to soften the water quality. This procedure fulfills the functionality of the cup and expands the development possibility of Wood-Leaf Glaze.

On the other hand, the ceramic tire has the function of softening water quality by improving the composition of the ceramic tire material. The pore texture of the glazed surface allows the body to contact the drinking water in the container through the pores, thereby softening the water quality. It is a kind of artistic porcelain with the function of absorbing impurities in the water. The functional Wood-Leaf Glaze can be divided into these categories: “Functional crackleware Wood-Leaf Glaze and its preparation method”, “A functional Wood-Leaf Glaze based on the hole-making process and its preparation method” and "A functional ceramic with formaldehyde absorption”.

- “Functional crackleware Wood-Leaf Glaze and its preparation method”

The crackleware Wood-Leaf Glaze is combined with functional ceramic materials. When making tea and drinking, the water can come into contact with the ceramic body, thereby producing an effect of purifying water. Its meaning is similar to purple sand.

Table 24 The formula 1

Tire material:		Glaze:	
red kaolin	25-30%	Potash feldspar	35-55%
white kaolin	5-10%	calcium carbonate	9-11%
Tuogou clay	25-30%	kaolin	5-7%
feldspar	10-15%	quartz	10-16%
quartz	4-5%	red iron powder	4-9%
$CaCO_3$	8-10%	zinc oxide	1-3%
MgO	0.05-0.1%	albite	10- 20%
SrO	0.5-0.1%		
Fe_2O_3	0.5-1%		
SiO_2	0.5-0.8%		
TiO_2	0.3-0.4%		
Na_2O	0.01-0.1%		
K_2O	0.002-0.01%		

- “A functional Wood-Leaf Glaze based on the hole-making process and its preparation method”

The hole-making process aims to increase the contact between the water and the body to achieve the effect of purifying water quality.

Table 25 The formula

Tire material:		Glaze:	
red kaolin	25-30%	K_2O	5-7%
white kaolin	5-10%	Na_2O	1-3%
Tuogou clay	25-30%	CaO	4%
feldspar	10-15%	diatomaceous earth	2-4%
quartz	4-5%	Al_2O_3	14-16%
$CaCO_3$	8-10%	Fe_2O_3	5-7%
MgO	0.05-0.1%	SiO_2	60-65%
SrO	0.5-0.1%	P_2O_5	0.1-0.5%
Fe_2O_3	0.5-1%	TiO_2	0.5-1.5%
SiO_2	0.5-0.8%	MnO_2	0.05-0.15%
TiO_2	0.3-0.4%		
Na_2O	0.01-0.1%		
K_2O	0.002-0.01%		

3.4 Design Experimental Results

3.4.1 The Result of Data Collection

The research involves leaf collection in Thailand, Australia, Indonesia, Italy, and China's Shandong, Hebei, Jiangxi, Jiangsu, Zhejiang, Shaanxi, Shanxi, Gansu and other countries and regions.

Figure 85 Collecting leaves (Feng Shanxin finishing)

The experiment included more than 30 kinds of plantssuch as poplar leaf, palm raspberry leaf, elm leaf, pomelo leaf, ginkgo leaf, bauhinia leaf, fig leaf, adiantum leaf, acer mono leaf, folium mori leaf, buergerianum leaf, linden leaf, hops leaf, pumpkin leaf, Humulus scandens, folium zelkovae leaf, pulmeria leaf, walnut leaf, cerbera manghas, bamboo leaf, broussonetia papyrifera, fokienia hodginsii leaf and cyress leaf.

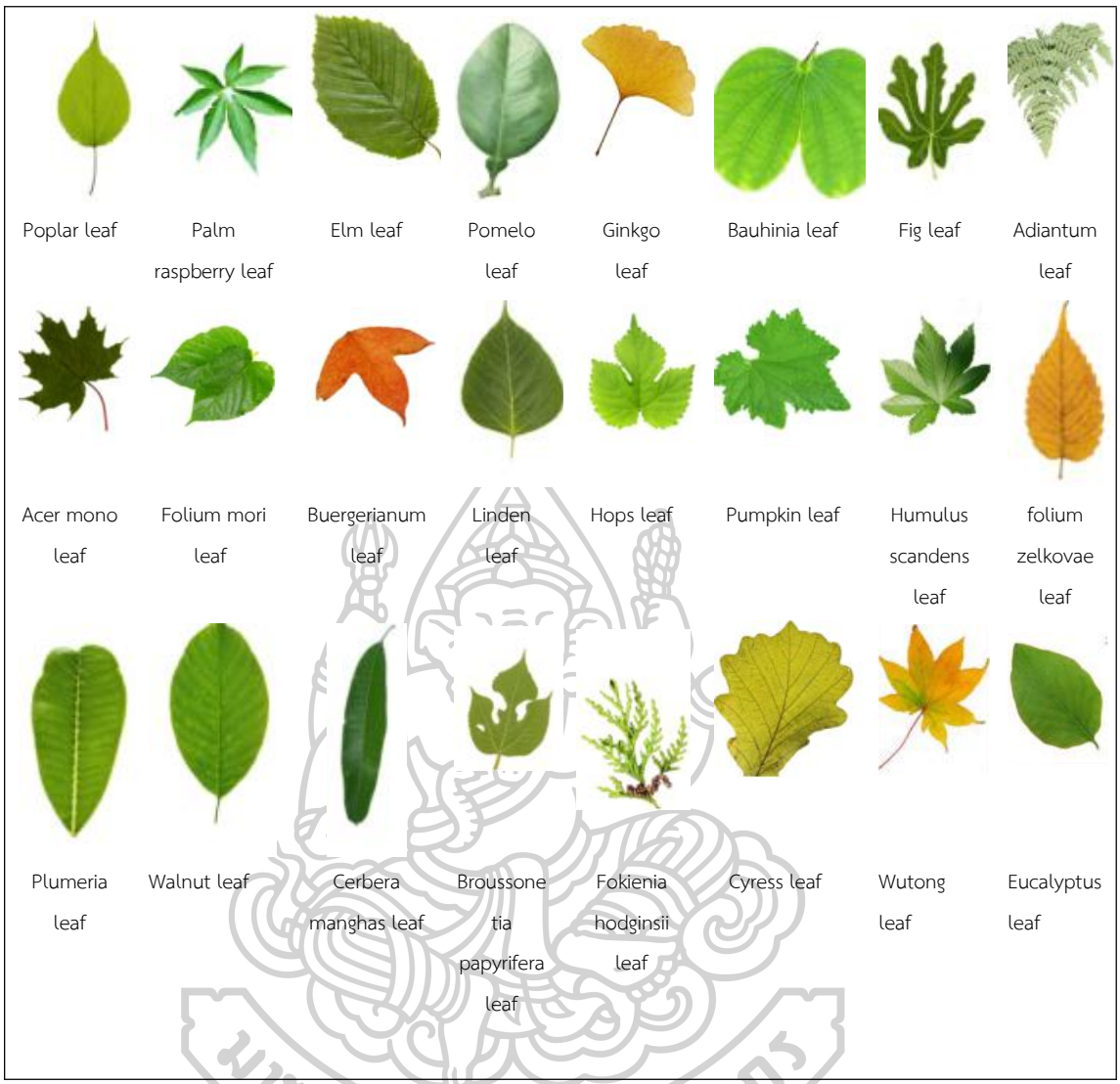


Figure 86 Different leaf types (Feng Shanxin finishing)

The results from the experiments showed that mulberry leaves contained a large amount of fiber, making it the best choice for firing. Leaves such as mulberry leaf, fig leaf, hops, lalayang leaf, and conformation trees which belonged to mulberry plants yielded a higher rate of finished products. They required only simple firing conditions and stable production conditions.

The linden leaves of Rutaceae can also be matured to produce Wood-Leaf Glaze, but the requirements for firing conditions are strict. These leaves can easily lose their profile and appear cracked.

The results showed that not all varieties of leaves can be successfully fired. For example, bamboo leaves, pumpkin leaves, and walnut leaves cannot be used successfully.

Figure 87 Leaf cracking (Photographed by Feng Shanxin 2019

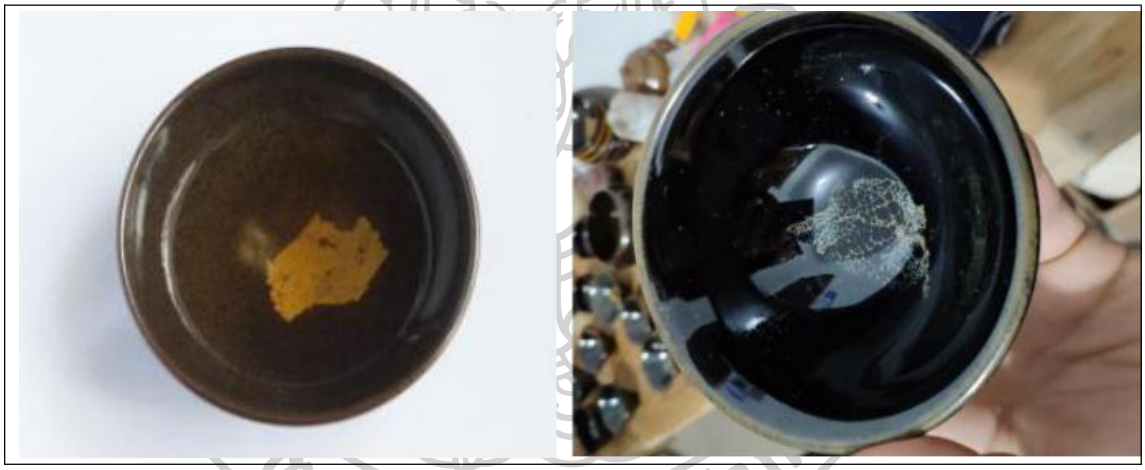


Figure 88 Leaf deformation (Photographed by Feng Shanxin 2019)

In addition to sorting the leaves by regions and specimens, the researcher also tested the leaves on different seasons. First of all, there are no leaves in winter. If it is necessary to continue to fire wood leaves in winter, sufficient leaves should be stored before the arrival of winter. Leaves in spring such as mulberry leaves or tree leaves are small in size and contain too much water. After baking, the leaves will become very thin, and the rate of finished products is very low during firing. Therefore, it is not recommended to use. In summer, leaves are plump and of a moderate size as there are more nutrients in the leaves. After baking, they will not lose a lot of water and can maintain sufficient thickness. The result of firing is stable and the rate of finished products is high. When selecting leaves, it is

necessary to consider whether the size of the leaves is suitable for the blank body. The color of the leaves should be dark green, and the tone of the leaves with a certain thickness will be darker. The rate of finished products of leaves in early autumn and mid-autumn is also relatively high. However, in late autumn when leaves start to turn yellow and wither, it is not suitable for firing Wood-Leaf Glaze because the nutrient water and component content are too low, and the toughness of leaves become poor.

The researcher collected leaves in Thailand, Australia, and Italy that are similar to mulberry leaves, bodhi leaves and other leaves with basic components that are commonly used in China, and can be fired to produce better Wood-Leaf Glazes.

3.4.2 The Result of Technology and Craftsmanship

The successful firing of the Wood-Leaf Glaze requires certain technical and technological conditions. The factors that need to be taken into consideration include the treatment of leaves, the improvement of glaze, the selection of kiln, the use of kiln equipment, and the adjustment of heating curve. Only skilled control of these factors will lead to a production of high-quality Wood-Leaf Glazes.

At the beginning of the study, the treatment of the blade involved caustic soda soaking, pressing and drying. However, the leaves soaked in caustic soda are not directly related to the firing of the cup, and the dried leaves treated in this way yielded a low rate of finished products. Moreover, the cycle time is too long. After leaves are dried, they cannot completely discharge. Leaf veins after being heated are easily curled and is not easy to use on the cup body as it is not a perfect fit. After several experimenting attempts, a better treatment method was obtained. A ceramic water separator was developed. The separator was placed in layers and baked in the microwave. However, these methods have some strict rules that need to be followed. Leaves cannot be baked for too long at a time. There should be

five-minute intervals to open the oven to release the water vapor in the cabinet. After each interval of five minutes, for the bake continues for about 5 minutes. These steps are repeated until the baking is completed. When touched, one should not feel any moisture in the baked leaf. Then the successfully dry-baked leaves must be vacuum storage.

Figure 89 Evenly arrange the leaves on the water distributor (Photographed by Wang Yurong 2019)

Glaze is also a key part in the firing of the Wood-Leaf Glaze. The glaze used in the early stage yielded a low rate of finished products. The leaves showed unclear veins and were damaged. Therefore, the researcher decided to improve and delay the melting time of glaze. The principle is that at high temperature, the leaf will first turn into ashes. At this time the blade is fragile, and the flow of glaze will destroy the integrity of the blade. With the increase of temperature, the leaves that turned into ashes will be carbonized. After carbonization, the leaves have a certain hardness, and the flow caused by glaze melting will not affect the integrity of the leaves. The improved glaze not only delays the melting time of glaze, but also has the characteristic of saving glaze, that is, ordinary glaze needs a glaze layer of 3-4mm, while this glaze needs only a thin layer of about 1-1.5mm, and the color is stable.

Carbonized leaves

Leaf storage

Figure 90 Leaf treatment (Photographed by Feng Shanxin 2019)

In the process of research and experiment, both the gas kiln and the electric kiln have been used. The final result revealed that the Wood-Leaf Glaze fired in the electric kiln was more stable, yielded a high rate of finished products and had a strong operability. On the contrary, the gas kiln yielded a low rate of finished products, had a high cost of operation and was more difficult to operate. The variation of air flow in gas kiln has a great influence on the shaping of the Wood-Leaf Glaze, while electric kiln heats up with resistance wire heating, so the air flow in furnace is stable. Although the electric kiln is relatively stable, the kiln still has a certain cyclone in it, so the saggar should be used when firing the Wood-Leaf Glazes. The Sagger will only prevent the ash falling, but will also give the blank body a stable atmosphere. Another advantage of electric kiln is that the temperature rise curve is specific and controllable. By adjusting the temperature rise curve, the researcher found that different varieties of blades and different seasons require different temperature rise curves. For example, the suitable heating curve of firing mulberry Wood-Leaf Glaze may not be suitable for firing bodhi leaf, and the heating

curve of summer and winter needs to be adjusted at the last stage to ensure the rate of finished products the regulation of the heating curve is basically in the last stage.

Figure 91 Electric kiln and gas kiln (Photographed by Feng Shanxin 2019)

Figure 92 Controller (Photographed by Feng Shanxin 2019)

3.4.3 Technical Results of this Design

The research process has yielded results that can be developed into new technical theories and knowledge used in the effort to revive China's traditional ceramic craftsmanship. Technology can be used to ensure that traditional culture can still flourish and even benefit from human progress. This is certainly the case in the research on traditional Wood-Leaf Glazes that have led to the discovery of new technical knowledge as evidenced in how the results from the research process in different stages have led to 7 Chinese and Patent Cooperation Treaty invention patents, 4 Scopus (Ei Compendex Web) papers, 2 Science Citation Index papers, and several awards.

-A variety of leaves displayed in the black cup

The black Wood-Leaf Glaze is the traditional form of the Wood-Leaf Glaze. During the research, a total of more than 100 kinds of leaves were fired, 382

temperature curves were set for experiments, and 1371 glaze formulations were configured. The experimenting process lasted 3 years.

Thai Bodhi Leaf

Shandong Fig Leaf

Gi'an Lalayang Leaf

Shandong Lalayang Leaf

Shandong Structuring Leaves

Shandong Mulberry Leaf

Jingdezhen Mulberry Leaf

Gi'an Mulberry Leaf

Selected from southern poplar leaves, the outline of the fired leaves is clear, the veins are detailed and obvious, and the color is blue.

Selected from northern poplar leaves, the outline of the fired leaves is clear, the veins are fine and obvious, and the color is blue and purple.

Figure 93 The black Wood-Leaf Glaze (Photographed by Feng Shanxin 2019)

- Multi-colored Wood-Leaf Glaze research results in display

The veins of the red Wood-Leaf Glazes are the clearest of all the colored cups, and show a white texture.

Figure 94 The red Wood-Leaf Glaze (Photographed by Feng Shanxin 2019)

The blue Wood-Leaf Glaze also presents a white texture. Blue represents nobility in Chinese culture. The price of ordinary blue ceramics is slightly

higher than that of other colors. The blue Wood-Leaf Glaze is even more precious.

Figure 95 The blue Wood-Leaf Glaze (Photographed by Feng Shanxin 2020)

In the yellow Wood-Leaf Glaze, the veins of the leaves are tender green and yellow-brown, and the texture of the dark yellow calyx is contrasted.

Figure 96 The yellow Wood-Leaf Glaze (Photographed by Feng Shanxin 2020)

- The wood-leaf teapot display

In the research process, the technique in making Wood-Leaf Glaze is also used to make teacups as an attempt to diversify the finished products from the leaf-firing technique.

Figure 97 The wood-leaf teapot (Photographed by Feng Shanxin 2020)

3.5 Summary of The Chapter

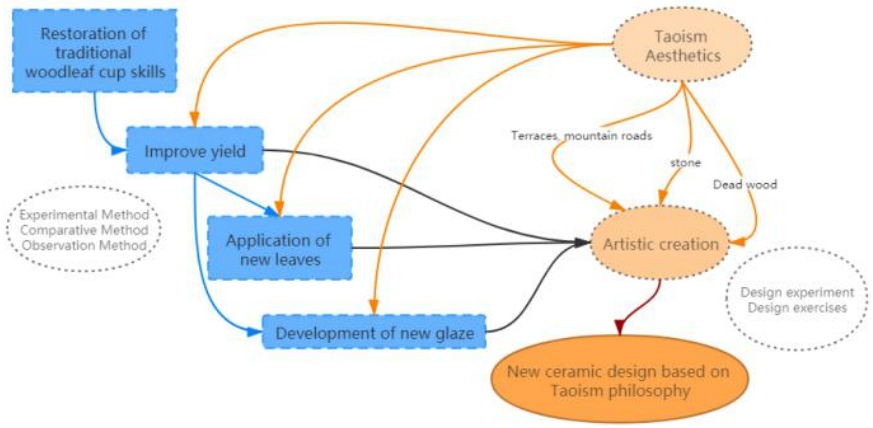


Figure 98 Research method for ceramics were

In this chapter, the researcher planned numerous design experiments. Many design exercises and a design research method for ceramics were

Chapter 4 Study Results and Comprehensive Design

4.1 Preparation and Design Creation Trial

For artistic creation, only continuous experimentation can lead to a better way of creation. In the initial stage of design creation, the researcher constantly learned from nature. Under the guidance of Tao's philosophy, he sought creative inspiration and conducted a series of creative experiments. With the continuous deepening of research, more and more results have been obtained in the creative process. The satisfy actor creative methods from the experiment process are all applied in the final design works.

4.1.1 The Beauty of Taoism Characteristics

Inspired by the stone from nature that has gone through a natural process of tribulation in nature. Stone is tenacious. Its character is worthy of praise.

Figure 99 Inspired by stone (Zibo City, Shandong Province 2019)

-Inspired by plants that grow naturally and have great vitality., Spring passes and autumn comes, a profound Taoism philosophy Is embodied in plants.

Figure 100 Inspired by fallen leaves (Road in Milan, Italy 2019)

4.1.2 Creation Experiment

- The process of wrestling clay

wrestling clay is one of the oldest ways of making pottery. Traditional throwing body's are all complete circles. This creation breaks the original law. Follow the natural stacking method to create and highlight the beauty of freedom in artistic creation. The traces of natural cracking in the work are preserved, showing the quiet beauty of the ceramics.

Figure 101 Throwing creation process (Photographed by Feng Shanxin 2019)

- Leaf combined painting

The creation of this work is inspired by fallen leaves, combined with leaf in the form of painting, using leaf glaze to draw patterns, and placing appropriate leaves for decoration and firing.

Figure 102 Combination of paintings and leaves (Photographed by Feng Shanxin 2019)

- “Tiaodao” (A ceramic decoration technique)

“Tiaodao” creation

The method of “Tiaodao” is to apply to the surface of the clay board, make the tip of the knife walk naturally, and get the natural texture effect as shown in the picture.

Figure 103 Texture creation (Photographed by Feng Shanxin 2019)

- Accumulation

In the early stage of creation, the researcher used the methods of throwing clay, wind and rain, and artificially simulated precipitation, but the overall effect was not good, and the artistic value was low. Inspired by the British land artist Richard Long, the researcher chose different tones of clay and used cutting lines for free cutting, leaving cutting marks on the surface of the clay. The splicing is made according to the color and shape, the whole is pressed firmly, and placed outdoors to be washed by rain. (See figure104-108)

Beat the clay to the ideal form

Figure 104 Beat the clay (Photographed by Wang Yurong 2019)

Put different tones of clay firmly together, and pay attention to the overall shape through any means such as beating by hands and tools.

Figure 105 Artificial beating (Photographed by Wang Yurong 2019)

Figure 106 Beating with tools (Photographed by Feng Shanxin 2019)

Figure 107 Finishing and forming (Photographed by Wang Yurong 2019)

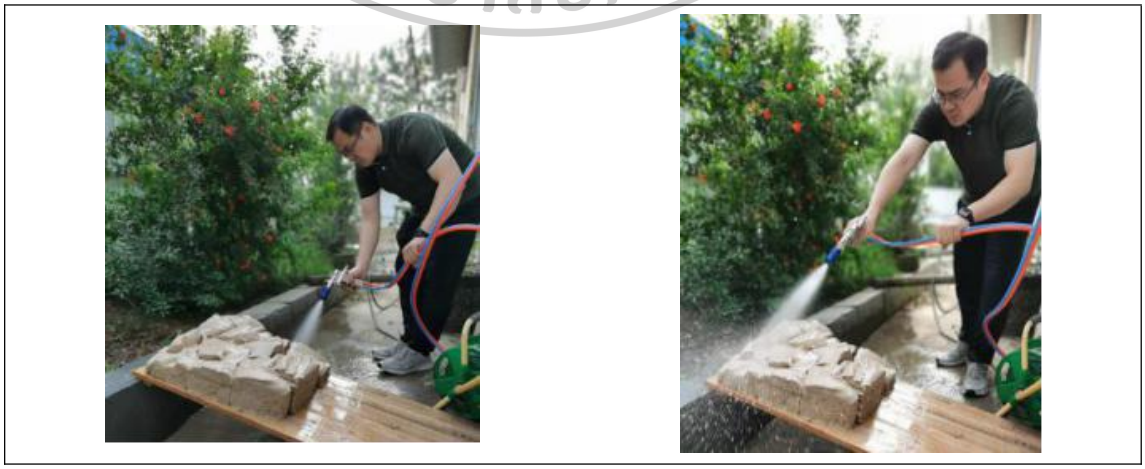


Figure 108 Artificial scouring (Photographed by Wang Yurong 2020)

Figure 109 Rainwater scouring (Photographed by Wang Yurong 2020)

- Broken

Breaking a complete vessel into pieces changed its original properties. When combined with the Wood-Leaf Glaze firing technique, it could convey a sense of an incomplete beauty. (See figure110)

Figure 110 Incomplete beauty (Photographed by Feng Shanxin 2019)

4.2 Comprehensive Design Summary

4.2.1 Creation Source

Nature is the best teacher. It doesn't need to make any sound. It

just needs to be felt with heart. Whether it is the silent rhythm of Terrain, the perseverance of hard rocks, the beauty of the silence of Dead wood, or the eternal beauty of nirvana of leaves. canal of these natural occurrences can present the beauty of silence. (See figure111)

Figure 111 Sources of creation (Photographed by Feng Shanxin 2019)

4.3 Comprehensive Design Creation

4.3.1The Creation Work 1 -Theme Creation of Terrain

The natural landforms of Terrain fully reflect the value of respecting and obeying the laws of nature. The construction of Terrain has to follow the basis of geology and topography. In respecting and using natural laws, the contour lines are traced as it they are, turning along the mountainous path. The width is appropriate,

and the length is unlimited, forming a unique artistic vision. In the process of creation, beating, dragging and other techniques are used to comply with the nature of the clay. Clay treatment thus embodies the Taoism concept of conforming with the laws of nature. (See figure112)

Figure 112 Creation from Terrain (Photographed by Wang Yurong 2020)

4.3.2 The Creation Work 2 -Dead Wood Creation

The withered trees in the jungle and the naturally corroded dead trees perfectly fit with the Zen aesthetics. It is one of the best sources of creative inspiration. The researcher took the withered trees with natural charm as the main body of creation according to the production process of ceramic art. First of all, plaster is used to turn the mold, and then, the clay body is obtained by the way of forming the clay sheet. Finally, it is fired in the kiln. (See figure113-120)

Kneading clay Rolling out flaky clay Obtain flake clay

Figure 113 Preparation of clay (Photographed by Wang Yurong 2020)

Figure 114 Press the mold (Photographed by Wang Yurong 2020)

Figure 115 Mold combination (Photographed by Wang Yurong 2020)

Figure 116 Taking out the body (Photographed by Wang Yurong 2020)

Figure 117 Trimming the body (Photographed by Wang Yurong 2020)

Figure 118 The body is dried and put into the kiln for the first firing (Photographed by Wang Yurong 2020)

Figure 119 Spraying glaze and glaze firing (Photographed by Wang Yurong 2020)

Figure 120 Finished product display (Photographed by Wang Yurong 2020)

4.3.3 The Creation Work 3 -Stone Creation

Stone is the product of nature. It has experienced many vicissitudes but remains indomitable, showing a silent and tenacious spirit. Rock characteristics are formed during the process of creation. Then the mold is turned over with gypsum, and finally the body is formed. The choice of stone is determined by whether they will be stuck in the mold when turning over the gypsum mold and whether the mold can be taken out in good condition.

Figure 121 Selecting and cleaning stones as templates

Figure 122 Plaster mold making (spacer should be applied between gypsum and gypsum to prevent adhesion) (Photographed by Wang Yurong 2020)

Figure 123 Taking out the mold (Photographed by Wang Yurong 2020)

Figure 124 Trimming the mold (Photographed by Wang Yurong 2020)

Figure 125 Cleaning the mold (Photographed by Wang Yurong 2020)

Figure 126 Drying (the finished mold contains a lot of moisture, which can be used after drying) (Photographed by Wang Yurong 2020)

Figure 127 Preparation of stone works (Knead the clay and roll out the clay pieces) (Photographed by Wang Yurong 2020)

Figure 128 Make the mud piece fit the mold perfectly, and make a support to prevent the mud piece from collapsing (Photographed by Wang Yurong 2020)

Figure 129 Closing the mold (Photographed by Wang Yurong 2020)

Figure 130 Taking out the body and repairing the mold line and details (Photographed by Wang Yurong 2020)

Figure 131 After the mold is turned over, the body is dried and put into the kiln for the first firing before the leaf is put in for glaze firing (Photographed by Wang Yurong 2020)

4.3.4 Taoism Characteristics of Ceramics

In practice, we should constantly learn from nature, experience it and discover the philosophical truth contained within it. We can form a theory so as to better guide the transmission such as creating ceramic art works that are in line

with Taoism Philosophy. (See figure132)

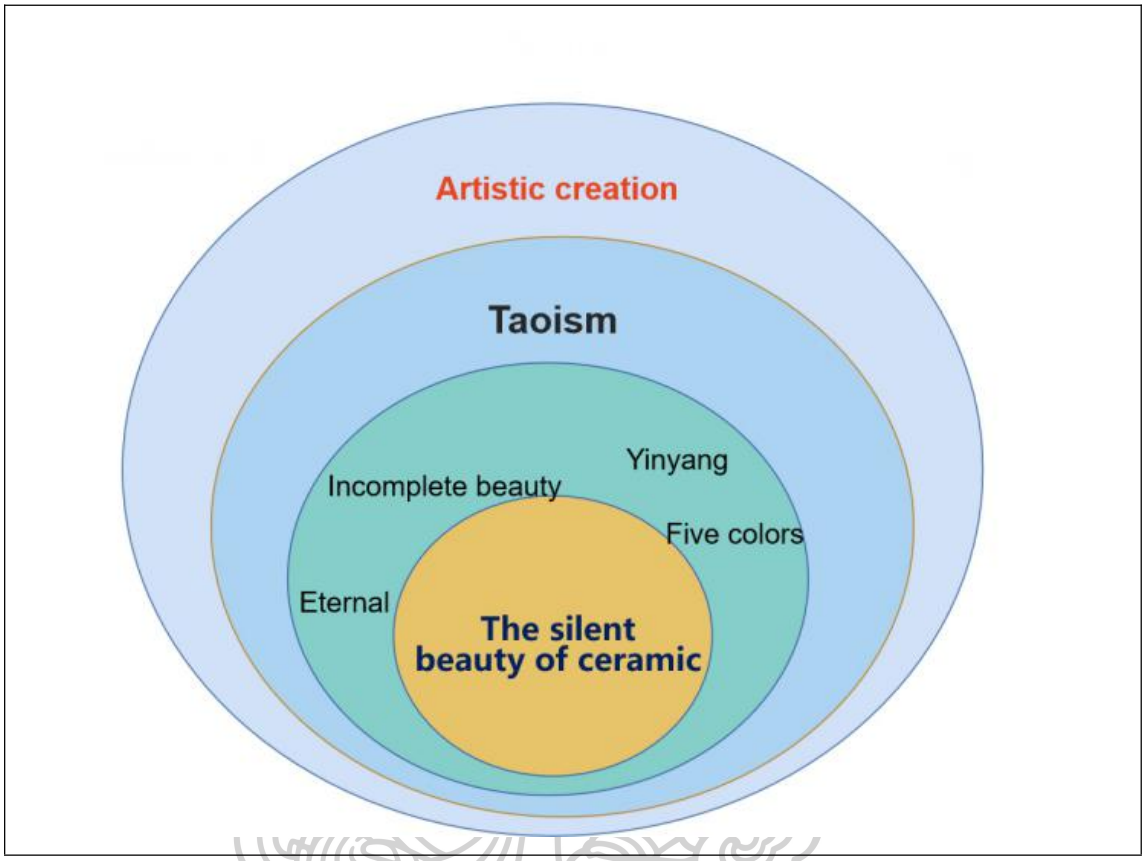


Figure 132 The silent beauty of ceramics (Photographed by Feng Shanxin 2020)

In Chinese traditional philosophy, “emptiness and quietness” is an ancient and important concept. As early as the pre-Qin period, the philosophical concept of “emptiness and quietness” was established. During the Wei and Jin Dynasties, the concept had a more vigorous and rich development in literature, religion, medicine, art and other aspects. It especially has an influence in metaphysics and formed a metaphysical thinking system of emptiness and tranquility, which had a positive impact on Buddhist Prajna thought, Taoism's metaphysics, and the theory of mind and nature of Neo Confucianism in the Song and Ming Dynasties. The concept of emptiness and quietness transcends religious significance and has a philosophical significance in ontology and epistemology. It has developed into “the general outline of Taoism thought and the lifeblood of Taoism thought”.

The falling leaves are silent, but it indicates the alternation of

seasons and the progress of time. The wood- leaf cup will set the silent leaves forever. On the one hand, it can be the natural “tranquility” of Tao “emptiness”. On the other hand, it can be a way of cultivation to reach the “virtual” pole. “Tranquility” can be divided into the natural and mental realm. Every step of ceramic art creation is silent, but it is carried out orderly according to the law of nature. The natural wind, water and fire can change the results of the creation. In the breeding of leisurely Zen, wood rots and stones are natural forces. The process of nature is recorded in the creation, and the creation is completed with ceramic as a special material. Finally, the beauty of silence is presented. Movement and stillness are related to each other; there is no movement without stillness. Statis can be seen as moving, and moving can be static. The ceramic art creation guided by natural focuses embedded in the beauty of nature in the clay. The combination of natural external force and soil collision presents the artistic charm of mountains, Terrain. The leaves naturally fall and scatter among them, firing the flesh and leaving the vein of eternal red.

4.4 The Feedback Collecting from The Exhibition

In the process of practice, the constantly adopted the philosophical principles of Tao, applied the technical results of research to the creation, and finally completed contemporary ceramic art works based on Tao. The research results and artistic creations were showcased in two successful exhibitions held at Qilu University of Technology. The first one is the exhibition of technical achievements of Wood-Leaf Glaze in May. The works are permanently exhibited at the Ceramic Art Museum of Qilu University of Technology. The other is the exhibition of Tao-based contemporary ceramic art installations in June.

4.4.1 Creation Works

-The creation work 1: “Terrain”

Artwork name: “Terrain”

Creator name: FENG SHANXIN

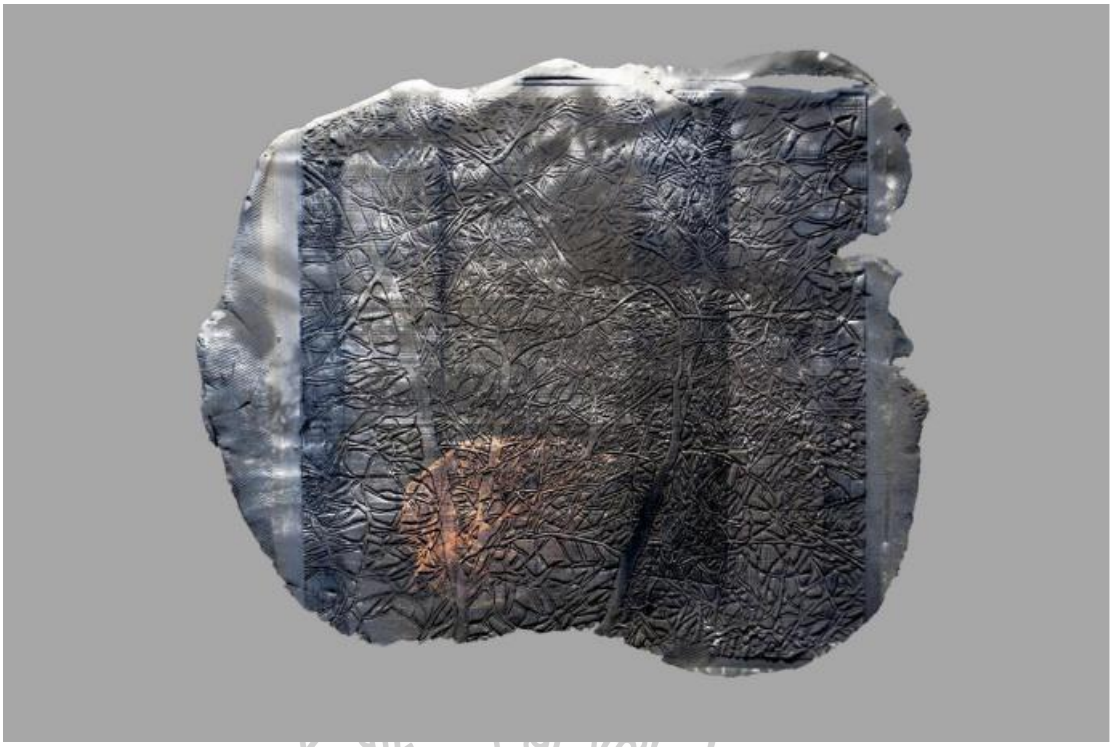
Dimension: 35cm × 35cm

Technique: Impressing

Creation time: April 2020

Firing temperature: 1200℃

Figure 133 The creation work 1, “Terrain”



Artwork name: “Terrain”

Creator name: FENG SHANXIN

Dimension: 35cm × 35cm

Technique: Impressing

Creation time: April 2020

Firing temperature: 1000℃

Figure 134 The creation work 1, “Terrain”

Artwork name: “Terrain”

Creator name: FENG SHANXIN

Dimension: 35cm × 35cm

Technique: Impressing

Creation time: April 2020

Firing temperature: 1000℃

Figure 135 The creation work 1, “Terrain”

-The creation work 2: “Wanshi”

Artwork name: “Wanshi”

Creator name: FENG SHANXIN

Dimension: 9m × 17m

Technique: Installation art

Creation time: April 2020

Firing temperature: 1230℃

Figure 136 The creation work 3, “Wanshi”

Artwork name: “Wanshi”

Creator name: FENG SHANXIN

Dimension: 9m × 17m

Technique: Installation art

Creation time: April 2020

Firing temperature: 1230℃

Figure 137 The creation work 3, “Wanshi”

-The creation work 3

Artwork name: “Kumu”

Creator name: FENG SHANXIN

Dimension: 9m × 17m

Technique: Installation art

Creation time: April 2020

Firing temperature: 1230℃

Figure 138 The creation work2, “Kumu”

Artwork name: “Kumu”

Creator name: FENG SHANXIN

Dimension: 9m × 17m

Technique: Installation art

Creation time: April 2020

Firing temperature: 1230℃

Figure 139 The creation work2, “Kumu”

4.4.2 Exhibition

After completing the work, a special exhibition was held at the Qilu University of Technology to show the work to students and teachers and collect feedback.

Figure 140 Exhibition Poster (Chinese)

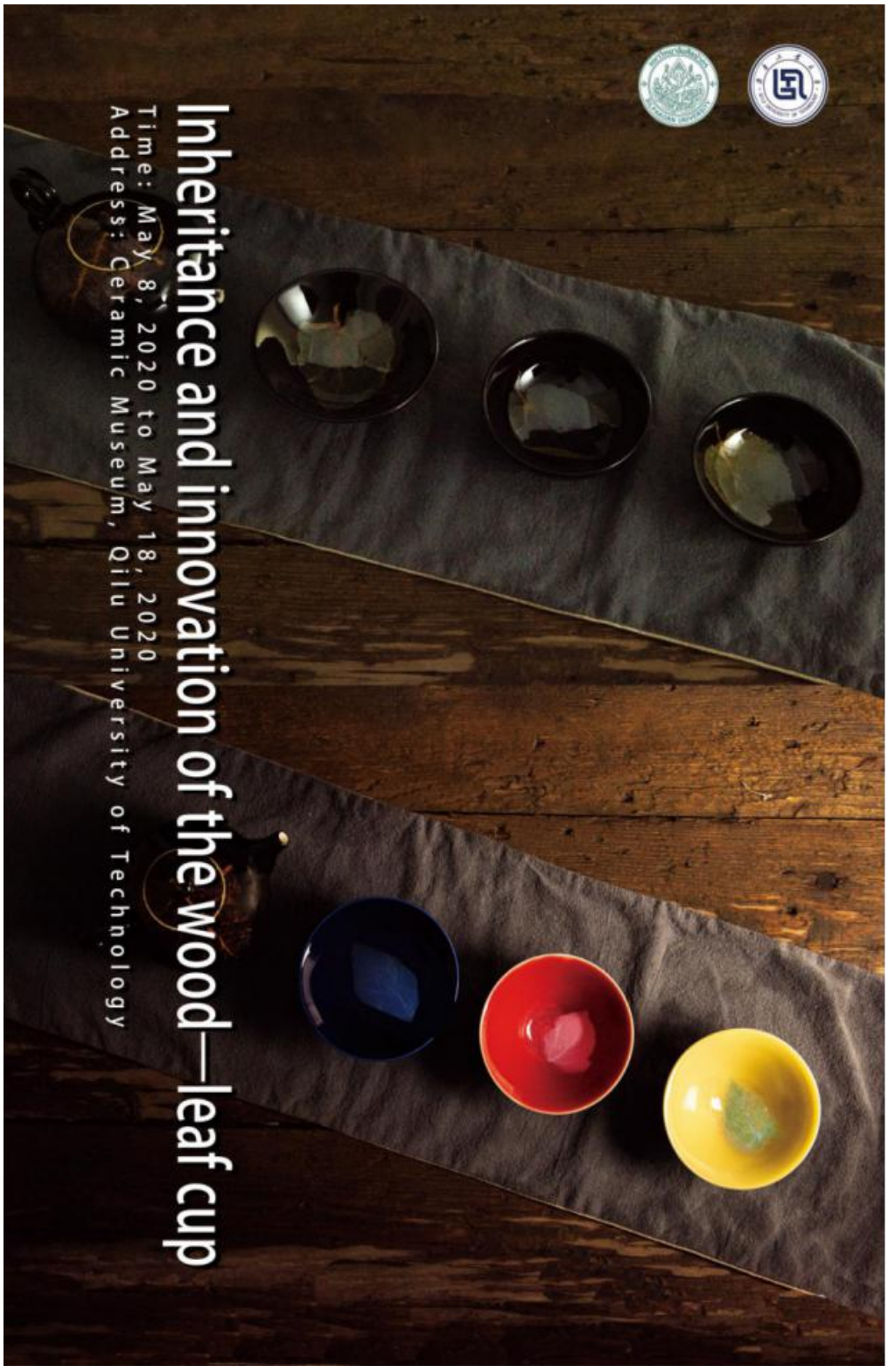


Figure 141 Exhibition Poster (English)

Figure 142 Exhibition Poster (Chinese)

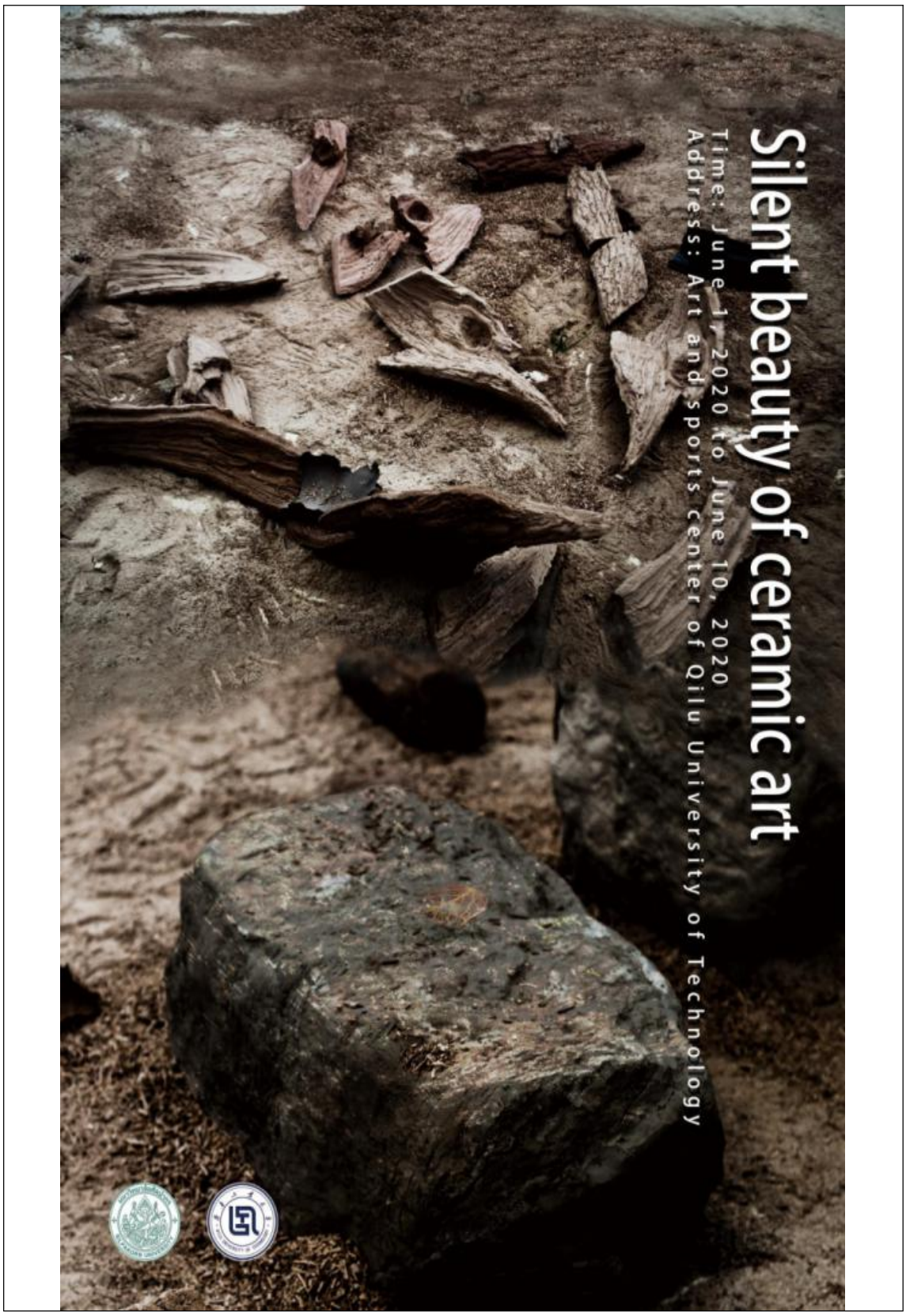
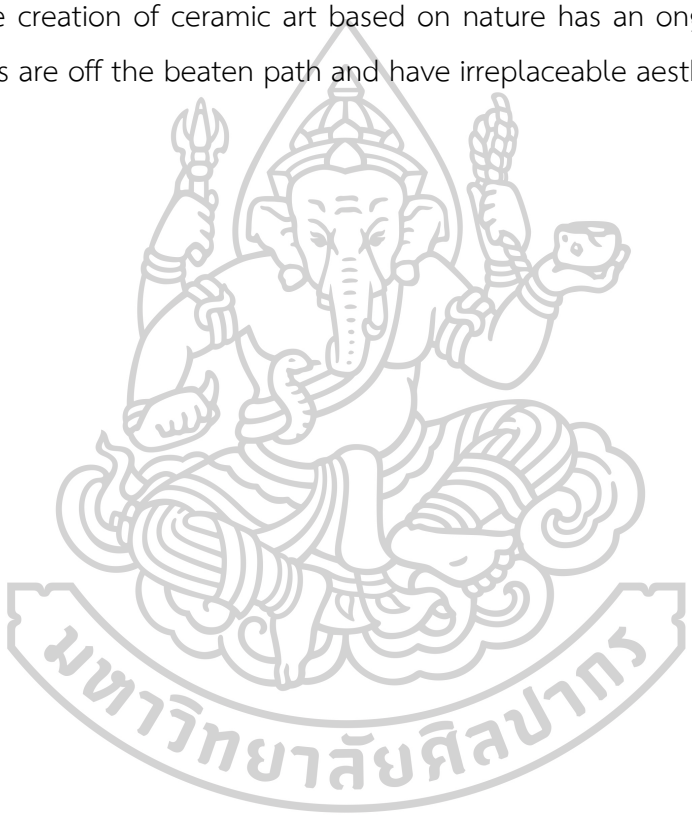


Figure 143 Exhibition Poster (English)

4.5 Summary of The Chapter

The concept of nature in Taoism characteristics can guide the artist to find the right direction in ceramic art's art creation. In this study, the researcher learns from nature under the philosophical guidance of Taoism characteristics to seek creative inspiration and continuously conduct creative experiments.

As the research continues, results are achieved in the creative process. The creation of ceramic art based on nature has an ongoing artistic vitality, and its works are off the beaten path and have irreplaceable aesthetic value.



Chapter5 Conclusion and Recommendation

This Study recovered the technique of making traditional Chinese Wood-Leaf Glaze through design practice and based on several creative experiments. Moreover, based on this, the glaze formula is improved, the diversity of raw material leaves is increased, and the technique of Wood-Leaf Glaze is innovatively developed.

Through the revival and redesign of the Wood-Leaf Glaze, and the integration based on Taoism characteristics, the final ceramic artwork is designed. This creative research provides a viable reference model for reviving traditional Chinese ceramic techniques and creating contemporary ceramic art based on them.

The diagram below is a summary of this study, with key nodes summarized and labeled.

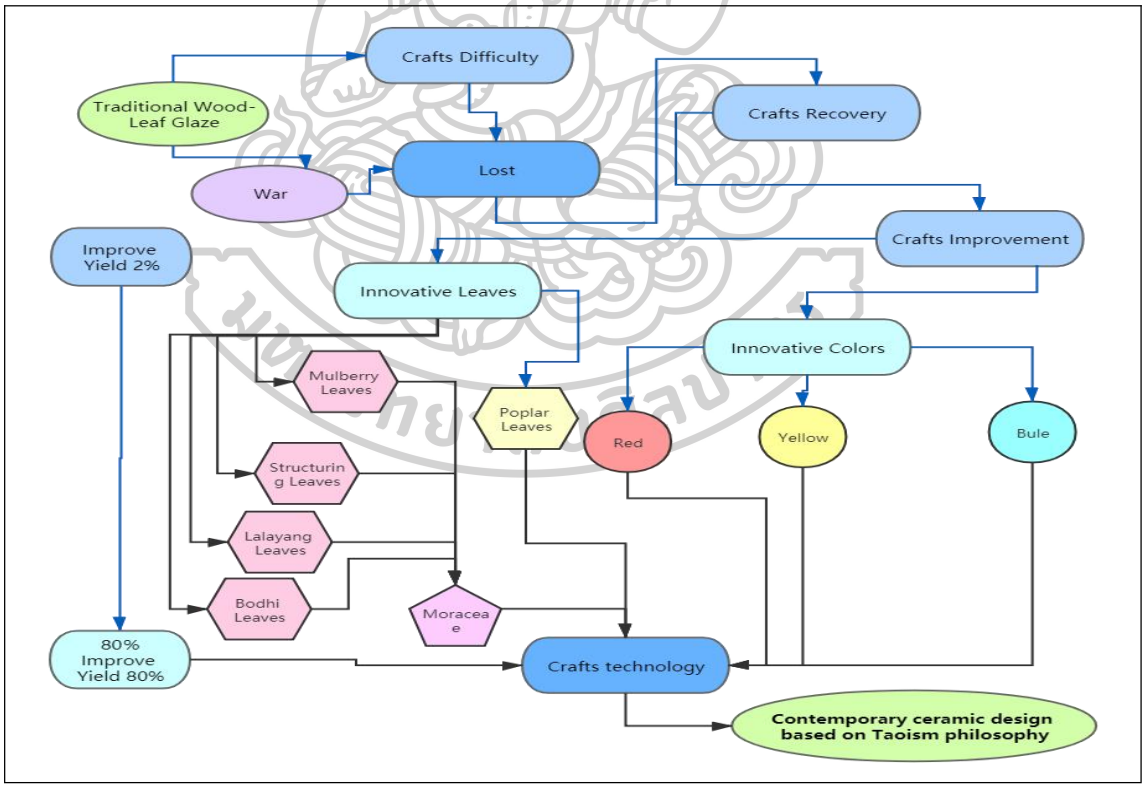


Figure 144 Process recovery flowchart

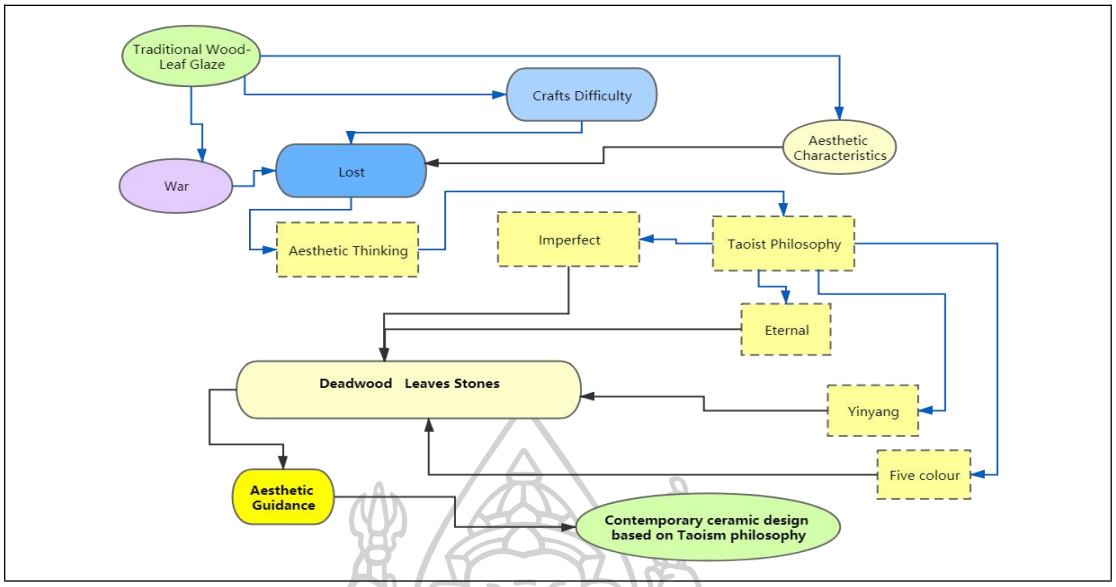


Figure 145 Historical flowchart

5.1 Fulfilment of Design Objectives

The following research objectives were accomplished:

-In Response to Research Objective 1: Revival of the craft of making wooden leaf cups.

The current state of the production of Wood-Leaf Glaze is a matter of concern in this study. There is a prevalence of faked Wood-Leaf Glaze which are not only unnatural and harmful to the human body. The research restored the firing process of natural Wood-Leaf Glaze by using natural materials and a mature firing process.

Based on the restoration of the traditional process, the exploration of materials and the optimization of firing methods have improved the production yield, completing an increment from 2% to 80%.

Innovative preparation of a variety of colored glazes suitable for the firing of Wood-Leaf Glaze led to the exploration of different designs of colored

Wood-Leaf Glaze.

Based on the traditional mulberry leaves, the rule-based exercise was concluded to design experiments to complete the firing of a variety of Wood-Leaf Glaze.

-In Response to Research Objective 2: Applying Taoism philosophy to ceramic design.

Through a literature review and analysis of various works of art, the understanding of the aesthetics of the Tao is combined with the art of ceramics. The researcher is mindful in applying the aesthetics and philosophy of the Tao that influences comprises of the researcher's thoughts on colors and creative forms.

In Response to Research Objective 3: Integrated design: ceramic design based on Taoism characteristics.

The researcher has created an integrated design based on the restoration of the technique of making Wood-Leaf Glaze and the reflections of Taoism philosophy. The creative works for the "Ceramic design based on Taoism characteristics were completed and constituted an entire installation artwork.

- Contemporary ceramic design bases on Taoism characteristics

Adopt the natural philosophy of Taoism and the Tao's guidance on colors to complete the work 'Contemporary ceramic design bases on Taoism characteristics.

- Exhibition

In the process of practice, the constantly adopted the philosophical principles of Tao, applied the technical results of research to the creation, and finally completed contemporary ceramic art works based on Tao. The research results and artistic creations were showcased in two successful exhibitions held at Qilu University

of Technology. (As shown in Figure 146) The first one is the exhibition of technical achievements of Wood-Leaf Glaze in May. The works are permanently exhibited at the Ceramic Art Museum of Qilu University of Technology. (As shown in Figure 147) The other is the exhibition of Tao-based contemporary ceramic art installations in June.

Figure 146 Exhibition 1, Time: May 2020 Venue: Exhibition Hall of Liberal Arts Complex, Qilu University of Technology

Figure 147 Exhibition 2, Time: June 2020 Venue: Exhibition Hall, Art Building, Qilu University of Technology

- Expert advice

The completed works, as well as the exhibition results, have been recognized by scholars and experts from the Qilu University of Technology, Shandong Academy of Arts, and Shandong Academy of Arts and Crafts. Meanwhile, the works were submitted to the Silpakorn University in Thailand and received the approval of the professor.

The second exhibition invited Professor Yuan Hong from Shandong Art Institute, Professor Liu Musen from Qilu University of Technology, Associate Professor Yu Jiexing from College of Arts and Crafts, ceramic artist Li Wenlei, etc.

Experts commented on the works on site. Several professors considered the works to have high artistic value. Meanwhile, the works were submitted to Silpakorn University in Thailand and were approved by the professors. Expert Opinion:

1) This is an excellent research result. It is recommended that the handle the glaze as a non-gloss effect can be executed better. There should be more investment in the aesthetic aspects in the creation. (Suggestions from Professor Liu Musen)

2) Expand the application range of Wood-Leaf Glaze process other creative process. (Suggestions from Professor Yuanhong)

3) Combine more aesthetic ideas to create more products with artistic value, so that the research results can have greater aesthetic benefits. (Suggestions from Associate Professor Yu Jiexing)

4) The exhibition forms can be diversified, and exhibitions are planned according to different audiences, so that the research results can more easily resonate with the audience. (Suggestions from ceramic artist Li Wenlei)

5.2. New Knowledge

Through extensive literature research and multi-process design experiments to recover the firing process of wood leaf graze, the material formulation was optimized and designed based on the firing process's recovery. The output rate is gradually improved again through more design experiments.

Figure 148 Yellow and Blue Wood-Leaf Glaze

The traditional Wood-Leaf Graze only available in black color, and the options are limited, which is an essential reason for the loss of wood leaf graze. This research has accomplished the innovation of the red, yellow and blue Wood-leaf Graze through the material formulation's design and increased the choice of glaze colors for Wood-Leaf calendars.

There are only two types of leaves that can be used for firing in wood leaf graze. The researcher experimented by screening more than 100 types of leaves and identified six types of leaves suitable for firing in Wood-Leaf Graze, expanding the types of leaves that can be fired in Wood-Leaf Graze successfully fired and used to create artistic works.

The researcher has incorporated the philosophical and aesthetic understanding of the Taoism characteristics into the creation of ceramic art, resulting in an original style of contemporary ceramic art.

5.3 Design Concept of Silent Beauty

- The creation work 1, “Terrain” interprets ideas from Taoism aesthetics: -the sound of beauty. The rhythmic beauty of the creation is expressed through the use of the technique of accumulation of dots into surfaces with elements of position and size. Terrace fields and roads conform to and present the rules of formal beauty. It is the beauty of form presented in a unified regularity of symmetry, proportion, and rhythm. The serpentine shape is the most beautiful line, and the terrace field and roads conform to the beauty of such a line. The lines of the terraces and roads wander along the shape of the mountains, twists and turns, changeable and flexible.

- The creation work 2, “Kumu” interprets ideas from Taoism aesthetics: signs of change in all things. What the dead wood presents is the essence of life. Dead wood is a special form of natural existence, It's an element of Chinese philosophy. Dead wood has a long history and humanistic connotation in Chinese traditional culture. “Dead wood” first appeared in Chinese Taoism philosophy.

Zhuangzi used “loose wood” to convey an open-minded outlook on life. Under the guidance of Taoism philosophy, this artistic creation puts ceramic art in the universe and blends with heaven and earth, which is closely related to Zhuangzi's *Essay on the Uniformity of All Things.* (Ames, 2016)

- The creation work 3, “Wanshi” interprets ideas from Taoism aesthetics: signs of change in all things. The texture of the stone is the trace of time. The researcher used ceramic pieces that almost look like natural stone to represent silence.

5.4 Recommendation

5.4.1 Regrets and Deficiencies

The followings are directions to improve and refine the Wood-Leaf ceramic art in the future.

The Creation of art that can too artistic and not as communicative or functional.

The traditional handicrafts involved in the research focus mainly the Wood-Leaf Glaze while there are many other traditional crafts that have disappeared or are on the verge of disappearing. More extensive researches and practices are needed to preserve and develop Chinese ceramic culture and skills.

5.4.2 Constructive Comments

For art creators in the contemporary ceramics, an in-depth study of the ceramic production process and materials is required. There needs to be an ability to combine advanced production techniques to achieve artistic creations, avoid programmatic approaches and focus on highlighting the soul of the product.

For institutions, research institutes or government departments,

they should combine the guidance of traditional technical heritage with the market economy to stimulate traditional arts with the market economy. This approach can also strengthen the protection and promotion of cultural heritage, express Chinese traditions and increase cultural exchanges.

Based on the research and feedback, the level of art creation is relatively high for the audience. While some of them have a deeper understanding of philosophy and aesthetics and can better understand the value of the researcher's contemporary art works, some audience that do not have such background in artistic appreciation and education may find the work too complex and abstract.

Based on the feedback, the researcher may include considerations of audience group factors in future designs. The research may also include other factors in the future works such as how this ceramic art can be broadly related to children's education or universal art education and the practical value of ceramics in the creation aspect such as how ceramic designs based on Taoism philosophy can be better integrated into the public vision.

REFERENCES

มหาวิทยาลัยศิลปากร

มหาวิทยาลัยศิลปากร

มหาวิทยาลัยศิลปากร

มหาวิทยาลัยศิลปากร

มหาวิทยาลัยศิลปากร

มหาวิทยาลัยศิลปากร

Appendix

ឧបសម្ព័ន ១ (បទប្រឌ.ច)
ANNEX 1 (RRCP Form)

ព្រះរាជាណាចក្រកម្ពុជា
Kingdom of Cambodia
ជាតិ សាសនា ព្រះមហាក្សត្រ
Nation Religion King

ក្រសួងឧស្សាហកម្ម និងសិប្បកម្ម
Ministry of Industry and Handicraft
អគ្គនាយកដ្ឋានឧស្សាហកម្ម
General Department of Industry
នាយកដ្ឋានកម្មសិទ្ធិឧស្សាហកម្ម
Department of Industrial Property

ពាក្យសុំប្រកាសនីយបត្រតក្កកម្ម
Request Form

កម្មវត្ថុ៖ សំណើសុំចុះបញ្ជីទទួលស្គាល់សារធ្បើងវិញប្រកាសនីយបត្រតក្កកម្មចិន។ **Subject: Request for Re-registration of Chinese Patent.**	សម្រាប់មន្ត្រីកាន់កាប់បញ្ជី **For Registrar** កាលបរិច្ឆេទទទួល : **Receiving Date** : 23/03/2020 លេខរបស់សំណុំលិខិតស្នើសុំ : **Application Number** : KH/RRP.CN/2020/00046 កាលបរិច្ឆេទសុំចុះបញ្ជី : **Filing Date** : 31/01/2019
ពាក្យសុំ បទប្រឌ១ **PATENTS FORM** **No. RRCP1**	**សំណើសុំចុះបញ្ជីទទួលស្គាល់សារធ្បើងវិញប្រកាសនីយបត្រតក្កកម្មចិន** **PREPARATION METHOD OF A LEAF-BASED CERAMIC GLAZE**

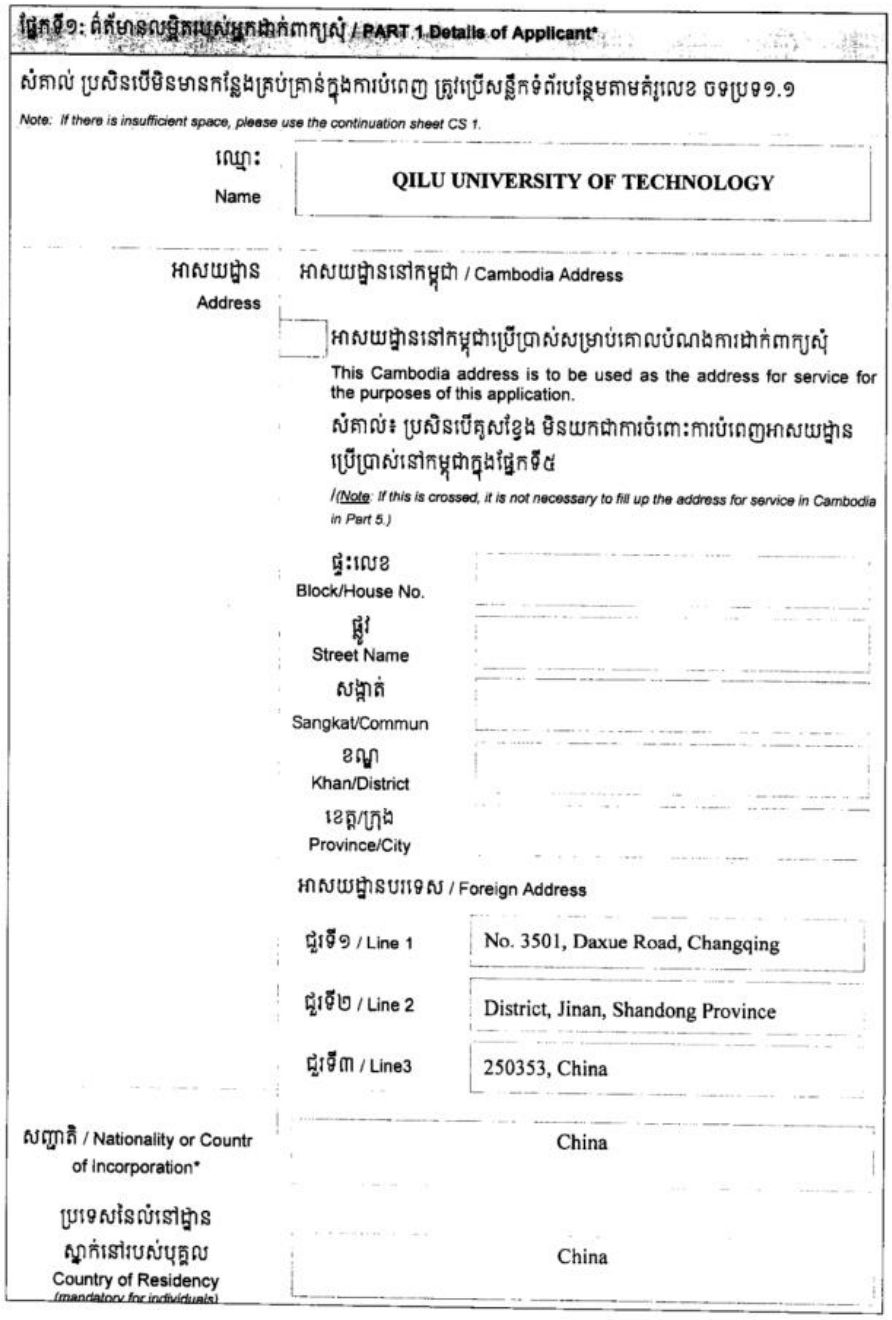
កំណត់សំគាល់ *General:*

ក. សញ្ញាផ្កាយត្រូវបំពេញ ***a.*** **denotes mandatory fields.*

ខ. ត្រូវប្រើសញ្ញាខ្វែងគុសក្នុងប្រអប់ប្រសិនបើមាន **b.** *Checkboxes should be marked with a cross where applicable.*

គ. ពាក្យសុំត្រូវភ្ជាប់មកជាមួយឯកសារចម្លងនៃញ្ញាបនបត្រប្រកាសនីយបត្រតក្កកម្មចិន (ភាសាចិន និងភាសាអង់គ្លេស)៖ (១)ដោយមានការបញ្ជាក់ពីអង្គភាពកម្មសិទ្ធិបញ្ញាចិន (២)លក្ខណៈបច្ចេកទេសនៃប្រកាសនីយបត្រតក្កកម្ម

C. This form shall be accompanied by a certified copy (Chinese and English) of :
(i) the certificate of grant of the Chinese patent and (ii) the specification of the granted Chinese patent.



ផ្នែកទី១: ព័ត៌មានលម្អិតរបស់អ្នកដាក់ពាក្យសុំ / PART 1 Details of Applicant*

សំគាល់ ប្រសិនបើមិនមានកន្លែងគ្រប់គ្រាន់ក្នុងការបំពេញ ត្រូវប្រើសន្លឹកទំព័របន្ថែមតាមគំរូលេខ ចទប្រ១.១

Note: If there is insufficient space, please use the continuation sheet CS 1.

ឈ្មោះ
Name: QILU UNIVERSITY OF TECHNOLOGY

អាសយដ្ឋាន
Address

អាសយដ្ឋាននៅកម្ពុជា / Cambodia Address

☐ អាសយដ្ឋាននៅកម្ពុជាប្រើប្រាស់សម្រាប់គោលបំណងការដាក់ពាក្យសុំ
This Cambodia address is to be used as the address for service for the purposes of this application.

សំគាល់៖ ប្រសិនបើគូសខ្វែង មិនយកជាការចំពោះការបំពេញអាសយដ្ឋានប្រើប្រាស់នៅកម្ពុជាក្នុងផ្នែកទី៥

(Note: If this is crossed, it is not necessary to fill up the address for service in Cambodia in Part 5.)

ផ្ទះលេខ Block/House No.	
ផ្លូវ Street Name	
សង្កាត់ Sangkat/Commun	
ខណ្ឌ Khan/District	
ខេត្ត/ក្រុង Province/City	

អាសយដ្ឋានបរទេស / Foreign Address

ជួរទី១ / Line 1	No. 3501, Daxue Road, Changqing
ជួរទី២ / Line 2	District, Jinan, Shandong Province
ជួរទី៣ / Line3	250353, China

សញ្ជាតិ / Nationality or Countr of Incorporation*	China
ប្រទេសនៃលំនៅដ្ឋានស្នាក់នៅរបស់បុគ្គល Country of Residency (mandatory for individuals)	China

ផ្នែកទី២: ព័ត៌មានលំអិតប្រកាសនិយបត្រតក្តកម្មចិន / PART 2 Details of Chinese Patent*

លេខប្រកាសនិយបត្រតក្តកម្ម Chinese Patent No.	ZL201910101076.6
កាលបរិច្ឆេទសុំចុះបញ្ជីប្រកាស នីយបត្រតក្តកម្មចិន Filing Date of Chinese Patent *(DD/MM/YYYY)*	31/01/2019
កាលបរិច្ឆេទផ្តល់ប្រកាសនីយបត្រ តក្តកម្មចិន Grant Date of Chinese Patent *(DD/MM/YYYY)*	24/12/2019
ចំនួននៃសេចក្តីអះអាង Number of claims	09

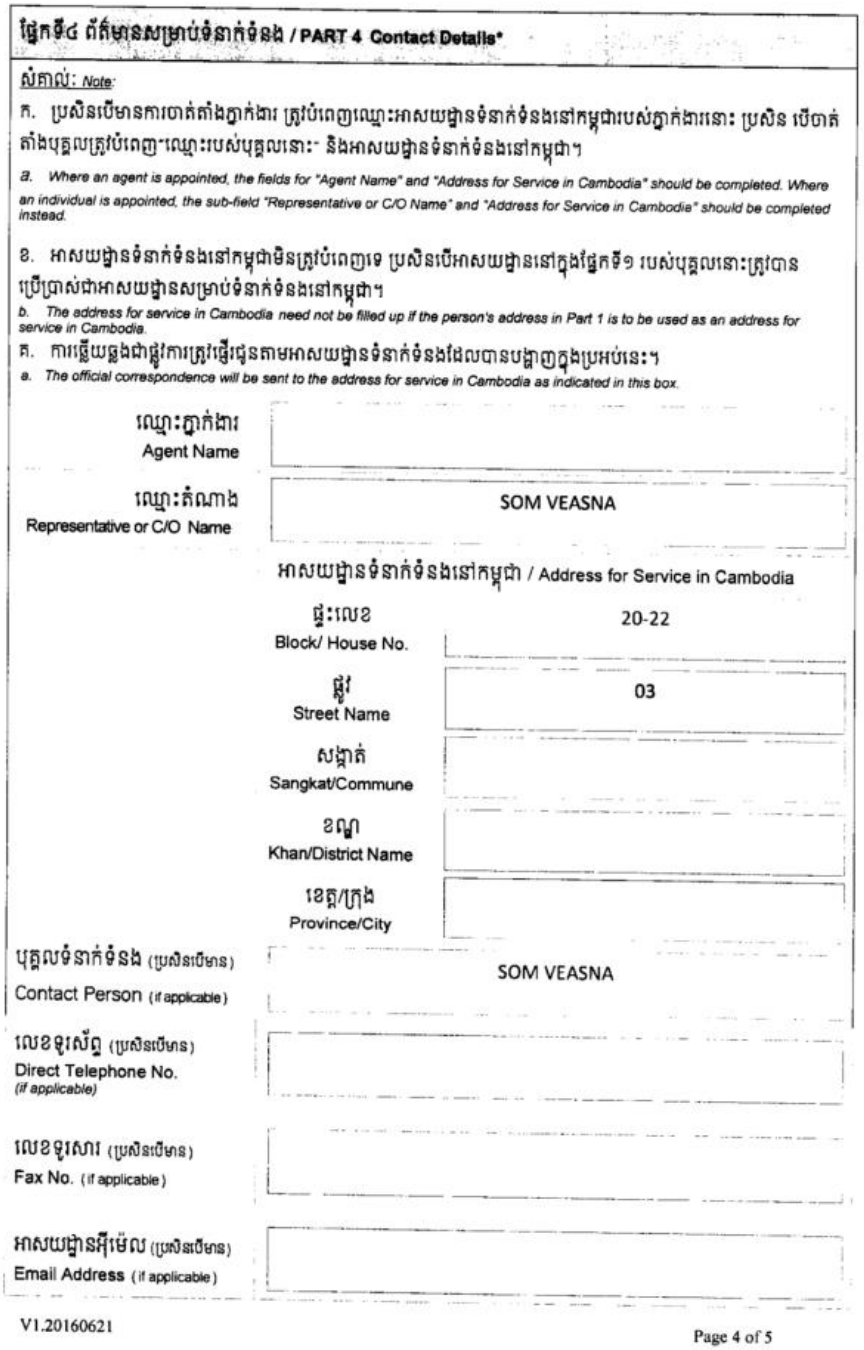
ផ្នែកទី៣: តារាងឯកសារលម្អិត / PART 3 Checklist*

ពិនិត្យតារាង ក Checklist A — សំណុំលិខិតស្នើសុំមានចំនួនសន្លឹកឯកសារដូចខាងក្រោម៖ The application consists of the following no. of sheets

ពាក្យសុំ Request	05	សន្លឹក /sheet(s)
សេចក្តីអធិប្បាយ Description	14	សន្លឹក /sheet(s)
សេចក្តីអះអាង Claim	02	សន្លឹក /sheet(s)
គំនូសបង្ហាញ Drawing	01	សន្លឹក /sheet(s)
ខ្លឹមសារសង្ខេប Abstract	01	សន្លឹក/Sheet(s)

ពិនិត្យតារាង ខ Checklist B — សំណុំលិខិតស្នើសុំភ្ជាប់មកជាមួយនូវ៖ The application as filed is accompanied by:

- ☑ លិខិតផ្ទេរសិទ្ធិ Power of Attorney
- ☑ ឯកសារចម្លងវិញ្ញាបនបត្រប្រកាសនីយបត្រតក្តកម្មចិន ដោយមានការ បញ្ជាក់ពីអង្គភាពកម្មសិទ្ធិបញ្ញាចិន។ Certified copy of Certificate of Grant of Chinese patent



ផ្នែកទី៤ ព័ត៌មានសម្រាប់ទំនាក់ទំនង / PART 4 Contact Details*

<u>សំគាល់: *Note*:</u>

ក. ប្រសិនបើមានការចាត់តាំងភ្នាក់ងារ ត្រូវបំពេញឈ្មោះអាសយដ្ឋានទំនាក់ទំនងនៅកម្ពុជារបស់ភ្នាក់ងារនោះ ប្រសិន បើចាត់តាំងបុគ្គលត្រូវបំពេញ-ឈ្មោះរបស់បុគ្គលនោះ- និងអាសយដ្ឋានទំនាក់ទំនងនៅកម្ពុជា។

a. Where an agent is appointed, the fields for "Agent Name" and "Address for Service in Cambodia" should be completed. Where an individual is appointed, the sub-field "Representative or C/O Name" and "Address for Service in Cambodia" should be completed instead.

ខ. អាសយដ្ឋានទំនាក់ទំនងនៅកម្ពុជាមិនត្រូវបំពេញទេ ប្រសិនបើអាសយដ្ឋាននៅក្នុងផ្នែកទី១ របស់បុគ្គលនោះត្រូវបាន ប្រើប្រាស់ជាអាសយដ្ឋានសម្រាប់ទំនាក់ទំនងនៅកម្ពុជា។

b. The address for service in Cambodia need not be filled up if the person's address in Part 1 is to be used as an address for service in Cambodia.

គ. ការឆ្លើយឆ្លងជាផ្លូវការត្រូវផ្ញើរជូនតាមអាសយដ្ឋានទំនាក់ទំនងដែលបានបង្ហាញក្នុងប្រអប់នេះ។

a. The official correspondence will be sent to the address for service in Cambodia as indicated in this box.

ឈ្មោះភ្នាក់ងារ Agent Name	
ឈ្មោះតំណាង Representative or C/O Name	SOM VEASNA

អាសយដ្ឋានទំនាក់ទំនងនៅកម្ពុជា / Address for Service in Cambodia

ផ្ទះលេខ Block/ House No.	20-22
ផ្លូវ Street Name	03
សង្កាត់ Sangkat/Commune	
ខណ្ឌ Khan/District Name	
ខេត្ត/ក្រុង Province/City	

បុគ្គលទំនាក់ទំនង (ប្រសិនបើមាន) Contact Person (if applicable)	SOM VEASNA
លេខទូរស័ព្ទ (ប្រសិនបើមាន) Direct Telephone No. (if applicable)	
លេខទូរសារ (ប្រសិនបើមាន) Fax No. (if applicable)	
អាសយដ្ឋានអ៊ីម៉ែល (ប្រសិនបើមាន) Email Address (if applicable)	

V1.20160621

Page 4 of 5

ផ្នែកទី៥ : សេចក្តីអះអាង PART 5 Declaration*

ការប្រកាស Declaration	<u>ដោយអ្នកដាក់ពាក្យសុំ / By Applicant(s) Filing the Application</u>

中国国际贸易促进委员会

China Council for the Promotion of International Trade
China Chamber of International Commerce

证明书
CERTIFICATE

号码 No. 201100B0/009991

兹证明：在所附转让协议上的转让人冯善鑫、孙政、王郁容、潘士强的签字和受让人齐鲁工业大学冯善鑫的签字属实。

THIS IS TO CERTIFY THAT: the signatures of FENG SHANXIN, SUN ZHENG, WANG YURONG, PAN SHIQIANG as the Assignors and the signature of FENG SHANXIN of QILU UNIVERSITY OF TECHNOLOGY as the Assignee on the annexed DEED OF ASSIGNMENT are genuine.

China Council for the Promotion of International Trade

授权签字：
Authorized Signature: Zhao Jie

日期：2020年02月28日
(Date: Feb. 28, 2020)

证明书查验网站 Website for verifying the certificate: http://www.rzccpit.com/validate.html

Cambodia

DEED OF ASSIGNMENT
FOR
PATENT / UTILITY MODEL CERTIFICATE (PETTY PATENT)

Date:

Title of Invention:

Preparation method of a leaf-based ceramic glaze

Assignor (s):

1. Feng, Shanxin
2. Sun, Zheng
3. Wang, Yurong
4. Pan, Shiqiang

Address (1)-(4): No. 3501, Daxue Road, Changqing District, Jinan, Shandong Province 250353, China

Assignee (s):

QILU UNIVERSITY OF TECHNOLOGY
No. 3501, Daxue Road, Changqing District, Jinan, Shandong Province 250353, China

The Assignor (s) declare that I/we are the inventor (s) of the above mentioned invention and for due consideration hereby assign the right to apply for and obtain patents/utility model certificates (petty patents) therefor in the Kingdom of Cambodia to the Assignee (s) and the Assignee (s) hereby accept such assignment.

In witness whereof, the Assignor (s) and Assignee (s) have signed their names below, effective on the date above.

ASSIGNOR (S): 冯善鑫 Fengshanxin
孙政 Sunzheng
王郁容 Wang Yu Rong
潘士强 Pan Shi Qiang

ASSIGNEE (S): 冯善鑫 Fengshanxin

CERTIFIED BY A NOTARY PUBLIC (DATE AND PLACE)

证书号第3643625号

发明专利证书

发明名称：一种基于树叶的陶瓷釉料的制备方法

发 明 人：冯善鑫;孙政;王郁容;潘士强

专 利 号：ZL 2019 1 0101076.6

专利申请日：2019年01月31日

专利权人：齐鲁工业大学

地 址：250353 山东省济南市长清区大学路3501号

授权公告日：2019年12月24日　　授权公告号：CN 109721249 B

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局长
申长雨

国家知识产权局
2019年12月24日

AJ201463

国家知识产权局

250013

山东省济南市解放路41号
济南鲁科专利代理有限公司 姜月磊(0531-85972588)

发文日：

2020年01月17日

申请号或专利号：202010053527.6　　发文序号：202001170197544O

专利申请受理通知书

根据专利法第28条及其实施细则第38条、第39条的规定，申请人提出的专利申请已由国家知识产权局受理。现将确定的申请号、申请日、申请人和发明创造名称通知如下：

申请号：202010053527.6
申请日：2020年01月17日
申请人：齐鲁工业大学
发明创造名称：一种木叶盏蓝色底釉及采用该木叶盏蓝色底釉制作木叶盏的方法

经核实，国家知识产权局确认收到文件如下：
发明专利请求书 每份页数:4页 文件份数:1份
说明书 每份页数:12页 文件份数:1份
实质审查请求书 每份页数:1页 文件份数:1份
专利代理委托书 每份页数:2页 文件份数:1份
权利要求书 每份页数:2页 文件份数:1份 权利要求项数： 10项
说明书摘要 每份页数:1页 文件份数:1份
说明书附图 每份页数:2页 文件份数:1份

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3. 国家知识产权局收到向外国申请专利保密审查请求书后，依据专利法实施细则第9条予以审查。

审 查 员：自动受理　　审查部门：专利局初审及流程管理部

国家知识产权局 专利申请受理章

200101
2019.11

纸件申请，回函请寄：100088 北京市海淀区蓟门桥西土城路6号 国家知识产权局专利局受理处收
电子申请，应当通过电子专利申请系统以电子文件形式提交相关文件。除另有规定外，以纸件等其他形式提交的文件视为未提交。

AJ201461

国家知识产权局

250013

山东省济南市解放路41号
济南鲁科专利代理有限公司 姜月磊(0531-85972588)

发文日：
2020年01月18日

申请号或专利号：202010054959.9　　发文序号：2020011800131390

专利申请受理通知书

根据专利法第28条及其实施细则第38条、第39条的规定，申请人提出的专利申请已由国家知识产权局受理。现将确定的申请号、申请日、申请人和发明创造名称通知如下：

申请号：202010054959.9
申请日：2020年01月17日
申请人：齐鲁工业大学
发明创造名称：一种木叶盏红色底釉及采用该木叶盏红色底釉制作木叶盏的方法

经核实，国家知识产权局确认收到文件如下：
发明专利请求书 每份页数:4页 文件份数:1份
实质审查请求书 每份页数:1页 文件份数:1份
专利代理委托书 每份页数:2页 文件份数:1份
权利要求书 每份页数:2页 文件份数:1份 权利要求项数： 10项
说明书摘要 每份页数:1页 文件份数:1份
说明书附图 每份页数:2页 文件份数:1份
说明书 每份页数:12页 文件份数:1份

提示：

1. 申请人收到专利申请受理通知书之后，认为其记载的内容与申请人所提交的相应内容不一致时，可以向国家知识产权局请求更正。

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3. 国家知识产权局收到向外国申请专利保密审查请求书后，依据专利法实施细则第9条予以审查。

审 查 员：自动受理

审查部门：专利局初审及流程管理部

国家知识产权局 专利申请受理章 (03)

200101
2019.11

纸件申请，回函请寄：100088 北京市海淀区蓟门桥西土城路6号 国家知识产权局受理处收
电子申请，应当通过电子专利申请系统以电子文件形式提交相关文件。除另有规定外，以纸件等其他形式提交的文件视为未提交。

1/1

AJ201462

国家知识产权局

250013

山东省济南市解放路41号
济南鲁科专利代理有限公司 姜月磊(0531-85972588)

发文日：

2020年01月17日

申请号或专利号：202010053513.4　　发文序号：2020011701971830

专利申请受理通知书

根据专利法第28条及其实施细则第38条、第39条的规定，申请人提出的专利申请已由国家知识产权局受理。现将确定的申请号、申请日、申请人和发明创造名称通知如下：

申请号：202010053513.4
申请日：2020年01月17日
申请人：齐鲁工业大学
发明创造名称：一种木叶盏黄色底釉及采用该木叶盏黄色底釉制作木叶盏的方法

经核实，国家知识产权局确认收到文件如下：
专利代理委托书 每份页数:2页 文件份数:1份
说明书摘要 每份页数:1页 文件份数:1份
说明书 每份页数:12页 文件份数:1份
权利要求书 每份页数:2页 文件份数:1份 权利要求项数： 10项
实质审查请求书 每份页数:1页 文件份数:1份
说明书附图 每份页数:2页 文件份数:1份
发明专利请求书 每份页数:4页 文件份数:1份

提示：

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3. 国家知识产权局收到向外国申请专利保密审查请求书后，依据专利法实施细则第9条予以审查。

审 查 员：自动受理

审查部门：专利局初审及流程管理部

国家知识产权局 专利申请受理章 (03)

200101
2019.11

纸件申请，回函请寄：100088 北京市海淀区蓟门桥西土城路6号 国家知识产权局受理处收
电子申请，应当通过电子专利申请系统以电子文件形式提交相关文件。除另有规定外，以纸件等其他形式提交的文件视为未提交。

1/1

AJ201930

国家知识产权局

250014

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济南鲁科专利代理有限公司 姜月磊(0531-85972588)

发文日：

2020 年 07 月 09 日

申请号或专利号：202010655092.2　　发文序号：2020070901135330

专 利 申 请 受 理 通 知 书

根据专利法第 28 条及其实施细则第 38 条、第 39 条的规定，申请人提出的专利申请已由国家知识产权局受理。现将确定的申请号、申请日、申请人和发明创造名称通知如下：

申请号：202010655092.2
申请日：2020 年 07 月 09 日
申请人：齐鲁工业大学
发明创造名称：一种开片木叶功能盖及其制备方法

经核实，国家知识产权局确认收到文件如下：
权利要求书 每份页数:2 页 文件份数:1 份 权利要求项数： 9 项
实质审查请求书 每份页数:1 页 文件份数:1 份
专利代理委托书 每份页数:2 页 文件份数:1 份
说明书摘要 每份页数:1 页 文件份数:1 份
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说明书 每份页数:11 页 文件份数:1 份
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2. 申请人收到专利申请受理通知书之后，再向国家知识产权局办理各种手续时，均应当准确、清晰地写明申请号。

3. 国家知识产权局收到向外国申请专利保密审查请求书后，依据专利法实施细则第 9 条予以审查。

审 查 员：自动受理　　审查部门：专利局初审及流程管理部

200101 2019.11　纸件申请，回函请寄：100088 北京市海淀区蓟门桥西土城路 6 号 国家知识产权局受理处收
电子申请，应当通过电子专利申请系统以电子文件形式提交相关文件，除另有规定外，以纸件等其他形式提交的文件视为未提交。

AJ201931

国家知识产权局

250014

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济南鲁科专利代理有限公司 姜月磊(0531-85972588)

发文日：

2020 年 07 月 09 日

申请号或专利号：**202010655068.9**　　发文序号：**2020070901119180**

专 利 申 请 受 理 通 知 书

根据专利法第 28 条及其实施细则第 38 条、第 39 条的规定，申请人提出的专利申请已由国家知识产权局受理。现将确定的申请号、申请日、申请人和发明创造名称通知如下：

申请号：202010655068.9
申请日：2020 年 07 月 09 日
申请人：[redacted]
发明创造名称：一种基于造孔工艺的木叶功能盘及其制备方法

经核实，国家知识产权局确认收到文件如下：
说明书附图 每份页数:2 页 文件份数:1 份
专利代理委托书 每份页数:2 页 文件份数:1 份
说明书 每份页数:10 页 文件份数:1 份
说明书摘要 每份页数:1 页 文件份数:1 份
权利要求书 每份页数:2 页 文件份数:1 份 权利要求项数： 7 项
发明专利请求书 每份页数:5 页 文件份数:1 份
实质审查请求书 每份页数:1 页 文件份数:1 份

提示：

1. 申请人收到专利申请受理通知书之后，认为其记载的内容与申请人所提交的相应内容不一致时，可以向国家知识产权局请求更正。

2. 申请人收到专利申请受理通知书之后，再向国家知识产权局办理各种手续时，均应当准确、清晰地写明申请号。

3. 国家知识产权局收到向外国申请专利保密审查请求书后，依据专利法实施细则第 9 条予以审查。

审 查 员：自动受理　　审查部门：专利局初审及流程管理部

纸件申请，回函请寄：100088 北京市海淀区蓟门桥西土城路 6 号 国家知识产权局受理处收
电子申请，应当通过电子专利申请系统以电子文件形式提交相关文件。除另有规定外，以纸件等其他形式提交的文件视为未提交。

AJ201534

国家知识产权局

250014

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济南鲁科专利代理有限公司 姜月磊(0531-85972588)

发文日：

2020 年 03 月 17 日

申请号或专利号：202010185603.9　　发文序号：2020031701422990

专 利 申 请 受 理 通 知 书

根据专利法第 28 条及其实施细则第 38 条、第 39 条的规定，申请人提出的专利申请已由国家知识产权局受理。现将确定的申请号、申请日、申请人和发明创造名称通知如下：

申请号：202010185603.9
申请日：2020 年 03 月 17 日
申请人：
发明创造名称：一种用于艺术瓷的陶瓷载体、具有吸附甲醛功能的陶瓷及其应用

经核实，国家知识产权局确认收到文件如下：
实质审查请求书 每份页数:1 页 文件份数:1 份
说明书附图 每份页数:1 页 文件份数:1 份
发明专利请求书 每份页数:4 页 文件份数:1 份
权利要求书 每份页数:2 页 文件份数:1 份 权利要求项数： 10 项
专利代理委托书 每份页数:2 页 文件份数:1 份
说明书 每份页数:18 页 文件份数:1 份
说明书摘要 每份页数:1 页 文件份数:1 份

提示：

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3. 国家知识产权局收到向外国申请专利保密审查请求书后，依据专利法实施细则第 9 条予以审查。

审 查 员：自动受理　　审查部门：专利局初审及流程管理部

200101
2019.11

纸件申请，回函请寄：100088 北京市海淀区蓟门桥西土城路 6 号 国家知识产权局受理处收
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Receipt

Attention	: Xin Shan Feng	Invoice Number	: ID68
Title	: Mr/Mrs/Miss	Date	: 4th April 2019

No	Description	Amount
1	Conference Registration Fee Batch 1 (Students/International)	USD 200
	Sub Total	USD 200
	Total	**USD 200**

Yogyakarta, 12th April 2019

Silvia Anggreni Purba
Treasurer

Thank you for your participation!

Address Administration Office
International Affairs Unit, Institut Seni Indonesia Yogyakarta
Jl. Parangtritis Km. 6,5 Sewon, Bantul, D.I. Yogyakarta, Indonesia

文章收录引用检索证明

委托人：冯善鑫

委托单位：齐鲁工业大学

检索数据库和检索年代：（默认数据库提供的时间范围）

1、《科学引文索引》（Science Citation Index Expanded）简称 SCI-EXPANDED

2、《工程索引》（Engineering Index）简称 EI

3、《Scopus 摘要与引文数据库》简称 Scopus

4、《韩国期刊数据库》（KCI-Korean Journal Database）简称 KCI

5、《美国国家医学图书馆—国家生物技术信息中心数据库》简称 PubMed

6、《艺术与人文引文索引》（Arts & Humanities Citation Index）简称 A&HCI

检索结果：

序号	数据库	收录	引用频次	他引频次
1	SCI	篇		
2	EI	1 篇	0	0
3	Scopus	1 篇	0	0
4	KCI	篇		
5	PubMed	篇		
6	A&HCI	篇		

特此证明

详细结果见附件

检索员（签字）：曹君

技术职务：馆员

哈尔滨工业大学科技查新站

2020 年 5 月 12 日

附件：

Engineering Village

1.

Accession number: 20201708505740

Title: **Application research of high temperature silver plating in products**

Authors: Xie, Ruhong ; Feng, Junjie ; Feng, Shanxin

Author affiliation: Institute of Art and Design, Shangdong woman' s university, Jinan; Shandong, China
Institute of Art and Design, Qilu University of Technology, Jinan; Shandong, China
Engineering training centre, Qilu University of Technology, Jinan; Shandong, China

Corresponding author: Xie, Ruhong (xieruhong12@163.com)

Source title: Materials Science Forum

Abbreviated source title: Mater. Sci. Forum

Volume: 980

Issue date: 2020

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ISSN: 02555476

E-ISSN: 16629752

CODEN: MSFOEP

Document type: Journal article (JA)

Publisher: Trans Tech Publications Ltd

Abstract: Silver has functional properties such as disinfection, sterilization, and anti-corrosion. The combination of silver and conventional ceramics by high-temperature silver plating can impart the functionality to ceramic products and increase the functionality of ceramic products. The traditional way of decorating ceramic products is mainly glazed decoration, which combines silver and ceramics, and its silver metallic luster can bring decorative effects to ceramic products. And it is produced by high-temperature silver plating, which saves costs in the production process compared to traditional silver plating. At the same time, compared with traditional ceramics, high-temperature silver-plated ceramics can take into account the properties of ceramics and can also play the role of disinfection, sterilization, anti-corrosion and other properties of silver. It is produced by high- temperature silver plating, which is more cost-effective than traditional silver plating in the production process. At the same time, compared with traditional ceramics, high-temperature silver- plated ceramics can achieve the disinfection and sterilization of silver. In consideration of the properties of ceramics, anti-corrosion and other attributes, a reasonable combination of the two fully demonstrate the functionality and decoration of both.

Number of references: 7

Main heading: High temperature corrosion

Controlled terms: Ceramic products - Cost effectiveness - Disinfection - Silver plating - Sterilization (cleaning)

Uncontrolled terms: Application research - Decorative effects - Functional properties - High temperature - Metallic luster - Other properties - Production process - Traditional ceramics

Classification code: 539.3 Metal Plating - 812.1 Ceramics - 911.2 Industrial Economics

DOI: 10.4028/www.scientific.net/MSF.980.70

Funding Details: Number
Acronym
Sponsor
Z2018S010
-
-

Funding text: Special thanks for: Shandong Provincial People?s Government Degree Committee, Shandong Province Graduate Education Quality Improvement Program ?Modern Ceramic Art Creation?, A Study on the Training Mode of International Art Design Talents under the Vision of ?One Belt, One Road? in the Key Project of Teaching Reform Research Project of Undergraduate Universities in Shandong Province in 2018(Z2018S010).

Database: Compendex

Scopus

文献

Feng, S.[a b], Pan, S.[c], Wang, Y.[c]

Research on the application of porous ceramic waste gas purification device in ceramic kiln

(2020) *Materials Science Forum*, 980, pp. 410-418.

DOI: 10.4028/www.scientific.net/MSF.980.410

[a] Engineering Training Centre, Jinan, Shandong, China
[b] Faculty of Decorative Arts, Silpakorn University, Bangkok, Thailand
[c] Institute of Art and Design, Qilu University of Technology, Jinan, Shandong, China

摘要
Ceramic kiln in the use of the process of high energy consumption, high resource consumption, serious environmental pollution and other problems are the current ceramic industry development of serious problems. Kiln combustion exhaust gas pollution types mainly include: SO2, NOx, CO, particulate matter, lead, cadmium, nickel and its compounds, fluoride and chloride and so on, and the traditional kiln direct emissions into the atmosphere, causing serious pollution to the environment, the need to have reliable purification treatment devices to meet emissions requirements, but the original purification plant purification effect is poor, process complex aspects of problems. This paper introduces a new porous ceramic purification device to improve the electric kiln exhaust gas purification to improve the catalytic conversion of CO, NOX, SO2 desulfurization and particulate matter purification. © 2020 Trans Tech Publications Ltd, Switzerland.

作者关键字
Ceramic kiln; Old and new kinetic energy conversion; Pollution waste gas purification device; Waste gas

索引关键字
Ceramics industry, Chlorine compounds, Energy utilization, Fluorine compounds, Gas emissions, Gas fuel purification, Kilns, Nickel compounds, Particles (particulate matter), Pollution, Waste incineration; Catalytic conversion, Ceramic industries, Combustion exhausts, Environmental pollutions, High energy consumption, Purification effect, Purification treatments, Resource consumption; Air purification

基金资助详情
Z2018S010
基金资助详情
Special thanks for: Shandong Provincial People?s Government Degree Committee, Shandong Province Graduate Education Quality Improvement Program ?Modern Ceramic Art Creation?, A Study on the Training Mode of International Art Design Talents under the Vision of ?One Belt, One Road? in the Key Project of Teaching Reform Research Project of Undergraduate Universities in Shandong Province in 2018(Z2018S010).

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文章收录引用检索证明

委托人：冯善鑫

委托单位：齐鲁工业大学

检索数据库和检索年代：（默认数据库提供的时间范围）

1、《科学引文索引》（Science Citation Index Expanded）简称 SCI-EXPANDED

2、《工程索引》（Engineering Index）简称 EI

3、《Scopus 摘要与引文数据库》简称 Scopus

4、《韩国期刊数据库》（KCI-Korean Journal Database）简称 KCI

5、《美国国家医学图书馆—国家生物技术信息中心数据库》简称 PubMed

6、《艺术与人文引文索引》（Arts & Humanities Citation Index）简称 A&HCI

检索结果：

序号	数据库	收录	引用频次	他引频次
1	SCI	篇		
2	EI	1 篇	0	0
3	Scopus	1 篇	0	0
4	KCI	篇		
5	PubMed	篇		
6	A&HCI	篇		

特此证明

详细结果见附件

检索员（签字）：曹君

技术职务：馆员

哈尔滨工业大学科技查新站

2020 年 5 月 2 日

科技文献查新专用章

附件：

Engineering Village™

1.

Accession number: 20201708505776

Title: **Research on the application of porous ceramic waste gas purification device in ceramic kiln**

Authors: Feng, Shanxin ; Pan, Shiqiang ; Wang, Yurong

Author affiliation: Engineering Training Centre, Qilu University of Technology, Jinan; Shandong, China
Faculty of Decorative Arts, Silpakorn University, Bangkok, Thailand
Institute of Art and Design, Qilu University of Technology, Jinan; Shandong, China

Corresponding author: Feng, Shanxin (shanxinhh77@163.com)

Source title: Materials Science Forum

Abbreviated source title: Mater. Sci. Forum

Volume: 980

Issue date: 2020

Publication year: 2020

Pages: 410-418

Language: English

ISSN: 02555476

E-ISSN: 16629752

CODEN: MSFOEP

Document type: Journal article (JA)

Publisher: Trans Tech Publications Ltd

Abstract: Ceramic kiln in the use of the process of high energy consumption, high resource consumption, serious environmental pollution and other problems are the current ceramic industry development of serious problems. Kiln combustion exhaust gas pollution types mainly include: SO2, NOx, CO, particulate matter, lead, cadmium, nickel and its compounds, fluoride and chloride and so on, and the traditional kiln direct emissions into the atmosphere, causing serious pollution to the environment, the need to have reliable purification treatment devices to meet emissions requirements, but the original purification plant purification effect is poor, process complex aspects of problems.This paper introduces a new porous ceramic purification device to improve the electric kiln exhaust gas purification to improve the catalytic conversion of CO, NOX, SO2 desulfurization and particulate matter purification.

Number of references: 19

Main heading: Air purification

Controlled terms: Ceramics industry - Chlorine compounds - Energy utilization - Fluorine compounds - Gas emissions - Gas fuel purification - Kilns - Nickel compounds - Particles (particulate matter) - Pollution - Waste incineration

Uncontrolled terms: Catalytic conversion - Ceramic industries - Combustion exhausts - Environmental pollutions - High energy consumption - Purification effect - Purification treatments - Resource consumption

Classification code: 452.4 Industrial Wastes Treatment and Disposal - 522 Gas Fuels - 525.3 Energy Utilization - 642.2 Industrial Furnaces and Components - 643 Space Heating, Ventilation and Air Conditioning - 951 Materials Science

DOI: 10.4028/www.scientific.net/MSF.980.410

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Database: Compendex

文献

Feng, S.[a b], Pan, S.[c], Wang, Y.[c]

Research on the application of porous ceramic waste gas purification device in ceramic kiln
(2020) *Materials Science Forum*, 980, pp. 410-418.

DOI: 10.4028/www.scientific.net/MSF.980.410

[a] Engineering Training Centre, Qilu University of Technology, Jinan, Shandong, China
[b] Faculty of Decorative Arts, Silpakorn University, Bangkok, Thailand
[c] Institute of Art and Design, Qilu University of Technology, Jinan, Shandong, China

摘要
Ceramic kiln in the use of the process of high energy consumption, high resource consumption, serious environmental pollution and other problems are the current ceramic industry development of serious problems. Kiln combustion exhaust gas pollution types mainly include: SO2, NOx, CO, particulate matter, lead, cadmium, nickel and its compounds, fluoride and chloride and so on, and the traditional kiln direct emissions into the atmosphere, causing serious pollution to the environment, the need to have reliable purification treatment devices to meet emissions requirements, but the original purification plant purification effect is poor, process complex aspects of problems. This paper introduces a new porous ceramic purification device to improve the electric kiln exhaust gas purification to improve the catalytic conversion of CO, NOX, SO2 desulfurization and particulate matter purification. © 2020 Trans Tech Publications Ltd, Switzerland.

作者关键字
Ceramic kiln; Old and new kinetic energy conversion; Pollution waste gas purification device; Waste gas

索引关键字
Ceramics industry, Chlorine compounds, Energy utilization, Fluorine compounds, Gas emissions, Gas fuel purification, Kilns, Nickel compounds, Particles (particulate matter), Pollution, Waste incineration; Catalytic conversion, Ceramic industries, Combustion exhausts, Environmental pollutions, High energy consumption, Purification effect, Purification treatments, Resource consumption; Air purification

基金资助详情
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基金资助详情
Special thanks for: Shandong Provincial People?s Government Degree Committee, Shandong Province Graduate Education Quality Improvement Program ?Modern Ceramic Art Creation?, A Study on the Training Mode of International Art Design Talents under the Vision of ?One Belt, One Road? in the Key Project of Teaching Reform Research Project of Undergraduate Universities in Shandong Province in 2018(Z2018S010).

通讯地址
Feng S.; Engineering Training Centre, Qilu University of TechnologyChina; 电子邮件: shanxinhh77@163.com

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委托单位：齐鲁工业大学

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1、《科学引文索引》（Science Citation Index Expanded）简称 SCI-EXPANDED

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3、《Scopus 摘要与引文数据库》简称 Scopus

4、《韩国期刊数据库》（KCI-Korean Journal Database）简称 KCI

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5	PubMed	篇		
6	A&HCI	篇		

特此证明

详细结果见附件

检索员（签字）：曹君

技术职务：馆员

哈尔滨工业大学科技查新站

2020 年 5 月 2 日

附件：

Engineering Village

1.

Accession number: 20201708505741

Title: **Innovative production of lead-free wood leafhopper under high temperature firing environment**

Authors: Feng, Shanxin ; ZhengSun ; Wang, Yurong

Author affiliation: Engineering training centre, Qilu University of Technology, Jinan; Shandong, China
Faculty of Decorative Arts, Silpakorn University, Bangkok, Thailand
Institute of Art and Design, Qilu University of Technology, Jinan; Shandong, China

Corresponding author: Feng, Shanxin (shanxinhh77@163.com)

Source title: Materials Science Forum

Abbreviated source title: Mater. Sci. Forum

Volume: 980

Issue date: 2020

Publication year: 2020

Pages: 79-87

Language: English

ISSN: 02555476

E-ISSN: 16629752

CODEN: MSFOEP

Document type: Journal article (JA)

Publisher: Trans Tech Publications Ltd

Abstract: The lead-free wood leafhopper is the iconic traditional ceramic art of the Jizhou kiln in the Song Dynasty of China. The traditional lead-free wood leafhopper is usually made of black glaze. The glaze is placed on the mulberry leaf and fired at a high temperature of about 1230 °C-1260 °C. And the veins are clear. Jizhou kiln was founded in the late Tang Dynasty. It flourished in the Five Dynasties and Northern Song Dynasty. It was the first prosperous in the Southern Song Dynasty. It began to decline in the late Yuan Dynasty and then stopped for more than 700 years. However, its unique artistic value has gradually be attracted the attention by the world. And it recovered in 1985 at last after unremitting efforts. The re-burning of the lead-free wood leafhopper has successfully opened the ceramic market of the lead-free wood leafhopper and made it occupy a certain position in the ceramic market. The price of lead-free wood leafhopper has remained high, and therefore ceramic producers are waiting for opportunities to produce on a large scale in order to achieve huge economic benefits. However, due to the great difficulty in the firing process of the lead-free wood leafhopper, the market has a phenomenon of low yield, high price, low consumer desire, and the use of chemical materials to fire products. The subject analyzed and solved these phenomena through a large number of experiments. Lead-free in this subject is a relatively broad definition, especially referring to the new type of lead-free wood leafhopper without contain heavy metals.

Number of references: 8

Main heading: Wood

Controlled terms: Commerce - Glazes - Heavy metals - Kilns

Uncontrolled terms: Artistic value - Broad definitions - Ceramic markets - Chemical materials - Economic benefits - High temperature - High-temperature firing - Traditional ceramics

Classification code: 531 Metallurgy and Metallography - 642.2 Industrial Furnaces and Components - 811.2 Wood and Wood Products - 813.2 Coating Materials

Numerical data indexing: Age 7.00e+02yr, Temperature 1.50e+03K to 2.73e+02K

DOI: 10.4028/www.scientific.net/MSF.980.79

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Database: Compendex

Scopus

文献

Feng, S.[a b], ZhengSun[c], Wang, Y.[c]

Innovative production of lead-free wood leafhopper under high temperature firing environment
(2020) *Materials Science Forum*, 980, pp. 79-87.

DOI: 10.4028/www.scientific.net/MSF.980.79

[a] Engineering training centre, Qilu University of Technology, Jinan, Shandong, China
[b] Faculty of Decorative Arts, Silpakorn University, Bangkok, Thailand
[c] Institute of Art and Design, Qilu University of Technology, Jinan, Shandong, China

摘要
The lead-free wood leafhopper is the iconic traditional ceramic art of the Jizhou kiln in the Song Dynasty of China. The traditional lead-free wood leafhopper is usually made of black glaze. The glaze is placed on the mulberry leaf and fired at a high temperature of about 1230 °C-1260 °C. And the veins are clear. Jizhou kiln was founded in the late Tang Dynasty. It flourished in the Five Dynasties and Northern Song Dynasty. It was the most prosperous in the Southern Song Dynasty. It began to decline in the late Yuan Dynasty and then stopped for more than 700 years. However, its unique artistic value has gradually be attracted the attention by the world. And it recovered in 1985 at last after unremitting efforts. The re-burning of the lead-free wood leafhopper has successfully opened the ceramic market of the lead-free wood leafhopper and made it occupy a certain position in the ceramic market. The price of lead-free wood leafhopper has remained high, and therefore ceramic producers are waiting for opportunities to produce on a large scale in order to achieve huge economic benefits. However, due to the great difficulty in the firing process of the lead-free wood leafhopper, the market has a phenomenon of low-yield, high price, low consumer desire, and the use of chemical materials to fire products. The subject analyzed and solved these phenomena through a large number of experiments. Lead-free in this subject is a relatively broad definition, especially referring to the new type of lead-free wood leafhopper without contain heavy metals. © 2020 Trans Tech Publications Ltd, Switzerland.

作者关键字
Color glaze; Innovation; Lead-free; Lead-free wood leafhopper

索引关键字
Commerce, Glazes, Heavy metals, Kilns; Artistic value, Broad definitions, Ceramic markets, Chemical materials, Economic benefits, High temperature, High-temperature firing, Traditional ceramics; Wood

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Special thanks for: Shandong Provincial People?s Government Degree Committee, Shandong Province Graduate Education Quality Improvement Program ?Modern Ceramic Art Creation?, A Study on the Training Mode of International Art Design Talents under the Vision of ?One Belt, One Road? in the Key Project of Teaching Reform Research Project of Undergraduate Universities in Shandong Province in 2018 (Z2018S010).

通讯地址
Feng S.; Engineering training centre, Qilu University of TechnologyChina; **电子邮件**: shanxinhh77@163.com

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委托人：冯善鑫

委托单位：齐鲁工业大学

检索数据库和检索年代：（默认数据库提供的时间范围）

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3、《国际会议录索引》（Conference Proceedings Citation Index）简称 CPCI

4、《中国知网》简称 CNKI

5、《期刊引证报告》（Journal Citation Reports）简称 JCR

6、《中文社会科学引文索引》（Chinese Social Science Citation Index）简称 CSSCI

检索结果：

序号	数据库	收录	引用频次	他引频次
1	SCI	1 篇	0	0
2	EI	篇		
3	CPCI	篇		
4	CNKI	篇		
5	JCR	1 篇		
6	CSSCI	篇		

特此证明

详细结果见附件

检索员（签字）：曹君

技术职务：馆员

哈尔滨工业大学科技查新站

2019 年 10 月 31 日

科技文献查新专用章

附件：

Close

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Page 1 (Records 1 -- 1)
[1]

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Record 1 of 1

Title: THE MAGNETIZATION AND PURIFICATION OF DRINKING WATER BY SPECIAL PURPLE SAND MATERIALS UNDER DIFFERENT FIRING TEMPERATURE

Author(s): Liu, MS (Liu, Musen); Feng, SX (Feng, Shanxin)

Source: THERMAL SCIENCE **Volume:** 23 **Issue:** 5 **Special Issue:** SI **Pages:** 2535-2541 **DOI:** 10.2298/TSCI181117141L **Part:** A **Published:** 2019

Times Cited in Web of Science Core Collection: 0

Total Times Cited: 0

Usage Count (Last 180 days): 0

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Cited Reference Count: 9

Abstract: Traditional purple sand has the function of magnetized water quality. This study refers to the characteristics of purple sand and produces a new ceramic raw material with magnetized water quality. In this paper, the key conditions and influencing factors influencing the purple sand making process are studied. The materials involved in the production process are formulated and a new material formulation for ceramic firing is prepared. Ceramic products in the research results can not only improve drinking water quality, but also provide new materials for the field of medical water purification. The application of new materials will improve product quality and reduce production cost.

Accession Number: WOS:000490349400003

Language: English

Document Type: Article

Author Keywords: new type of purple sand material; magnetized water; water purification; medical water; firing temperature

KeyWords Plus: QUALITY; FIBER

Addresses: [Liu, Musen] Qilu Univ Technol, Shandong Acad Sci, Coll Art, Jinan, Shandong, Peoples R China.
[Feng, Shanxin] Qilu Univ Technol, Shandong Acad Sci, Engn Training Ctr, Jinan, Shandong, Peoples R China.

Reprint Address: Feng, SX (reprint author), Qilu Univ Technol, Shandong Acad Sci, Engn Training Ctr, Jinan, Shandong, Peoples R China.

E-mail Addresses: shanxinhh77@163.com

Publisher: VINCA INST NUCLEAR SCI

Publisher Address: MIHAJLA PETROVICA-ALASA 12-14 VINCA, 11037 BELGRADE, POB 522, BELGRADE, 11001, SERBIA

Web of Science Categories: Thermodynamics

Research Areas: Thermodynamics

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ISSN: 0354-9836

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29-char Source Abbrev.: THERM SCI

ISO Source Abbrev.: Therm. Sci.

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General Project of the Social Science Planning Research Project of the Ministry of Education	12YJA760037
Cultural and Educational Social Science Research Project of China	SDYC13039 17YJC760042
Key Project of Art Science in Shandong Province	201706337

Special thanks for: Key Subjects of Art Science in Shandong Prowince (CZ1710007), Cultural and Educational Social Science Research Project of Shandong Province (11CWYJ14), The General Project of the Social Science Planning Research Project of the Ministry of Education (12YJA760037), Cultural and Educational Social Science Research Project of China, (SDYC13039), Cultural and Educational Social Science Research Project of Shandong Province, (4CWYJ27), Education Quality Improvement Project of Shandong Graduate Student, The Key Project of Art Science in Shandong Province (201706337), Cultural and Educational Social Science Research Project of China, (17YJC760042).

Open Access: DOAJ Gold

Output Date: 2019-10-31

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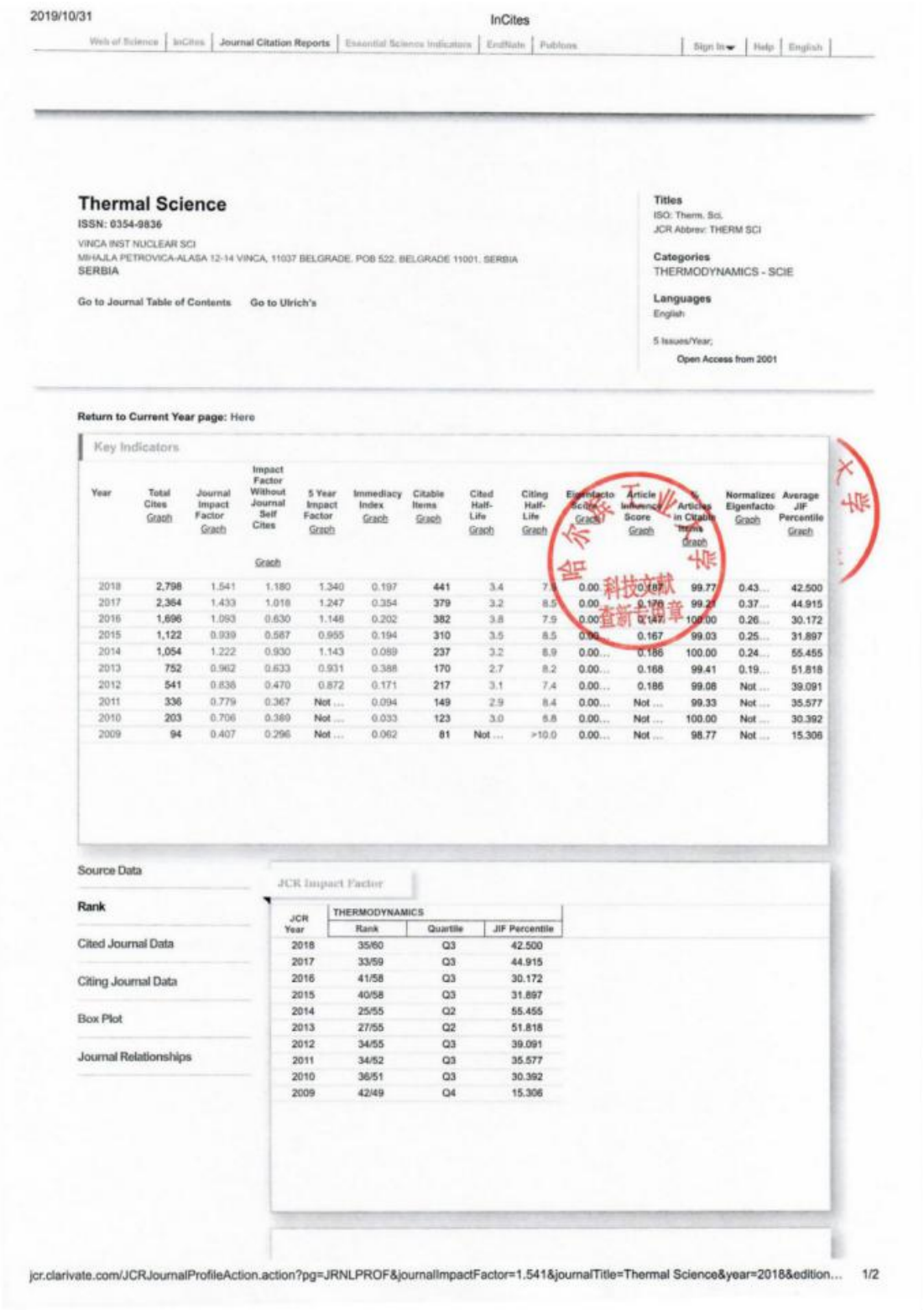

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SERBIA

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Titles
ISO: Therm. Sci.
JCR Abbrev: THERM SCI

Categories
THERMODYNAMICS - SCIE

Languages
English

5 Issues/Year;

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Key Indicators

Year	Total Cites Graph	Journal Impact Factor Graph	Impact Factor Without Journal Self Cites Graph	5 Year Impact Factor Graph	Immediacy Index Graph	Citable Items Graph	Cited Half-Life Graph	Citing Half-Life Graph	Eigenfacto Score Graph	Article Influence Score Graph	% Articles in Citable Items Graph	Normalized Eigenfacto Graph	Average JIF Percentile Graph
2018	2,798	1.541	1.180	1.340	0.197	441	3.4	7.9	0.00...	0.167	99.77	0.43...	42.500
2017	2,364	1.433	1.018	1.247	0.354	379	3.2	8.5	0.00...	0.170	99.21	0.37...	44.915
2016	1,696	1.093	0.630	1.148	0.202	382	3.8	7.9	0.00...	0.147	100.00	0.26...	30.172
2015	1,122	0.939	0.587	0.955	0.194	310	3.5	8.5	0.00...	0.167	99.03	0.25...	31.897
2014	1,054	1.222	0.930	1.143	0.089	237	3.2	8.9	0.00...	0.186	100.00	0.24...	55.455
2013	752	0.962	0.633	0.931	0.388	170	2.7	8.2	0.00...	0.168	99.41	0.19...	51.818
2012	541	0.838	0.470	0.872	0.171	217	3.1	7.4	0.00...	0.186	99.08	Not ...	39.091
2011	336	0.779	0.367	Not ...	0.094	149	2.9	8.4	0.00...	Not ...	99.33	Not ...	35.577
2010	203	0.706	0.389	Not ...	0.033	123	3.0	6.8	0.00...	Not ...	100.00	Not ...	30.392
2009	94	0.407	0.296	Not ...	0.062	81	Not ...	>10.0	0.00...	Not ...	98.77	Not ...	15.306

Source Data

Rank

Cited Journal Data

Citing Journal Data

Box Plot

Journal Relationships

JCR Impact Factor

JCR Year	THERMODYNAMICS Rank	Quartile	JIF Percentile
2018	35/60	Q3	42.500
2017	33/59	Q3	44.915
2016	41/58	Q3	30.172
2015	40/58	Q3	31.897
2014	25/55	Q2	55.455
2013	27/55	Q2	51.818
2012	34/55	Q3	39.091
2011	34/52	Q3	35.577
2010	36/51	Q3	30.392
2009	42/49	Q4	15.306

jcr.clarivate.com/JCRJournalProfileAction.action?pg=JRNLPROF&journalImpactFactor=1.541&journalTitle=Thermal Science&year=2018&edition... 1/2

文章收录引用检索证明

委托人：冯善鑫

委托单位：齐鲁工业大学

检索数据库和检索年代：（默认数据库提供的时间范围）

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特此证明

详细结果见附件

检索员（签字）：曹君

技术职务：馆员

哈尔滨工业大学科技查新站

2019 年 10 月 31 日

科技文献查新专用章

附件：

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Page 1 (Records 1 -- 1)
[1]

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Record 1 of 1

Title: STUDY ON THE CONTENT OF TRACE BENEFICIAL ELEMENTS IN DRINKING WATER BY NEW NEEDLE STONE CERAMIC MATERIALS UNDER DIFFERENT HEATING CONDITIONS

Author(s): Liu, MS (Liu, Musen); Feng, SX (Feng, Shanxin)

Source: THERMAL SCIENCE **Volume:** 23 **Issue:** 5 **Special Issue:** SI **Pages:** 2543-2550 **DOI:** 10.2298/TSCI181117142L **Part:** A **Published:** 2019

Abstract: In this paper, the rich in calcium and magnesium zinc chrome strontium selenium and other 40 kinds of trace elements beneficial to human body and mineral material analysis, developed a new kind of new needle stone ceramic materials that can change the drinking water quality. Existing ceramic materials, although some contain trace elements. Some existing ceramic materials of the human body needs trace elements, but its chemical properties of stability, very difficult to apply to water. Which are rich in stone needle component of ceramic material, not only can improve water quality in the drinking water is rich in many kinds of trace elements, and on the form has the very good plasticity, can be processed to produce forms of household appliances and other functional products, also can make particles added to the water purification device in long time used in this paper, first of all, the main factors of affecting the content of trace elements in drinking water done in-depth research, and then according to the material, the factors which influence study materials can be widely used in drinking water purification and treatment.

Accession Number: WOS:000490349400004
Language: Welsh
Document Type: Article
Author Keywords: trace elements; drinking water; needle stone ceramic materials; water quality
KeyWords Plus: LOW-COST; FIBER

Addresses: [Liu, Musen] Qilu Univ Technol, Shandong Acad Sci, Coll Art, Jinan, Shandong, Peoples R China.
[Feng, Shanxin] Qilu Univ Technol, Shandong Acad Sci, Engn Training Ctr, Jinan, Shandong, Peoples R China.
Reprint Address: Feng, SX (reprint author), Qilu Univ Technol, Shandong Acad Sci, Engn Training Ctr, Jinan, Shandong, Peoples R China.
E-mail Addresses: shanxinhh77@163.com

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Key Project of Art Science in Shandong Province	201706337

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Titles
ISO: Therm. Sci.
JCR Abbrev: THERM SCI

Categories
THERMODYNAMICS - SCIE

Languages
English

5 Issues/Year;
Open Access from 2001

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Key Indicators

Year	Total Cites Graph	Journal Impact Factor Graph	Impact Factor Without Journal Self Cites Graph	5 Year Impact Factor Graph	Immediacy Index Graph	Citable Items Graph	Cited Half-Life Graph	Citing Half-Life Graph	Eigenfacto Score Graph	Article Influence Score Graph	% Articles in Citable Items Graph	Normalizec Eigenfacto Graph	Average JIF Percentile Graph
2018	2,798	1.541	1.180	1.340	0.197	441	3.4	7.9	0.00...	0.187	99.77	0.43...	42.500
2017	2,364	1.433	1.018	1.247	0.354	379	3.2	8.5	0.00...	0.176	99.21	0.37...	44.915
2016	1,696	1.093	0.630	1.146	0.202	382	3.8	7.9	0.00...	0.147	100.00	0.26...	30.172
2015	1,122	0.939	0.587	0.955	0.194	310	3.5	8.5	0.00...	0.167	99.03	0.25...	31.897
2014	1,054	1.222	0.930	1.143	0.089	237	3.2	8.9	0.00...	0.186	100.00	0.24...	55.455
2013	752	0.962	0.633	0.931	0.388	170	2.7	8.2	0.00...	0.168	99.41	0.19...	51.818
2012	541	0.838	0.470	0.872	0.171	217	3.1	7.4	0.00...	0.186	99.08	Not ...	39.091
2011	336	0.779	0.367	Not ...	0.094	149	2.9	8.4	0.00...	Not ...	99.33	Not ...	35.577
2010	203	0.706	0.389	Not ...	0.033	123	3.0	8.8	0.00...	Not ...	100.00	Not ...	30.392
2009	94	0.407	0.296	Not ...	0.062	81	Not ...	>10.0	0.00...	Not ...	98.77	Not ...	15.306

Source Data
Rank
Cited Journal Data
Citing Journal Data
Box Plot
Journal Relationships

JCR Impact Factor

JCR Year	THERMODYNAMICS		
	Rank	Quartile	JIF Percentile
2018	35/60	Q3	42.500
2017	33/59	Q3	44.915
2016	41/58	Q3	30.172
2015	40/58	Q3	31.897
2014	25/55	Q2	55.455
2013	27/55	Q2	51.818
2012	34/55	Q3	39.091
2011	34/52	Q3	35.577
2010	36/51	Q3	30.392
2009	42/49	Q4	15.306

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VITA

NAME	Shanxin FENG
DATE OF BIRTH	24 Match 1987
PLACE OF BIRTH	shandong, China
INSTITUTIONS ATTENDED	Qilu University of Technology
HOME ADDRESS	3501 Daxue Rd, Changqing District, Jinan, Shandong, China
PUBLICATION	1.The Engineering Index, Application Research of High Temperature Silver Plating in Products, 3/3Materials Science Forum (Volume 980) ISSN:1662-9752 70-78 2.The Engineering Index, Research on the Application of Porous Ceramic Waste Gas Purification Device in Ceramic Kiln, 1/3 Materials Science Forum (Volume 980) ISSN:1662-9752 410-418 3.The Engineering Index, Innovative production of lead-free wood leafhopper under high temperature firing environment, 1/3 Materials Science Forum (Volume 980) ISSN:1662-9752 79-87 4.Science Citation Index, The magnetization and purification of drinking water by special purple sand materials, 2/2 Thermal Science 23(2019):141-141. 5.Science Citation Index, Study on the content of trace beneficial elements in drinking water by new needle stone ceramic materials, 2/2, Thermal Science, 23(00):142-142 6.International invention patent, PREPARATION METHOD OF A LEAF-BASED CERAMIC GLAZE FIELD OF INVENTION, 1/4 KHRRP-CN20200004 7.Chinese invention patent CN201910101076.6
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