

Artistic Characteristics of Moire in Qin and Han Tiles: A Review

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Abstract. This topic from the eaves tiles in China, building tile, floor tile and pantile two kinds, its production method is to use mud first article against similar ceramic pipe cylindrical billet plate, and then cut in half, as two and a half round Jane watts, if cut into three parts, namely become floor tile after they were made, on Jane watts front end then modelled or half-round eaves tiles .This kind of firing of simple tiles and slat tiles originated in the Western Zhou Dynasty, and was unearthed in large number in the ruins of the Western Zhou Palace in Fufeng Qishan, Shaanxi Province. The issue here is that it reflects the great creation of the ancient Chinese labouring people in building pottery, and created the first building with tile roof. The objective is to understand the phenomenon underlying with regard to this topic. For methodology part, we have made a case example based on Moire in Qin and Han Tiles and carried out comprehensive reviews from the existing reading materials. In conclusion, from the following relationship of the main line: art and science and technology, art is romantic, perceptual, moving, exciting technology is rational, rigid and meticulous combination of the two research, the result is bound to be greater than or equal to the sum of the two Secondly, the classical traditional patterns and modern fashion patterns of the comparative study, the use of predecessors' artistic achievements, for our today's design inspiration to increase the creation of elements.

Keywords: Artistic, Characteristics of Moire, Design, Literature Review, Tiles.

1. Introduction

This topic focuses on the study of the artistry of the two patterns, at the same time, the artistry of the two patterns will be processed and collated to find their internal connection and difference [1]. In this paper, the choice of the two patterns, respectively, is the representative of the Qin brick and Han tiles in the Chinese traditional architecture, tile pattern; And nano-material sweeping new energy materials under the electron microscope scanning images Chinese patterns represents the highest level of Chinese traditional aesthetic, the eaves tiles for thousands of years, productivity under the extreme, in ancient times, diligence of the Chinese people, with wisdom and hands, clay fired into eaves tiles and put on the most beautiful and good life yearning to cloud patterns. The sun patterns of water ripple Animal lines such as forms [2-5] of expression, we hope life rich Peaceful country and safe people. Can we learn from the most primitive patterns to extract the design elements of folk art unconsciously [7-10], compared with the contemporary design elements, ancient open today, the past is the significance of this topic nano-material new energy materials in today's world is more and more highlights its dominance, depletion of non-renewable energy [11-13]. The limited exploitation of energy materials due to global warming has led scientists in materials research to turn their research on new energy materials to nano-material, which is very hot. However, such new energy materials are different from ordinary materials Common materials are essentially different. This topic hopes to analyze and recreate the microscopic world through the scanning images taken from the perspective of scanning electron microscopy and may reveal a property similar to the sequence maps or locus to represent the genetic structure or genome standard of styling DNA studies.

2. Frame of references

In the history of Chinese architecture, the invention and use of terracotta tiles are of symbolic significance. In the study of terracotta tile history, the tile is the most representative. As one of the building components of ancient houses in China, the tile can not only beautify buildings, but also protect wooden houses. It can be said that killing two birds with one stone. It is a kind of tile placed at the end of the roof of the house by the ancients, commonly known as "tuan watt" or "watt". Usually a part of the eaves, the ancient people would draw various graphics and words in the tile to show the social background and spiritual culture of that time. It can be known from the literature that the ancient building tile in China began in the Xia Dynasty [14-16]. But from the archaeological data, the palace, temples and other large buildings in the Shang Dynasty, there is no trace of tile. So far, the earliest physical excavations of tiles appeared in the early Western Zhou Dynasty, located in the Zhouyuan site of Fufeng Qishan [17-19]. This changed the state of ancient Chinese architecture from "rafters" to a crisscrossed wooden house structure, opening up a new regulation for the history of ancient Chinese architecture. The study of ancient tiles has a long history. At that time, stone experts had begun to collect ancient tiles. Until the Ming and Qing Dynasties, the research on the tile became increasingly rich, which made the ancient tile more and more attention by the academic circle, and related works were published one after another. In terms of The Times and contents of ancient tiles, most of them were gathered in the Qin and Han Dynasties, and the content patterns depicted by tile tiles were mainly Moire and characters. In the study of ancient tiled patterns, we should not be limited to the interpretation of the face pattern of the tiled, we should combine the pattern of the tiled with the historical background, architectural structure and so on.

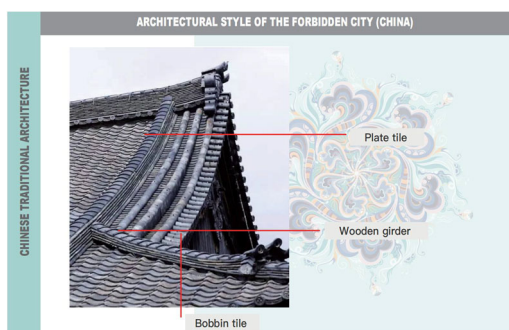


Figure 1: Chinese history architecture

The tiles unearthed from the Piyong Site of Chang'an City of Han Dynasty are all round tiles with plain face, which makes us have to combine this situation with the social background and historical culture at that time. As one of the witnesses of history, architecture solidifies the rise and fall and culture of an era. And the appearance of tile, not only can achieve the effect of beauty, but also can protect the building, prolong the service life of the building, but also from the side of the announcement of the status of the life of the building users, is an indispensable part of China's ancient architecture, for our future generations of archaeology.

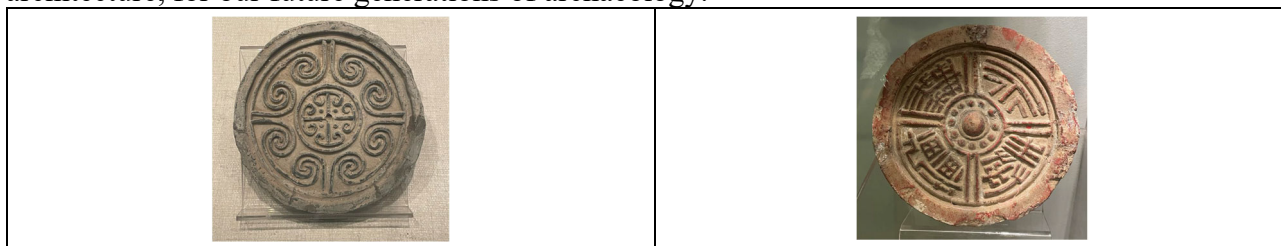


Figure 2: Chinese traditional tile pictures

The study of the work provides a large number of historical data basis, has a very important academic significance. As a traditional Chinese pattern, tile Moire not only has profound cultural deposits and historical accumulation, but also has become an important material for modern decorative patterns, which provides more possibilities for our new design sources."Qin bricks and

Han tiles" indicates the brilliant architectural decoration of this period. The tile of the Han Dynasty is the most excellent animal decoration. In addition to the four gods of the perfect shape, namely the blue dragon, the white tiger, the rose finch and the basalt, there are also many varieties of rabbits, deer, oxen and horses. In Qin Dynasty, lotus pattern, kwai pattern and Moire pattern were the most common tiles. The giant tile ornaments unearthed from the ruins of the Qin Palace are decorated with animal morphing patterns, similar in style to bronze and jade ware. Architecture can most directly reflect the cultural connotation, political, economic and scientific and technological development of a certain period, as shown in (Figure 1-3).



Figure 3: Extraction artistic elements of Chinese tile

We proposed from the perspective of fine arts, xi 'an part dynasty art design to carry out the analysis and research of cultural relics, such as dependency of xi 'an Qin Han tang zhou period chinese tiles art study, focuses on the artistic expression characteristics and evolution laws, as the case can also be compared with similar modern artistic expression characteristics, the characteristic of the expression or predict the future direction On the basis of clear pattern induction and research, combined with the new concept of cultural tourism, the development of tourism cultural and creative products is carried out, so as to achieve the industrialization transformation of cultural and creative products, and make cultural exchange and mutual learning take cultural and creative products as the carrier.

3. Why Nano-material materials?

Nano-material, a combination of the word "graphite" and the suffix-ene, was named after Hanns-Peter Boehm, who described a single layer of carbon foil in 1962. nano-material was first described in 1987 as a component of graphite intercalation compounds (GICs). Conceptually, GIC is a crystalline salt of the imbedding agent and nano-material. The term was also used in the early description of carbon nanotubes, as well as epitaxial nanomaterial and polycyclic aromatic hydrocarbons. nano-material can be thought of as an "infinitely alternate" (with only six carbon rings) polycyclic aromatic hydrocarbon. The IUPAC Technical Outline states: "Previously, the terms graphite layer, carbon layer or carbon sheet have been used to describe nano-material. It is incorrect to use the term containing graphite in a single layer. Graphite implies a three-dimensional structure. The term nano-material should only be used when discussing the reactions, structural relationships or other properties of the layers." Geim defines "isolated or unsupported nano-material" as "nano-material is a single atomic plane of graphite that can only be considered unsupported if it is sufficiently isolated from its environment (which is critical)." This definition is narrower than the IUPAC definition and refers to nano-material that is split, transferred and suspended. Other forms of nano-material (such as those grown on various metals) can also become unsupported, for example in a suspended state or transferred to silicon dioxide (SiO₂) or silicon.

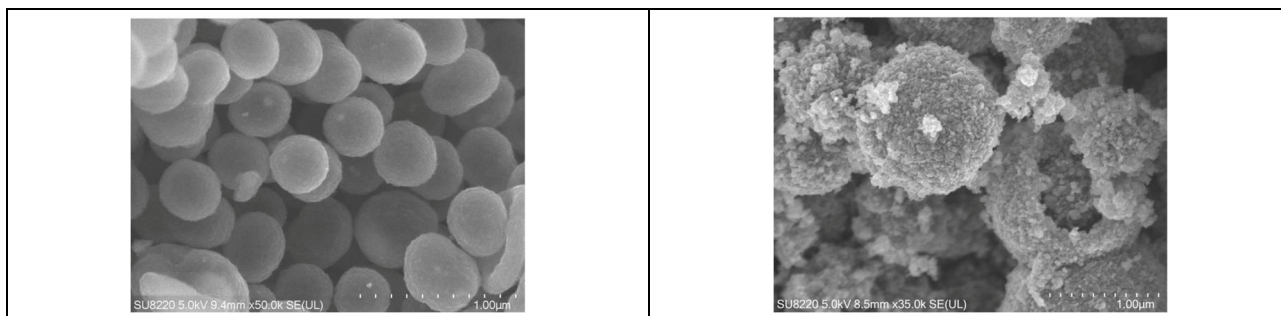


Figure 4: Scanning electron microscope image

Nano-material is a crystalline allotrope of carbon with two-dimensional properties. Its carbon atoms are packed together in a regular, atomic-scale wire mesh (hexagons). Each atom has four bonds, one σ bond and one of its three adjacent atoms, and one π key off the plane. The distance between the atoms is about 1.42 Å. The hexagonal lattice of nanomaterial can be thought of as two staggered triangular lattices. This idea has been successfully used to calculate the band structure of individual graphite layers. nano-material's stability is due to its tightly packed carbon atoms hybridized with sp^2 orbitals -- the sigma bond formed by s orbitals, P_x and P_y . The last p_z electron forms the π bond. The π bonds hybridize together to form the π band and the π^* band. These bands are responsible for most of nano-material's remarkable electronic properties, as it is a semi-filled band that allows free movement of electrons. nano-material sheets in solid form usually show diffraction evidence of accumulation in the direction of graphite (002). The same is true of some single-walled nanostructures. However, unpeeled nano-material with only (HK0) rings was found in the core of the graphite onion before the sun. Transmission electron microscopy (TEM) showed that there were defects on the flat nano-material sheets and proposed the role of melt twodimensional crystallization.

When nano-material is exposed to carbon-containing molecules, such as hydrocarbons, it can self-repair holes in the sheets. Bombarded by pure carbon atoms, the atoms perfectly arrange themselves into hexagons, completely filling the holes. The atomic structure of monolayer nano-material was studied by transmission electron microscopy (TEM). The electron diffraction pattern shows the expected honeycomb lattice. The suspended nano-material also showed "ripples" in the flat plate, with an amplitude of about 1 nanometer. Due to the instability of two-dimensional crystals, these ripples may be inherent to the material, or may result from the ubiquitous grime seen in all TEM images of nano-material. Atomic resolution real space image SiO_2 substrates of isolated monolayer nano-material can be obtained by scanning tunnelling microscopy. Photoresist residues, which must be removed to obtain an atomic-resolution image (Ishigami et al., 2007), may be "adsorbents" observed in the transmission electron microscope image and may account for the observed wrinkles. The creases in SiO_2 are caused by the conformation of nano-material with the underlying SiO_2 and are not inherent.as shown in (Figure 4).

Nano-material is the only form of carbon (or solid material) in which, due to its 2D structure, each atom can react chemically from both sides. The atoms at the edges of nanomaterial sheets have special chemical reactivity. nano-material has the highest ratio of edge atoms of any allotrope atom. Layer defects increase their chemical reactivity. The monolayer nano-material plane reacts with oxygen at an initial temperature below 260 °C (530 K). nanomaterial burns at very low temperatures (e.g., 350 °C (620 K)). nano-material is usually modified with oxygen - and nitrogen-containing functional groups and can be analyzed by infrared spectroscopy and X-ray photoelectron spectroscopy. However, the oxygen and nitrogen functional groups used to determine the structure of nano-material require very good structural control. In 2013, Stanford University physicists reported that single-layer nanomaterial is 100 times more chemically reactive than thicker sheets (Yamada et al., 2013).

4. Case Example

Tile pattern: negative reputation of the starting point of the ancient silk road of China, the Qin brick and Han tile has a long history and unique style, throughout the ancient and modern, bearing the weight of thousands of years of culture, the accumulation of historical traces along with recent years One Belt And One Road The concept and initiative of regional cooperation and development put forward that Shaanxi has unique advantages in geographical location and policy tendency, and China is committed to carrying forward traditional culture and improving cultural confidence under the new situation. Qin bricks and Han tiles have once again gained a rare opportunity to attract the attention of the world. Therefore, how to use the means of intangible cultural heritage protection to sort out their artistic value, and how to promote their national recognition and reshape their industrial image through the form of cultural and creative souvenirs has become the focus of research.

In the Warring States Period, the form of tile was semi-circular. In the Qin Dynasty, tile was developed from semi-circular to circular. The making of tile in the Han Dynasty was very prosperous (Figure 5a and 5b).a) Roll Moire tile this kind of tile is generally in the circle for four equal parts, each act the role of a roll of Moire its change is more, or symmetrical, in the middle separated by a straight line, the contrast of the curve and the straight line; Or as the same rotation, full of rhythm. b) Animal pattern tile, this tile is mainly decorated with deer pattern, fish pattern,swallow pattern, etc. c) Four God pattern tile, this kind of tile is decorated with four God pattern, namely blue dragon, white tiger, rose bird, Xuanwu. The mental function of the Han dynasty have four gods had to ward off bad luck to get rich, Han dynasty eaves tiles, four God performed several kinds of animals in the circular composition image, is very vivid and natural, energetic and strong, is the high-quality goods in pattern design. d) The word class eaves tile such eaves tiles skilfully in words as a decoration, design extremely beauty, words are mostly some auspicious, Long live a thousand years of prosperity and wealth and so on this use of text as decorative content of the expression, concentrated to reflect the characteristics of the Han Dynasty decoration.

Qin dynasty the Chahal is very rich, has the very high artistic value Qin dynasty brick and tile also has a reputation Qin brick hard, is called lead brick, hollow brick is prevalent in the warring states qin and han dynasties period giant building material, decorated with mostly on its design, more is a geometric pattern Animal motifs and history or mythology Qin dynasty dragon hollow bricks, design used stamps, in the front Upper and right three sides have pattern Front and side on the central BiWen ACTS the role of two dragon, phoenix bird and Ganoderma lucidum, and attached the right act the role of taking a dragon The full filled, leaving no gaps, appears plump guileless, longfeng image, solemn mystery, its bold, has a unique temperament of Qin and Han dynasties works of art The han dynasty brick has two kinds of hollow or solid brick. nano-material scanning images: Study the scanning images of nano-material materials, try to find the connection between the shapes of objects in the microscopic world of the scanning images, and recreate these existing shapes with the concept of artistic design The concept of scientific and technological innovation is integrated into daily design to provide reference data and templates for future scientific and technological innovation poster design.



Figure 5: Problem statement of research object

5. Discussion

Through the study of Moire tile in the Qin and Han Dynasties, the modelling, composition, colour and other elements of Moire are integrated into this subject research, so as to enhance the influence of traditional Chinese culture and provide a new guiding role for the application of tile culture in the design of modern cultural and creative products (Figure 6).

The analysis of the cultural connotation and pattern of the Moire of the tile will help us to know the political and cultural influence of the tile on the Qin and Han people at that time, and strengthen our protection and understanding of the intangible cultural heritage Through to the Qin and Han dynasties patterns of the eaves tiles to explore help improve the economic development of relevant accessory eaves tiles culture, and the development of Shaanxi Qin Zhuan Han Wa related art products or have certain effect to help. Through the nano-material under the electron microscope scanning image density rhythm perspective, aesthetic perspective, the visual effect is analysed Find the internal composition law of nano-material scanning images, analyse the arrangement form of nano material materials, discover its aesthetic value, and interpret the charm of science and technology from the perspective of art.

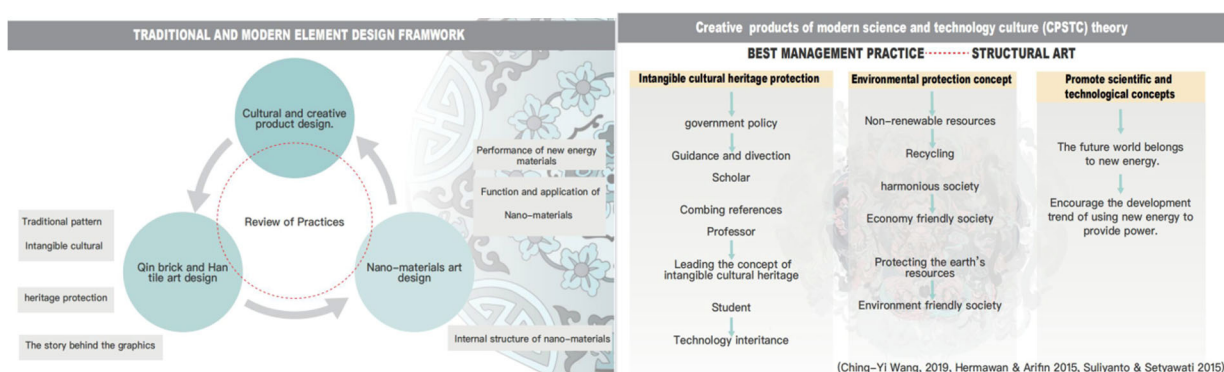


Figure 6: Construction of research model

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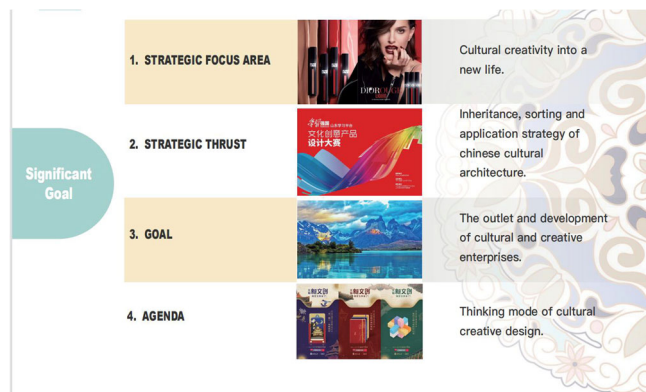


Figure 7: Significant goal

5.1 Theoretical significance

Tile is one of the most important parts of traditional Chinese architecture. Its appearance and development are interrelated and mutually restricted with Chinese society. As the carrier of Chinese culture, tile reflects Chinese history, culture, politics and national beliefs, and is one of the indispensable objects in China. In 2005, Geim's group J and Kim's group H found that nano-material at room temperature had a high carrier mobility 10 times that of commercial silicon wafers (about $10 \text{ AM} / \text{V} \cdot \text{s}$), and was little affected by temperature and doping effects, showing ballistic transport characteristics at room temperature submicron scale (up to 0.3 at 300 K), which is as the nano electronic devices nano-material's most prominent advantage, make the electronic engineering field attractive room temperature ballistic field effect tube possible larger Fermi velocity and low contact resistance, is helpful to further reduce the device switching time, the operation of the ultra-high frequency response characteristic is another significant advantages of nano-material based electronic devices. In addition, the reduction of nano-material to nanoscale or even a single benzene ring also maintains good stability and electrical properties, making it possible to explore single electronic devices. The addition of nano-material to the battery electrode material can greatly improve the charging efficiency and increase the battery capacity. Self-assembled multilayer nano-material sheets are not only ideal for lithium-air batteries, but can also be used in many other potential energy storage applications such as supercapacitors and electromagnetic cannons. In addition, the new nano-material material does not rely on platinum or other precious metals, effectively reducing cost and environmental impact (Figure 8).

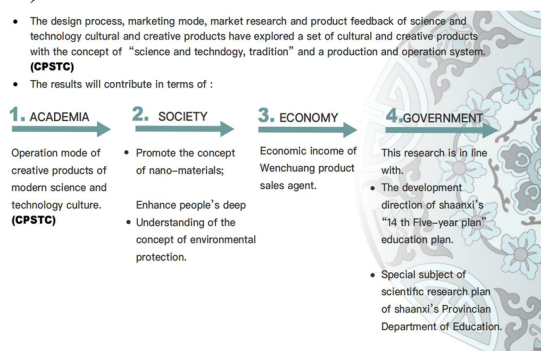


Figure 8: Explain the research significance from four aspects

5.2 Practical value

With the improvement of China's economic strength, in the pursuit of economic development, more and more attention is paid to the traditional Chinese culture of the Qin and Han Dynasty tile patterns, so that we can accurately discuss the cultural implication and social background at that time. Eaves tiles patterns long history, has a distinct traditional culture colour, eaves tiles unique pattern is other art forms are difficult to express the theme, by studying the case of Moire pattern application in

the clothing, the eaves tiles Moire design become conforms to the modern aesthetic requirements of the product, has the very high artistic value and cultural value [3-4] nano-material can also be applied to the transistor touchscreen Researchers in China have discovered that bacterial cells cannot grow on nano-material while human cells are not damaged. Using this, nano-material can be used to make bandages, food wrappers and even anti-bacterial T-shirts; nano-material-based photochemical cells could replace metal-based organic light-emitting diodes. nano-material could also replace traditional metallic graphite electrodes in lamps, making them easier to recycle. This material could not only be used to develop paper-thin materials for ultra-light aircraft It can even make the 23,000-mile-long space elevator that scientists dream of a reality.

5.3 Economic value

With the development of society, people's demand for spiritual culture is increasingly high, and the simple application of traditional pattern elements can no longer meet people's requirements for cultural and creative products Modern people pay more attention to the combination of spiritual culture and wen gen products, designed with interesting, practical and can meet people's aesthetic product Eaves tiles pattern as characteristic of traditional Chinese elements, however, will be sent to you by wen gen products and packaging design a variety of material such as the carrier, to promote eaves tiles patterns and the economic benefits of products, is of great significance to carry forward Chinese traditional culture In this project, the artistic design of nano-material scanning images is recreated, and the scientific and technological nature of nano-material is popularized in the form of illustrations, so that everyone can understand and feel the changes brought by scientific and technological progress, and arouse our mission of caring for the earth and protecting the earth .

5.4 How software assists the research process?

Software cartography: use PS, AI and other software to create patterns and draw renderings Compared with manual drawing, software drawing has the advantage of saving physical storage space and convenient transmission and sharing process. Hand-drawn images need to occupy a large amount of physical storage space and are prone to damage in wet and moth-eaten environment. The advantages of software drawing are more obvious in the collection of paper data (Figure 9).

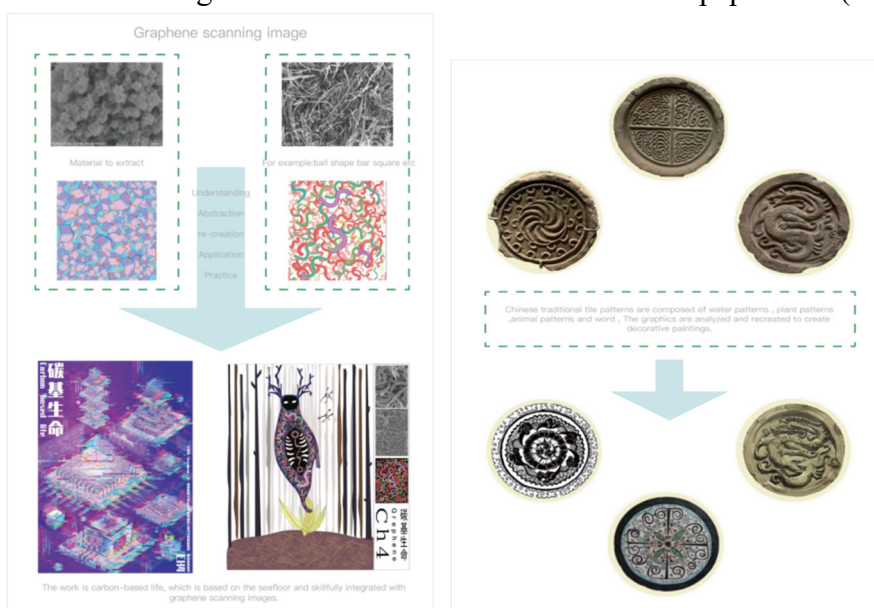


Figure 9: The research process

6. Conclusion

Tile promptly pantile head, main protecting roof, the effect of wind and rain erosion Be full of adornment effect again at the same time, make the building more beautiful Eaves tiles have strong different art style of The Times Qin dynasty eaves tiles, the vast majority of circular with grain, grain appearance mainly animal lines Plant grain and Moire 3 kinds Animal grain has a running deer Set the bird leopard and insects, etc.; Leaf veins in plant grain Lotus-shaped grain and kwai pattern Moire pattern eaves tiles structure, basically be edge wheel range, the eaves tiles with string lines are back into two laps, four etc between cylindrical part filled with all sorts of Moire, inner ring is acted the role of checkered reticulate lines Four leaf veins or tree leaf veins, etc This kind of Moire Han dynasty eaves tiles used, but line kind of the han dynasty qin dynasty thick some relatively Qin eaves tiles, rarely have words Han dynasty eaves tiles grain more fine, the picture looks vivid, followed period of dragon white tiger rosefinch God xuanwu four eaves tiles, xingshenjianbei, majestic gesture, is the representative work of this period Han dynasty eaves tiles, in addition to the common moire eaves tiles, a large amount of text is eaves tiles, many reflect the ruler's consciousness and desire, such as dry autumn, live for ever Han and the world The day Changle Weiyang Daji like riches and honour appropriate Hou Wang these words tile, font small Zhuan bird insect Zhuan official script true book, layout of dense have sent, Zhang Famao beautiful plain mellow, showing the beauty of unique Chinese characters Date and instalment of qin and han dynasties: qin dynasty to the early western Han dynasty with circular eaves tiles pantile, manufacturing methods, from the first tile on the drum transverse to a half, longitudinal cutting down again into a cylinder Cut half eaves tiles from the central watt tube connected So have significantly cut marks on the back of the tile To the western Han dynasty, in the middle of the tile was prepared using a selecting such assignment, tile tube is only do half cylinder, tile back with no signs of knife In addition, the Qin Dynasty with decorative round tile, no large cylinder in the centre, and the Han Dynasty will have cylindrical Qin tile narrow edge, knead by hand, uneven width, Han tile side wheel neat Qin tile area is not large, Han tile area is small also slightly larger than Qin tile.

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