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Performance Embodiment of Acrylic Material in Art Painting Creation

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ABSTRACT. In art painting creation, painting material is an important carrier. Acrylic as a young material has very wide applications in modern art. This study mainly analyzed the properties of acrylic material. Firstly, the emergence and development of acrylic were introduced, and then its material characteristics were analyzed. Finally, the performance embodiment of acrylic paintings was compared with oil paintings and watercolor paintings. It was found that acrylic paintings not only had some advantages of oil and watercolor paintings but also had own style characteristics; acrylic paintings also have advantages in durability and flexibility; acrylic paintings could present the characteristics that oil and watercolor paintings did not have while realizing the techniques of them. Acrylic paintings have a broad development space in art creation, which is worth further attention and promotion.

Key words: Acrylic material, Art, Painting creation, Performance comparison, Oil painting, Watercolor

INTRODUCTION

Art painting creation refers to expressing some thoughts and emotions through some materials, such as canvas and pigments, in a space or plane, which is an artistic activity reflecting social activities and natural life. With the development of the times, people's ideas and concepts are constantly changing, and for artists, the techniques and materials of art painting creation have been constantly changed and developed. The material of paintings is the carrier of an artist's artistic expression,[1] and moreover, it will have an impact on the form and theme of painting creation. Different materials have different usages and techniques. In primitive society, people used natural materials such as clay and charcoal in painting creation. With the development of economy and culture, wax paintings, mural paintings, and oil paintings appeared,[2,3] which improved the status of materials in art painting creation. The performance and application of various materials also attracted more and more attention from researchers. Trachtenberg *et al*.[4] studied the determination of the molecular composition of artworks and found that diacetylene headgroup had a very important effect on molecular recognition. Magrini *et al*.[5] studied Keith Haring's wall painting of *the Necker Children Hospital in Paris* and found through X-ray and electron microscope that severe material separation appeared in the wall painting. Through analyzing the fallen debris, they found that the wall painting was composed of organic pigments such as Naphthol red, phthalocyanine blue and green, and Hansa yellow, which were consistent with the pigments used by other artists. Amadori *et al*.[6] analyzed the works of the painter Lorenzo Lotto and found that his works were characterized by using color primers and multi-layer sequences with complex mixtures, which were typical of Venetians at that time. Pelosi *et al*.[7] found through spectroscopy and microscope that calcite, gypsum, anhydrite, and calcium oxalate were detected in the frescoes of the Forty Martyrs Church. In addition to the traditional pigments in the middle ages, there were also lead-based compounds and jarosite. In the field of art, acrylic material has been widely used as a substitute for oil paint.[8] It has been widely studied in aspects of art and culture.[9,10] Lombardo[11] reviewed and introduced a book "*Acrylic Painting Step-by-Step*" written by Gelbert *et al*. Ormsby *et al*.[12] introduced a British artist, John Holland, and analyzed his acrylic paintings to improve their understanding of Holland's paintings. Yi *et al*.[13] analyzed the painting language and expression technology of acrylic materials, and pointed out that the appearance of acrylic materials promoted the development of modern painting art to some extent. Zetina *et al*.[14] studied the acrylic material used by Gunter Gerzso in his works, and explored the painting materials and painting techniques through non-invasive methods, such as infrared, X-ray fluorescence, etc. Higgins and Gail[15] studied the technique of drawing birds with acrylic materials, and pointed out that the depth of background should be achieved by superposition. As acrylic material is relatively new in the field of painting, the relevant studies are few, and the understanding of its performance

in painting creation is also less. To further understand the performance characteristics of acrylic material, this study made a detailed analysis on acrylic material. This study analyzed its production, development, characteristics, and performance, and compared it with oil paintings and watercolor, making some contributions to the further exploration of the application prospect of acrylic material and the expansion of the new form of art painting creation. This work is conducive to the further application of acrylic material in art painting creation and the enrichment of modern art forms.

EXPERIMENTAL

Overview of Acrylic Material

According to different properties, painting materials can be divided into water-based materials, oily-based materials, dry materials, and emulsion materials, as shown in *Table* 1.

Water-based material is the earliest painting material used by human beings. It can be processed and modified at any time with water as the medium. It is a reversible painting material, which is characterized by fast drying and convenient use, but it can not achieve some unique texture effects. Oil-based material is an irreversible painting material, which has a wide range of color gamut and lightness, and strong expressive force. Its biggest defect lies in that a large part of oil-based materials have some harmful chemicals to human body. Dry material is non-transparent, lusterless, and rich in color, which do not need to be diluted by liquid, but it has poor adhesion and high requirements for preservation conditions. Emulsion material refers to the material produced by emulsification. It has characteristics of water-based material and oil-based material. It is not only lipophilic but also hydrophilic. It was first used in ancient Greece, and then it was widely used in Western murals and easel paintings. Unlike egg emulsion, acrylic material is a kind of synthetic emulsion, which is a pigment with acrylic resin as a medium.[16,17] Acrylic material has strong inclusiveness and adaptability and stable properties. It is colloid, aqueous, and transparent. Acrylic paintings can realize the techniques of oil and watercolor paintings and have strong expressive force. Acrylic material has unique advantages in painting.

***Table* 1.** Classification of painting materials

Water-based materials	Gouache, watercolor, Chinese painting, rock color
Oil-based materials	Traditional oil painting, solid oil painting
Dry materials	Color pen, pencil, charcoal pen
Emulsion materials	Egg emulsion, acrylic paint, ethylene, cellulose

In the preparation of acrylic pigment, firstly, methyl methacrylate, butyl acrylate, and acrylic acid are mixed evenly and poured into a 100 ml funnel, named liquid A. Then, ammonium persulfate, diacetone acrylamide, and water are mixed evenly. After being fully dissolved, it was poured into a 100 ml funnel and named liquid B. Water, OP-10, disodium fatty alcohol polyoxyethylene ether sulfosuccinate, and disodium alkylphenol polyoxyethylene ether sulfosuccinate were mixed evenly, heated in an electric furnace, stirred until transparent, and named liquid V. 1/3 of liquid A, 1/3 of liquid B, and liquid C were mixed and put into a 500 ml flask. The mixture was heated and pre-emulsified for 30 min. When the temperature of the material did not rise again, the polymerization reaction at 85°C was carried out for 30 min to make the material in a semi-microemulsion state. Finally, liquid A and liquid B were added in equilibrium, reacted at 88°C for four hours, cooled, and filtered to obtain acrylic material.

Characteristics of Acrylic Material

The advantages of acrylic material are as follows.

(1) Transparent: through dilution and adjustment, the material forms a transparent or translucent state. It can be superimposed layer by layer on the screen to show a new visual feeling.

(2) Gelatinous: acrylic material has a large viscosity; therefore, it has no high requirements for the substrate and can be created on the wall, paper, cloth, metal, cement, etc.

(3) Aqueous:[18] after adding water, it can flow and becomes light. It can create a special painting effect by flowing and blending, which has great uncertainty, randomness and, non-replication.

(4) Durable: after drying, acrylic material will form a solid color film together with the pigment, which is not easy to deteriorate and fall off, has strong adhesion, and stable chemical changes; therefore, it can be preserved for a long time and keep the bright and full color.

(5) Quick drying: acrylic material with a moderate thickness can be dried in 10 minutes; therefore, it is easy to cover and modify immediately, greatly reducing the painting time.

(6) Flexible: it not only has the heavy feeling of oil painting materials and can be repeatedly stacked but also has the transparency of watercolor pigments, which can achieve techniques such as thin wiping and thick painting.

(7) Convenient: it is soluble in water and oil, and it is more convenient to mix, carry, and keep.

(8) Inclusive: it can be compatible with other water-based materials, such as watercolor, gouache, etc., making the picture richer.

The disadvantages of acrylic material are as follows.

(1) The drying speed is too fast so that spraying water to keep wet is often needed in the painting process.

(2) The particle size of the pigment is large and rough.

(3) When mixing multiple colors, it tends to mix too evenly.

RESULTS AND DISCUSSION

Performance Embodiment of Acrylic Material

Comparison with oil paintings. Oil paintings were produced in the 15th century and has a long history than acrylic. It experienced the development from classical to modern. It has very wide applications in painting materials. The difference in performance between acrylic paintings and oil paintings is mainly reflected in the following aspects:

From the perspective of the basic properties, oil paint is an oil-soluble material, usually organic material, which needs to be kept away from light, and it has strong covering power and three-dimensional feeling and is bright and rich in color. But in the process of preservation, it will gradually fade. As a water-soluble material, acrylic material will form a porous film after drying; therefore, it has good water resistance and can keep the color bright.

From the perspective of the painting effect, oil paintings and acrylic paintings have a great similarity. At first glance, it is not easy to distinguish oil paintings from acrylic paintings; however, there are still some differences in hue and lightness between them. Due to the larger particles of acrylic paintings, the light and shade visual effect on the picture is more intense, and it will not turn yellow due to oxidation in the process of preservation; however, oil paintings have a warm feeling that acrylic paintings do not have.

From the perspective of painting techniques, first of all, in the direct painting method, the pigment with more oil can be placed above the bottom layer with less oil in the oil painting, but the pigment with less oil cannot be placed above the layer with more oil, as it will cause the cracking of the work. Moreover, in the process of painting, the drying speed of oil paintings is very slow, and the acrylic paint with great fluidity and contingency can realize techniques such as painting, splashing, and spraying, which is more conducive to the free exploration of the creator. Secondly, in the indirect painting method, oil paint has low fluidity and low drying speed. When the colors are superposed, it is easy to mix with the previous pigments, and it is easy to oxidize in the drying process, which will lead to the change of color phase. The drying of acrylic paint is fast, the chemical change is stable, and the colors are not easy to mix; therefore, it is easier to show the bright visual effect. In addition, there will be no "dirty" and "gray" phenomenon in the process of superposition, and it is not easy to cause stains.

From the perspective of the choice of base, oil paintings have high requirements for the substrate. Oil paintings need to be created on the drawing board and canvas. Moreover, there is a layer of adhesive to prevent the influence of the oil surface adhesive on the painting cloth. Acrylic paint is not limited by the base and can be created on most solid and clean surfaces without complex treatment.

From the perspective of preservation, oil paintings have a high degree of preservation. The preservation time of oil paintings can be prolonged by repeated lustering. However, due to the nature of the material, oil paintings will inevitably change color, crack, and fall off (*Fig.* 1), while acrylic paintings can be preserved for a long time without



***Figure* 1.** A cracked oil painting (source: the Internet).



***Figure* 2.** Acrylic painting (*A Bigger Splash* painted by David Hockney).

repeated lustering and keep the color bright (*Fig*. 2).

Based on the similarities and unique advantages of acrylic and oil paintings, many artists combine oil paint with acrylic paint. Acrylic paint can be used for painting the draft of oil painting creations. Oil paint and acrylic paint can also be used at the same time in the painting process, but a principle needs to be paid attention to, i.e., the paint with a high content of oil (oil paint) should be cover over the paint with a low content of oil (acrylic paint) to avoid the dim and cracked picture. Also, acrylic paint can also be used to create a colored and textured base, which is more conducive to the inspiration of artists.

Comparison with watercolor paintings. Watercolor paintings have a history as long as oil paintings.[19] It was first born in Holland and matured in England in the 19th century. It is a kind of mainstream painting. Watercolor paint, like acrylic paint, is a water-soluble material with fast water evaporation and high color purity.[20] It has good fluidity, which is conducive to improvisation. Differences between watercolor paintings and acrylic paintings are as follows.

From the perspective of basic properties, particles of watercolor paint are more delicate and can be dissolved in water many times, and can disperse in water evenly; however, it has a poor adhesive effect and moderate covering effect and is difficult to be modified. Particles of acrylic paint are relatively rough, can not be evenly dispersed, and are easy to gather. Because of the characteristics of gum, acrylic paint has good adhesion and strong covering power and will not be dissolved in water after rapid drying.

From the perspective of the painting process, due to the good permeability, watercolor is easy to make the picture

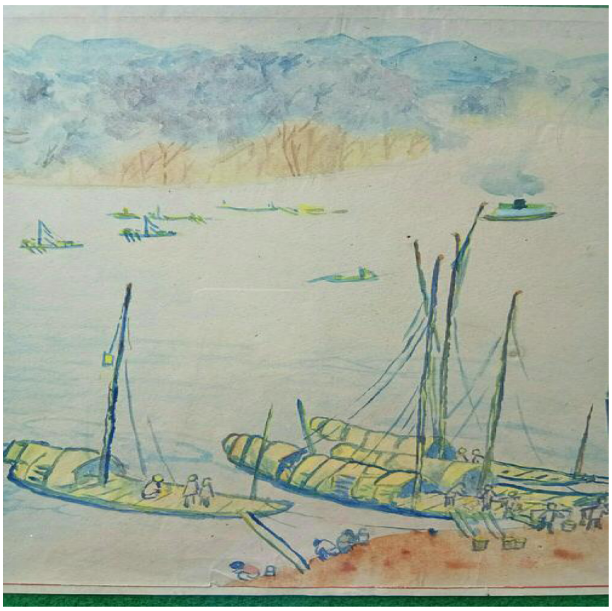


***Figure* 3.** A faded watercolor painting (source: the Internet).

dirty after many times of coloring, and the times of coloring are relatively limited. However, if there is a mistake, it can be washed out with water. Moreover, the light color can not be covered on the heavy color; therefore, it is difficult to draw. However, acrylic paint can be colored many times, and repeated covering can be carried out. Small pens can be used to add details to the painting. But it cannot be washed by water if there is a mistake in the painting.



***Figure* 4.** Acrylic painting (source: the Internet).

From the perspective of painting techniques, the painting techniques that can be realized by watercolor can all be realized by acrylic paint, and acrylic paint has many painting techniques that watercolors can not realize.

From the perspective of preservation, the original painting effect will be damaged when watercolor painting encounters water. As time goes on, the paper will turn yellow, and the color will become gray (*Fig.* 3). Acrylic paintings have moisture resistance, water resistance, and durability, which can be preserved for a long time (*Fig.* 4).

At present, many artists combine watercolor paint with acrylic paint in artistic creation. For example, an acrylic layer is painted on the paper as the base, and then the painting with watercolor will obtain smoother and bolder lines to make watercolor paintings have the thickness and bright colors of oil paintings and the charm of water.

CONCLUSION

With the continuous development of acrylic materials, in addition to ordinary pigments, more and more pigments with special effects have been favored by artists, and their techniques have constantly improved. This paper mainly introduced the production and development of acrylic material, analyzed the characteristics of acrylic material, and compared it with oil and watercolor paint. It was found that acrylic material could not only realize the visual effect of oil and watercolor paintings but also had the advantages oil and watercolor paint did not have. Acrylic material has a very broad development prospect and a large representation space in art painting creation.

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