

Soviet Artists’ Paints of the 1950-1970s: Archival and Experimental Data

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Introduction

Until recently, realistic Soviet art of the second half of the XX century was interesting only for a limited number of specialists, but nowadays is becoming more and more popular. The aim of the research is to specify the regularity of using new paint materials and their technological features within 1950-70s. It’s an important topic for several reasons.

Samples

Samples of paint layers were taking under a microscope during the restoration and technological examination of the 57 works of Soviet artists from museums and private collections.

To select the works of art for research, we picked ones with the known dates and authors’ signature. So that, we were able to compare results of this investigation with archival data on chemical compound paints and the beginning of their production.

First, a lack of information about paint materials and their usage by the Soviet artists. Second, due to the Iron Curtain, the artists could apply paints manufactured only in the USSR. It’s important to emphasize that during this period paint industry was developing very rapidly. Factories not only produced most common paint compositions, but also developed new pigments and binding media for the Soviet artists.

Techniques and Equipment

The technological study of the paintings included a variety of analytical methods. Samples of paint layers were examined by means of polarizing microscopy (POLAM L-213M microscope). To determine the elemental composition, the μ-X-ray spectral analysis method (scanning electron microscope JSM 5610LV equipped with the INCA spectrometer (Oxford)) was used. Analysis of the binder medium, as well as a number of pigments and fillers, was performed by μ-FTIR-spectroscopy (FTIR-microscope LUMOS, Bruker) (Fig. 2).



Fig. 1. E. Maleina. On the River. 1956.

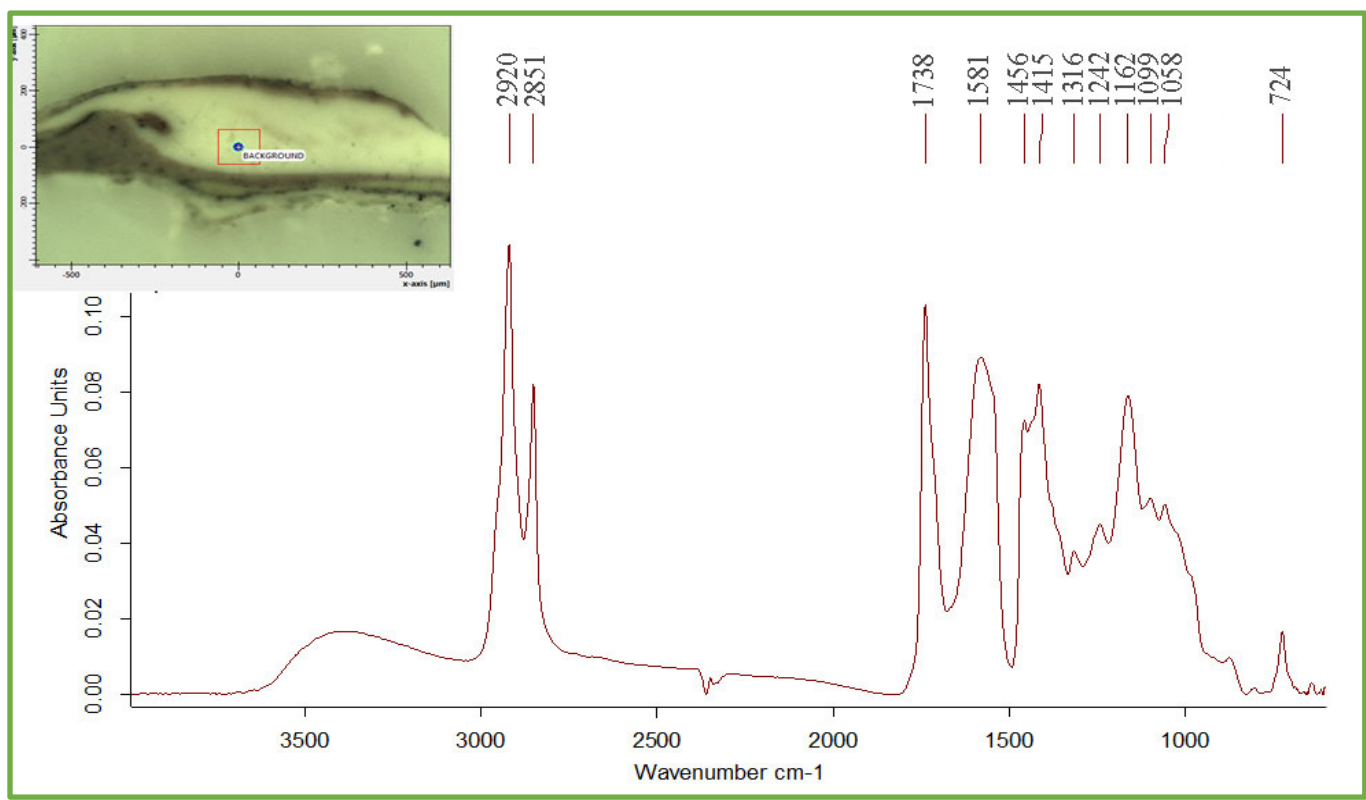


Fig. 2. Spectrum of white layer was recorded from the area highlighted with the red contour. Modified oil (pentaerythritol of fatty acids) was determined as binding medium.

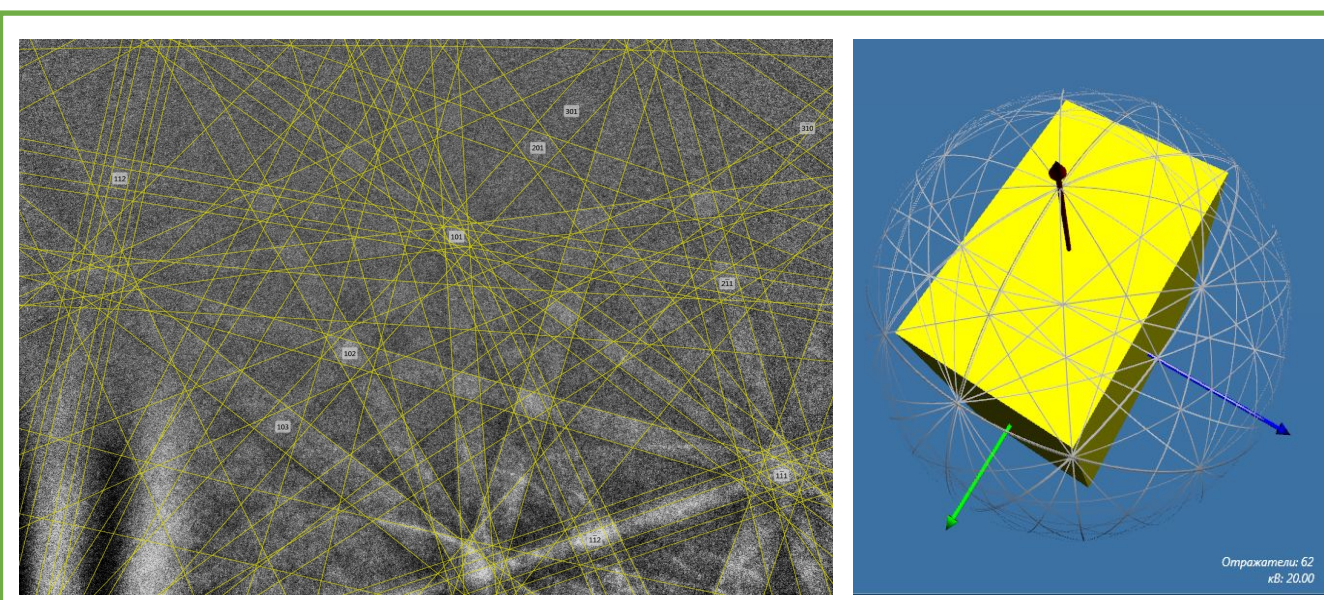


Fig. 3. The EBSD-pattern of studied crystal TiO₂ (as admixture to Lead white). Rutile in tetragonal crystal system as well as orientation of crystal lattice were identified.

electron diffraction (MIRA 3 LMU (TESCAN) method with the EBSD AZtechKL Advanced diffraction pattern analysis system with the NordlysNano detector (Oxford Instruments)) (Fig. 3).

White pigments

- Zinc white** was the most popular white pigment. It was identified in 55 paintings of 57 ones
- Lead white** was identified only in 10 paintings of 57 ones. The pigment was as in pure form and also as an additional component
- Titanium white** was a new pigment for Soviet paint industry. According to the Standards of the Leningrad Artistic Paints Plant, in **1972**, a mixture composed of titanium dioxide in the form of **anatase** and 25% Zinc white was used as white paint. Titanium white was identified in 6 paintings

- 1964**, Titanium white (rutile) as admixture to Lead white;
- 1970 (?)**, Titanium white (anatase) with Barium sulphate (ground); Titanium white (anatase) with Zinc white and Barium sulphate;
- 1976**, Titanium white (rutile) with Chalk (ground); Titanium white (rutile) with Zinc white and Barium sulphate;
- 1979**, Titanium white (anatase) with Zinc white (ground);
- 1979**, Titanium white (rutile) with Zinc white and Calcite (ground);
- 1980**, Titanium white (rutile) with Barium sulphate (ground); Titanium white (rutile, anatase) with Zinc white

A study of the Lead white morphology showed that, in addition to dispersed particles of hydrocercussite, unusual large crystals of cerussite (up to 8 μm in long) occured (Fig. 4). Such crystals are found in 5 out of 10 cases of Lead white usage.

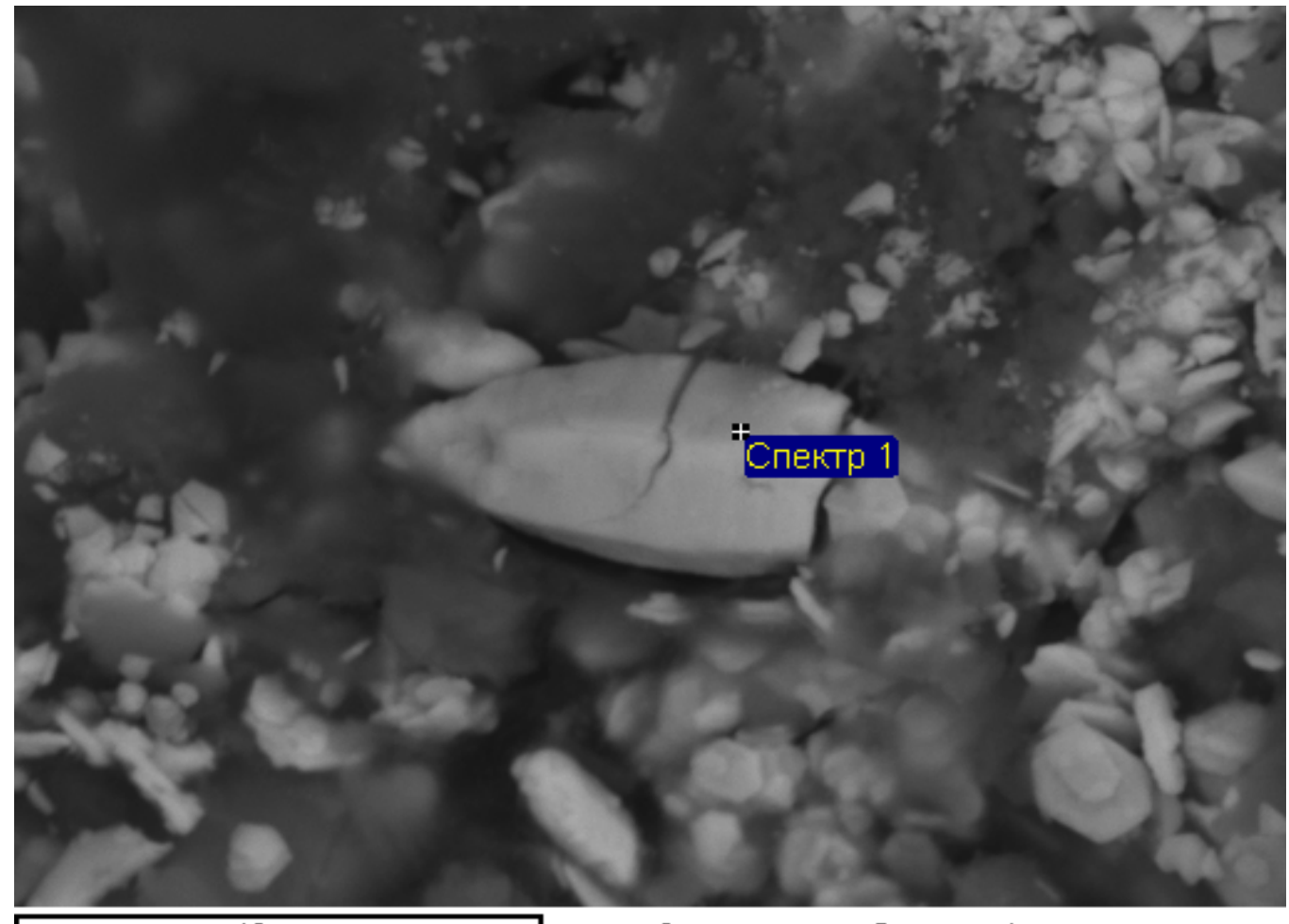


Fig. 4. SEM-image of a large crystal of cerussite.

Conclusion

Soviet artists preferred a conventional oil paints: Zinc white, Ultramarine, Cobalt blue, Viridian, Cobalt green, Volkonskoite, Chrome green, Cadmium sulphide-selenide red, Strontium yellow, Cadmium yellow, various ochers and mases. Also, a number of pigments, such as Emerald green, Chrome orange, Vermillion, Zinc yellow (with potassium) were found infrequently. These pigments are more common for the paintings of the first half of the XX century.

Having this variety of pigments the artists were proune to pick desired colour by mixing a large number of paints (Fig. 5).

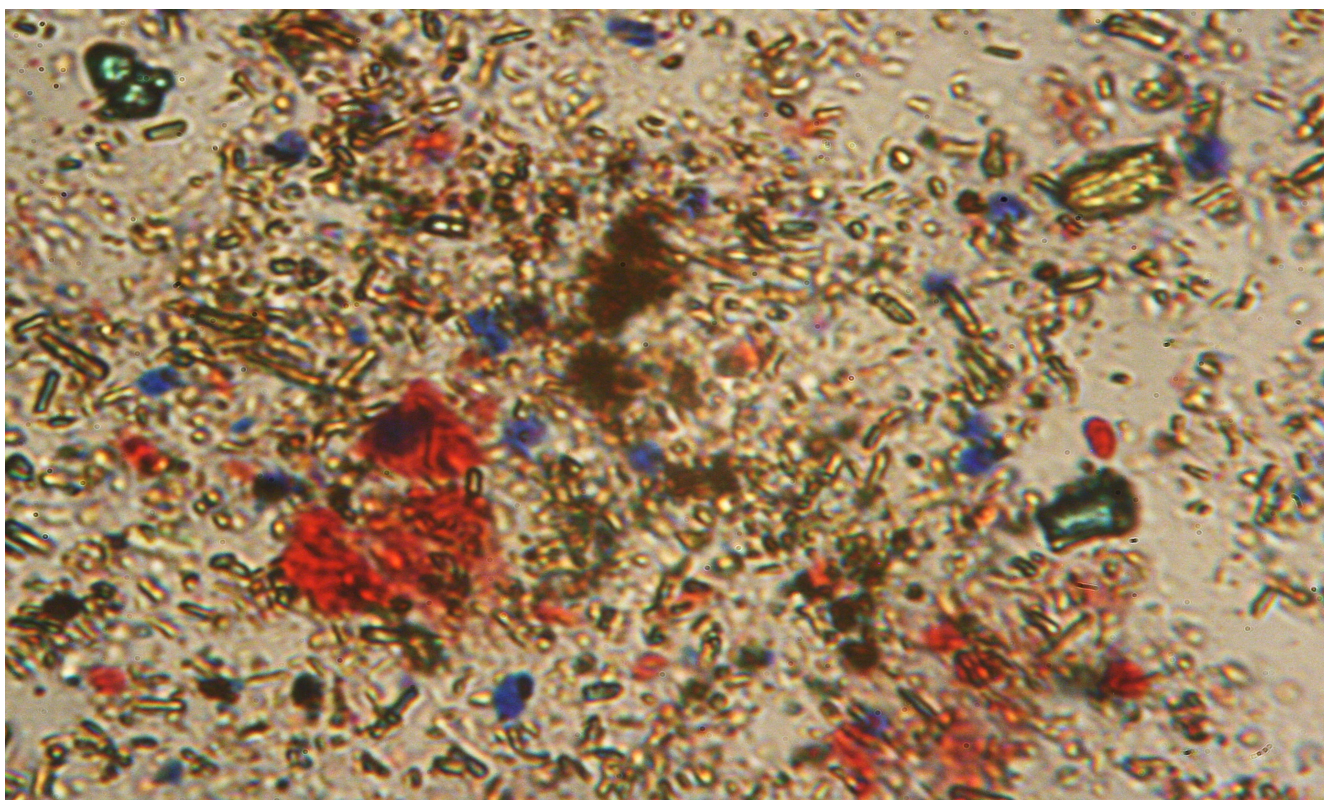


Fig. 5. The sample of orange colour in transmitted polarized light. The number of pigments in one probe reached 10.

New Pigments of Soviet Paint Industry

- Phthalocyanines blue and green**
 - 1937-39** - The beginning of pigments production in Europe;
 - 1955** - The beginning of pigments production in the USSR for water-soluble paints;
 - 1967** - The beginning of pigments production in the USSR for oil paints
 - 1958**, Phthalocyanine green, oil
 - 1962**, Phthalocyanines blue and green, tempera
 - 1963**, Phthalocyanines blue and green, tempera
 - 1967**, Phthalocyanines blue and green, oil
 - 1971**, Phthalocyanines blue and green, oil
 - 1974**, Phthalocyanine green, oil
 - 1976**, Phthalocyanines blue and green, oil
 - 1979**, Phthalocyanine green, oil
 - 1980**, Phthalocyanines blue and green, oil

- Manganese blue**
 - 1935** - The beginning of pigment production in Europe;
 - 1948-50** - The beginning of pigment production in the USSR for oil paints
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 - Pigment was identified in 5 paintings dated from **1950** to **1980**
- Pigment Green B**
 - 1921** - The beginning of pigment production in Europe;
 - 1955** - The beginning of pigment production I n the USSR for water-soluble paints;
 - 1971** - The beginning of pigment production in the USSR for oil paints
 - Pigment was identified in 2 paintings dated **1975**

- Cobalt blue spectral**
 - 1961** - The beginning of pigment production in the USSR for oil paints
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 - Pigment was identified in 7 paintings dated from **1964** to **1980**
- Ammonium cobalt phosphate hydrate**
 - 1943** - The beginning of pigment production in Europe;
 - 1958** - The beginning of pigment production in the USSR
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 - Pigment was identified in 10 paintings dated from **1955** to **1980**