FRANCISZKA THEMERSON'S WHITE PAINTINGS: A CASE STUDY FOR UNDERSTANDING SURFACE PHENOMENA IN MODERN PAINTINGS

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Introduction

White paintings have been made by many artists since the beginning of the 20th century[1]. This project looks at a series of white painting by Polish-British artist Franciszka Themerson (1907-1988)[2] with the aim of understanding the physical-chemical processes behind the development of large surface cracks observed on the surface of some of her 'White paintings. The white paintings and the cracked areas within them have been analysed through a multiananlytical approach, focussing on the analysis and degradation of organic materials present in the paint mixture, with the aim of finding a link between analysis at molecular level and visual observation on the paint surface. An unprecedented collaboration with the Artist's estate has given us invaluable access to a wide range of paintings as well her original studio materials (e.g., paint tubes, tools) and a complete archive of photographs and relevant documents.

Franciszka Themerson and her white paintings

Franciszka Themerson was born in Warsaw in **1907** (nee Weinles or Wajnlejz). In **1931** Franciszka graduated from the Warsaw School of Fine Arts and married Stefan Themerson (Plock, 1910 - London 1988), with whom she started to collaborate in experiments in photography and films, becoming pioneer members of the Polish cinematic avant-garde (Fig. 1).

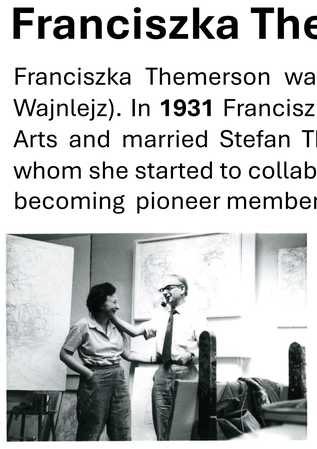


Fig. 1 *Franciszka and Stefan and a still from antifascist* ***Europa*** *(1931), looted by nazis, though lost, then rediscovered, conserved and shown at the BFI in 2021*

The Themerson were an intellectual couple involved in remarkable artistic collaborations for the whole of their lives.

Fig. 2 Franciszka in her studio in the 1960s

Franciszka was a very eclectic artist and expressed herself in a wide range of artistic disciplines and media such as photography and films, drawings, illustrations, puppetry and paintings. Her paintings evolved through her life both in terms of subject matter and style but always maintained a humorous and intellectual look at life and the human being. Towards the end of the 1940's she started to produce mainly monochrome paintings with compositions executed on a thick paint layer either by incising outlines with a sharp tool (e.g., knives, palette knives, brush handles and her own fingers – Fig. 2) or by drawing the outlines directly using white paint squeezed out of the tube (see *Napoleon*, 1975 – Fig 3). These paintings are predominantly white; however, her technique seems to change slightly between the paintings produced in the 1950s, 1960s and 1970s (Fig. 3).

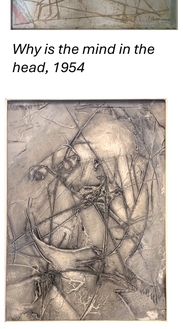
Why is the mind in the head, 1954

Alors, 1954

The Conspiracy of Cross Section, 1955

Demoiselle, 1959

Comme la vie est lente et comme l'Esperance est violente (quoting Apollinaire), 1959



Fusion, 1962

Mother and Child, 1962

The burden of fruition, 1963

Two realities into one, 1963

Palimpsest, 1965

Le Devenir, 1965

Neither, 1974

White Painting, 1974

Napoleon, 1975

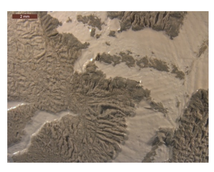
White Painting 1977

Fig. 3 Franciszka Themerson's white paintings form the 1950s, 1960s, and 1970s

Towards the end of the 1950s many of her paintings started to include one or more thin paint layers (a glaze or a wash) applied thinly on top of a thicker white paint layer. These paintings (produced ss far as we know up to the mid to end of the 1960s) often present large superficial drying cracks. Not all the paintings in this period present large cracking or present cracking to the same extent and we are currently investigating both differences in techniques, materials and physical history to pinpoint the reasons behind these differences.

Preliminary observations indicate that where the paint is not cracking the top pigmented layer appears more mixed with the white layer underneath.

Mother and child, 1962



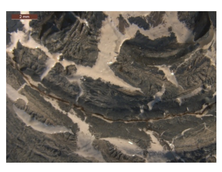
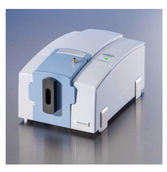


Fig. 4 *Mother and child, 1962: General view (left), details of an area in Normal and Raking Lights (top left) and surface micrographs of the large surface cracks.*

Mother and child, 1962 (fig. 4) has been used as a first case study due to the presence of very prominent drying cracks, that distract from reading the composition fully. Like other white paintings of the period, it was painted by applying thin washes of colours over a white thick impastoed preparatory layer. Surface micrographs show that that the thin top paint layer has wrinkled during the aging and curing of the paint layers. Understanding the properties of the top layers and their interface is crucial for understanding the development of the cracks. To this end a multi analytical study of the painting using both non-invasive and micro-invasive techniques was undertaken.

Analytical Results and Discussion

Initial non-invasive analyses gave some preliminary information on the materials and their aging/degradation stage. UVL photography (Fig. 5) shows that the white paint layer visible within the cracks fluoresces very brightly in UV light, while Ma-XRF maps for Ca and P (Fig. 6) identified the black pigment in the thin top paint layer as bone black. ER-IR spectra (Fig. 7) not only identified the binder as an oil, but spectra recorded inside the superficial cracks indicated that the White paint layer is rich in both acid and metal soaps. These results were subsequently confirmed and expanded on via microinvasive analytical techniques.



The KK transformed spectrum of the external reflectance spectrum taken in a white area shows that the surface is rich both in acids and metal soaps.

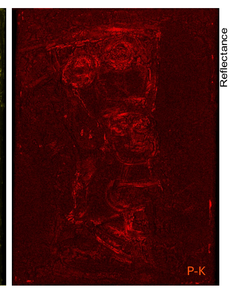


Fig. 5 P*hotograph in UV light* ***Fig. 6*** *MA-XRF maps of Ca and P (Bone Black)*

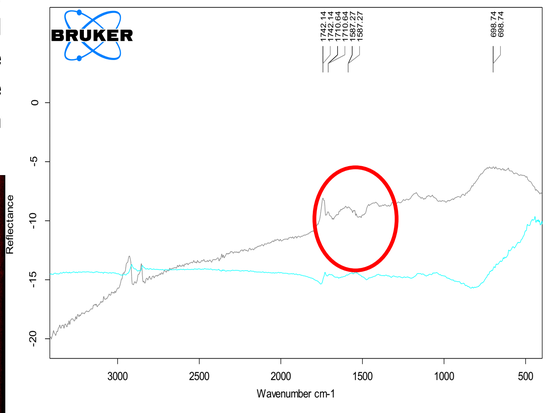


Fig. 7 *ER-IR and KK transformed spectra of a white area in a crack*

Analysis at the optical microscope (OM) of a cross section embedded in resin (Fig. 8) confirmed the presence of a thick white layer, underneath a very thin (10-20 μm) top paint layer. OM micrographs in UV light revealed an increase in fluorescence in the upper part of the white paint layer, possibly indicating a more medium rich area.

μ-Raman spectra identified the white pigments as **anatase,** one of the polymorph of TiO_2 and $BaSO_4$ (Fig. 9). The particles of anatase measured in the SEM-BSE images were found to be very large (20-25 um – Fig. 10).

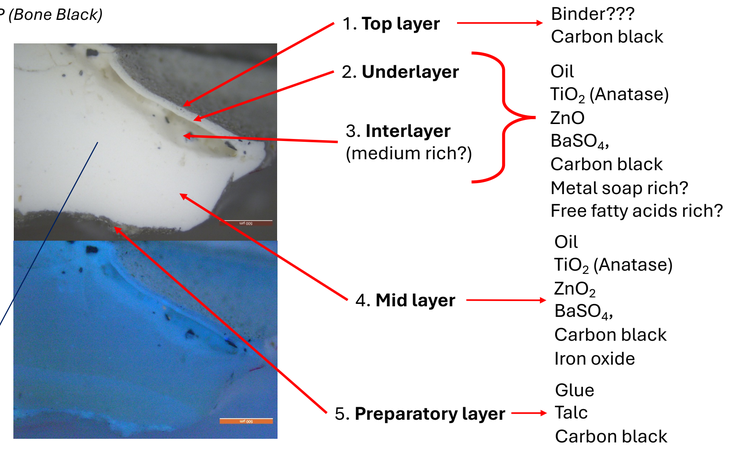


Fig 8*: Optical Microscopy image of a paint cross-section taken in Normal Light (top) and UV Light (bottom) at 100x magnification with a schematic analysis of the layer structure observed.*

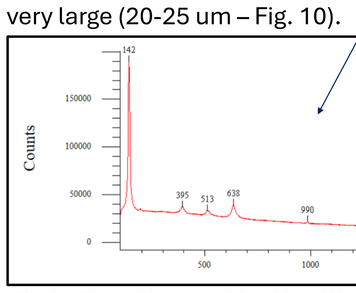


Fig. 9 *μ–Raman Spectrum of the white mid layer*

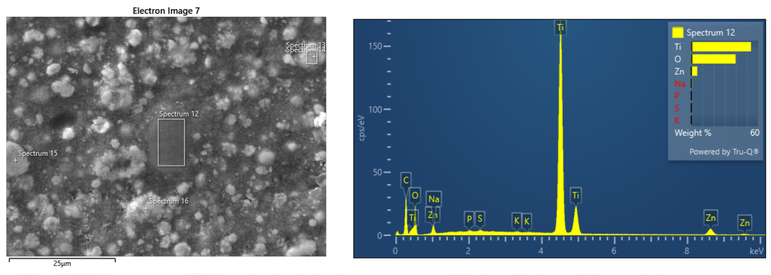


Fig. 10 *SEM image and EDX analysis of the large grey particle identified as a TiO_2 particle*

Anatase was used as the white pigment in formulation of Titanium White paints until the 1960s.[3] In fact, paintings in the white series dated up to 1965, and partially analysed so far were found to contain anatase, while post 1965, the rutile polymorph was found. Anatase is a photocatalytically active polymorph of TiO_2, however the formation of cracks does not seem linked to the presence of one or the other polymorph.

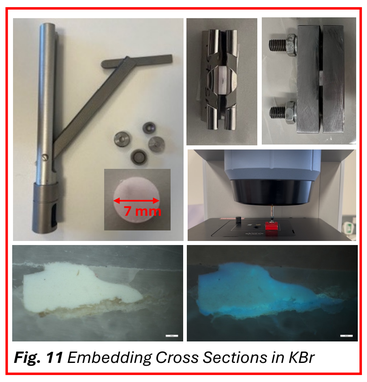


Fig. 11 *Embedding Cross Sections in KBr*

μ-FTIR imaging was then used to provide information on the spatial distribution of organic species across a cross-sections. The samples were embedded in KBr and analysed as cross sections after dry-polishing following a literature modified procedure (Fig. 11).[4] Maps were produced by integrating the peaks in the ranges 1556 - 1523 cm^{-1} (Zn-carboxylate peak at 1539 cm^{-1}) and 1023 - 907 cm^{-1} (Silicate peak at 991 cm^{-1} – Fig. 12). Results suggest that the top section of the thick white paint layer are richer in Zn-Carboxylates and that particles fluorescing brightly in UV light also contained these metal soaps. The imaging results also identify the preparatory layer as talc. The presence of talc and animal glue in the preparatory layer was confirmed via μ-FTIR, SEM-EDX, and Raman analyses (results not presented here). This is in line with other white paintings in the series.

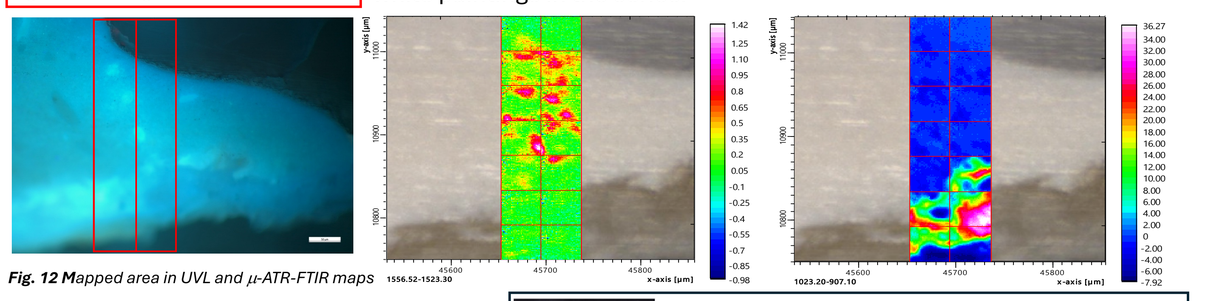


Fig. 12 *Mapped area in UVL and μ-ATR-FTIR maps*

The selective sampling of the top layer is very challenging as the layer is very brittle and strongly adhered to a white underlayer. The transmission μ-FTIR spectrum of a sample (Fig. 13), is very similar to that of the mid white paint layer and highlight the presence of metal soaps in this area.

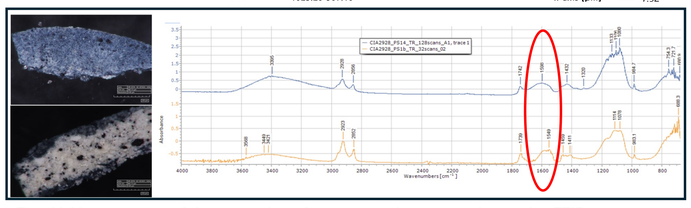


Fig. 13 *Hirox images of the two sides of a top paint layer samples and μ-FTIR transmission spectra of the a top and a mid paint layers spectra*

Conclusions and future work

The work undertaken so far has shed light on the material and techniques used by Franciszka Themerson in *Mother and Child, 1962* and is also relevant to the wider context of her white 1960s paintings, which have also been partially analysed as a comparison. Results seems to indicate that the craquelure may have developed due to the overlaying of a lean layer of paint on top of a medium rich layer. The presence of surface acids and metal soaps close to the top surface may also have exacerbated the phenomenon.

Despite this working hypothesis, analytical results so far have not given a clear confirmation of the binder of the thin top layer. A more selective method of analysis is required to confirm whether the top layer is a leaner oil layer or something different. μ-ER-IR imaging and GC-MS analysis of samples of the top paint layer, as well as higher resolution imaging analysis of cross sections may be able to provide further information. Additionally , paint reconstructions and aging studies may allow us to verify hypothesis and estimate a time frame for the cracks' formation. This will inform a view of the artist's intention, and impact conservation and display decisions.

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