

## Comprehensive synchrotron-based technical analysis of the practice of Pierre Soulages at the end of the 1950s and screening of markers of alteration

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Singular alterations affecting modern oil paintings have recently drawn a great deal of attention in conservation science[1]. Although their appearance remains a rare and isolated phenomenon, they are singular through their random occurrence, their fast kinetics of development, and the difficulty in anticipating and stabilizing them[2]. For many artists, the middle of the XXth century is also a landmark in the experimentation of novel artistic pathways in relation to the use of synthetic materials and new paint techniques. In this context, it is critical to document the materials and techniques used by artists, with the purpose of gaining new insights into the interactions at stake within paint layers.

Among the non-figurative artworks concerned by this typology of alteration are the works of Pierre Soulages (1919-2022), a French abstract painter focusing his creative intent on the reflection of the light on a textured thick black matter. When he was active in the Montparnasse district at the end of the 1950s, he reached the most productive phase of his career, as over 70 paintings were executed between May 1958 and March 1960. While most paintings from this period remain in an excellent state of conservation, some of them show some specific signs of alteration today, with peculiar symptoms such as softening of cured paint layers and cleavages[3].

In order to provide a complete understanding of the artist's practice and investigate alteration phenomena visible in paintings from museums and private collections, a corpus of about fifty micro-samples from eighteen paintings executed between 1956 and 1961 was selected. The study carried out on this corpus combines spectroscopic and imaging analyses using synchrotron and laboratory techniques. A focus was made on commercial preparation paint layers and their interactions with layers applied by the artist.

In this study, the micrometric spatial resolution and high brilliance provided by synchrotron beam were used to detect cues of the creation process, such as the presence of impurities introduced unintentionally during materials' manufacture or intentional additions by the painter, and to characterize eventual alteration products. In this presentation, we will address the initial results obtained by SR-based  $\mu$ -XRF (PUMA beamline at SOLEIL), SR-DUV multispectral photoluminescence (PUMA and DISCO beamline, SOLEIL synchrotron), and spatially-resolved SR-XRD (ID13 at the ESRF synchrotron) carried out on complete stratigraphies and commercial preparation layers. The set of analyses allowed us to have an overview of the variations in composition of pigments used during this period. It also enabled the establishment of the first links between the visual observations of alteration made at the macro-scale by the painting conservator and the chemical information retrieved from the micro-scale analyses.

[1] K. J. van den Berg et al., Eds., Conservation of Modern Oil Paintings. Springer International Publishing, 2019. doi: 10.1007/978-3-030-19254-9.

[2] P. H  lou-de La Grandi  re, J. Boon, N. Scherrer, and S. Zumb  hl, "Soulages'Peinture 12 March 1960: diagnostic analytical studies and tentative consolidation of major curled-up delamination areas." Nordisk Konservator Forbund, 2021. doi: 10.24451/ARBOR.16444.

[3] P. H  lou-de La Grandi  re, "A Montparnasse Disease? Severe Manifestations of Metal Soaps in Paintings by Pierre Soulages from Around 1959 to 1960 (Delaminating Oil Paint Layers, Medium Exudates, Discolorations)," Metal Soaps in Art. Springer International Publishing, pp. 393–412, 2019. doi: 10.1007/978-3-319-90617-1\_23.

**Author:** Ms COUSTET, Chloë (Université Paris-Saclay, CNRS, ministère de la Culture, UVSQ, MNHN, Institut photonique d'analyse non-destructive européen des matériaux anciens (IPANEMA), 91192 Saint-Aubin, France)

**Co-authors:** Ms HÉLOU-DE LA GRANDIÈRE, Pauline (Cergy Paris Université, Cergy, France); Dr SCHÖDER, Sebastian (PUMA beamline, SOLEIL synchrotron, Gif-sur-Yvette, France); Dr THOURY, Mathieu (Université Paris-Saclay, CNRS, ministère de la Culture, UVSQ, MNHN, Institut photonique d'analyse non-destructive européen des matériaux anciens (IPANEMA), 91192 Saint-Aubin, France)

**Presenter:** Ms COUSTET, Chloë (Université Paris-Saclay, CNRS, ministère de la Culture, UVSQ, MNHN, Institut photonique d'analyse non-destructive européen des matériaux anciens (IPANEMA), 91192 Saint-Aubin, France)

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