# THE MUSEUM OF MODERN ART

The David Booth Department of Conservation

**TITLE:** *Ladybug*

**MUSEUM NO.:** 2518.1967

**ARTIST**: Joan Mitchell

**DATE:** 1957

**MEDIUM**: Oil on canvas

**DIMENSIONS:** 6’ 5 7/8” x 9’

**SIGNATURE:** Signed in LR, “L(sic) Mitchell”

**CONSERVATORS**: Magdalena Solano and Laura Richter Le

**DATE OF EXAMINATION**: January 10, 2024

## PROVENANCE

The work was painted in Paris, and it was exhibited in the XXIX Venice Biennale in 1958[1]
MoMA purchased the painting from Stable Gallery, where it had been shown Mar 3-22, 1958.[2]

## DESCRIPTION

The painting was executed with Lucian Lefebvre-Foinet oil paint, diluted with turpentine, on a Lucian Lefebvre-Foinet canvas.[3] According to a letter Mitchell wrote to Michael Goldberg from Paris, she purchased Lefebvre canvas and tacked them to the walls of her studio to paint.[4]

The painting is stretched on a 7-member expansion bolt stretcher with two vertical and one horizontal crossbars (made at MoMA. The canvas is stapled both on the edges and verso, placed diagonally at around 1.5 in intervals. The canvas verso has paint stains scattered across. These do not appear to have transferred from the front side when the work was rolled. Instead, it is assumed that these come from the artist’s studio space. The canvas has a white priming layer that extends to the edges, indicating that Mitchell purchased the fabric pre-primed.

The white background has a second layer that appears as off-white streaks (most noticeable in the top, right corner). Mitchell might have brushed a coating over the white ground with sweeping strokes, or more likely, applied streaks of white paint over it. The paint is applied in lively streaks of vibrant color. The areas of thickest impasto are up to ¼ in thick. Thinned paint was allowed to drip down in long lines, most densely along the bottom edge. Many of the brushstrokes are composed of two color partially mixed and streaky in appearance (for example, green and yellow or violet and black).

Scientific analysis revealed that the red paint is an alizarin crimson lake and the violet paint contains both cobalt arsenate violet and organic components -- crystal/methyl violet and new fuchsin. Since these pigments are at risk of fading, microfading tests were carried out on each. The crimson color exhibited minimal change and plateaued over time, indicating that the color would not continue to change with increased exposure. The violet paint slightly darkened and turned more blue/green, but the change over 600 second at 900 uA illumination remained at levels invisible to the naked eye. However, since the change was linear over this period, further testing would be

[1] Rahn, 2019, 36.
[2] According to Artist’s Questionnaire.
[3] Mitchell identifies these materials in the Artist’s Questionnaire.
[4] As cited in Rahn, 2019, 94 (Undated letter to Michael Goldberg, Archives of American Art, Michael Goldberg Papers, Undated Letter Folder 3. 1.)

required to determine a plateau point. It was, however, determined that the work is safe to exhibit. For more details, see scientific analysis below.

## TREATMENT HISTORY

- In the Atist's Questionnaire, Mitchell notes that the painting was squished going through customs rolled.
- 1963: the painting was stretched on a new stretcher, and to avoid loss in the cracks near the turnover edge, the edges were infused with wax.
- 1980: when on loan to the Brooklyn Museum, two areas of cleavage were consolidated with 6 AYAA in Ethanol.
- 1993: lifting paint was consolidated with Plexisol 550 in benzine and heated (BEVA 371 diluted in benzine was tested but did not hold well).
- 1995: lifting paint was consolidated with BEVA 371. Abrasions and losses were inpainted with Magna.
- 2001: lifting paint was set down with PVA emulsion, the wax was removed by blotting with glassine paper and heat. Losses were inpainted with Golden Acrylics.
- 2002: a series of punctures were consolidated with BEVA D8. A loss was inpainted with Gamblin followed by pastel.
- 2003: when on loan to the Modern Art Museum of Fort Worth, an area of lifting was noted and examined by conservators Valerie September and Claire Barry. They also note that the work had been treated for lifting when on display at the Whitney the year prior, as well as treated by Jim Coddington between the two loans.

## BIBLIOGRAPHY

Albers, Patricia. *Joan Mitchell: Lady Painter : A Life*. 1st ed. Alfred A. Knopf, 2011.

Anfam, David, Joan Mitchell, and Cheim & Read. *Joan Mitchell : Paintings from the Middle of the Last Century 1953-1962*. Cheim & Read, 2018.

Livingston, Jane, Linda Nochlin, and Yvette Y Lee. *The Paintings of Joan Mitchell*, 1901.

Mitchell, Joan, Anne Wehr, and David Zwirner (Gallery). *Joan Mitchell : I Carry My Landscapes around with Me*. David Zwirner Books, 2019.

Rahn, Amy J. "In & Between: Joan Mitchell in New York and Paris, 1955 – 1965." ProQuest Dissertations Publishing, 2019.

## CONDITION

The edges have some wax residue, most noticeably on the upper and lower turnover edges. The wax has discolored to a yellow tone, as well as collected a layer of gray dust in sections. This wax also extends in sweeping strokes onto the paint surface around the edges (appearing as off-white streaks, see scientific analysis below). There are old nail holes on the tacking edges.

There are small losses that have been consolidated, but have not been filled or inpainted, and over which the adhesive has slightly darkened.

The dark red color contains prominent drying cracks. Several cracks have discolored adhesive, and or retouching.

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**TREATMENT PROPOSAL**

1) Dust the recto and verso.
2) Reduce the wax around the edges to the extent possible.
3) Tone discolored retouching.

**TREATMENT**

1) The recto was cleaned with a nylon brush and cosmetic sponges. Dust caught in the impasto was removed with a small brush and air puffer.
2) The verso was cleaned with soot sponges.
3) The wax around the tacking edges was reduced by softening the wax with a heat tool and dabbing it off with Evolon.[5] After testing, this was determined to be the most effective method, both in avoiding solvent exposure and minimizing abrasion.

Testing Methods Considered

| | | | | | |
|---|---|---|---|---|---|
| Heat tool with cotton swabs | Petroleum benzine | ShellSol D38 | Xylene | 80% petroleum benzine, 20% xylene | Mechanically with a thin bone folder |
| Wax softened enough to be easily lifted at 120˚F | Insoluble | Semi-soluble | Soluble | Semi-soluble | Effective on thick layers of wax |

4) Losses, nail holes, and discolored retouching around the tacking edges were inpainted with Golden Matte Fluid Acrylic Colors.

[5] Evolon CR is a non-woven micro-filament textile is made from 70% Polyester and 30% Polyamide.

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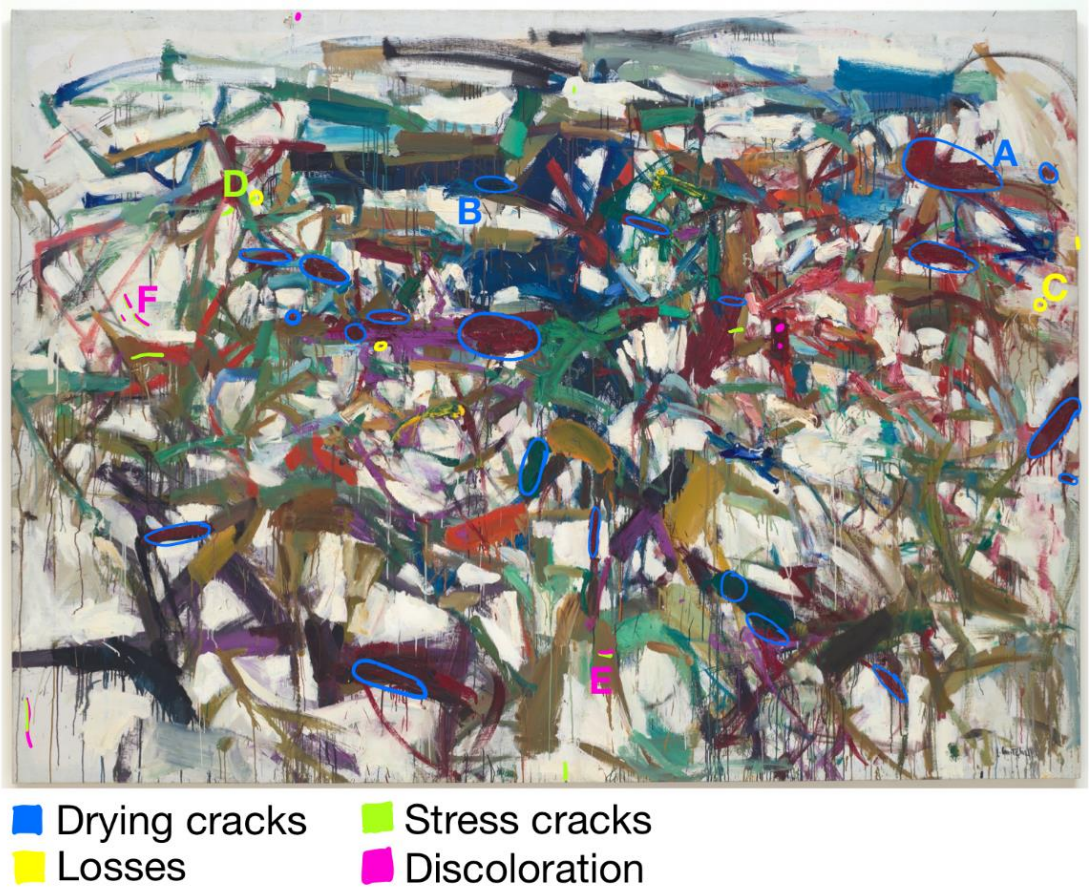
**CONDITION IMAGES**



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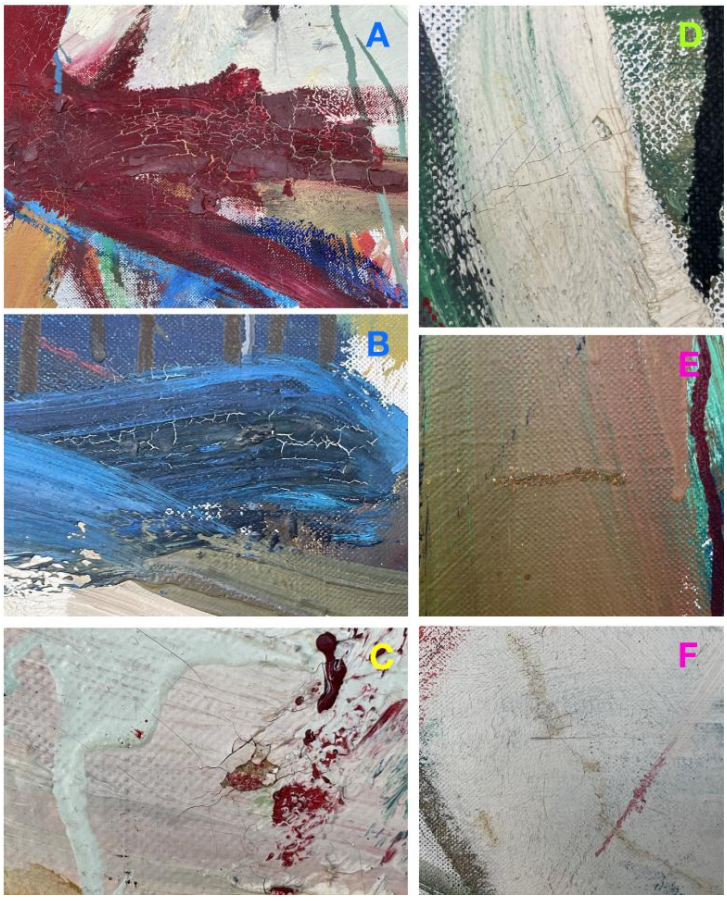


Bottom, right corner

Wax
Nail holes
Discolored inpainting

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**PHOTODOCUMENTATION**

Before Treatment, Recto, Normal Light

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Before Treatment, Raking Light

Ultraviolet Light

After Treatment, Recto

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After Treatment, Verso

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**SCIENTIFIC ANALYSIS**

Abed Haddad analyzed pigment composition using a combination of XRF Mapping, Raman Spectroscopy, SERS, and FTIR. Laura Richter Le carried out MFT on the violet and crimson paints, since they contained organic components that could be fugitive.

Pigment identification was carried out by:

- XRF Mapping: Bruker M6 Jet Stream with a Rh target and SSD (50keV, 600 µA, 550 micron spot size, 550 micron pixel size, 5ms/pixel dwell time, Purging gas: none)
- Sampling for analysis with Raman and SERS: samples were obtained from violet, purple, pink, crimson, and white paints. (map on the following slide)
- Raman: Renishaw In-via Raman system equipped with a 785 nm and 830 lines/mm grating, and a Leica confocal microscope with a 50X LWD objective
- SERS: Renishaw In-via Raman system equipped with a 532 nm diode laser and 1800 lines/mm grating and a Leica confocal microscope with 50X LWD objective. Samples were first exposed to HF vapor for 10 minutes before analysis per Pozzi et al.[6]

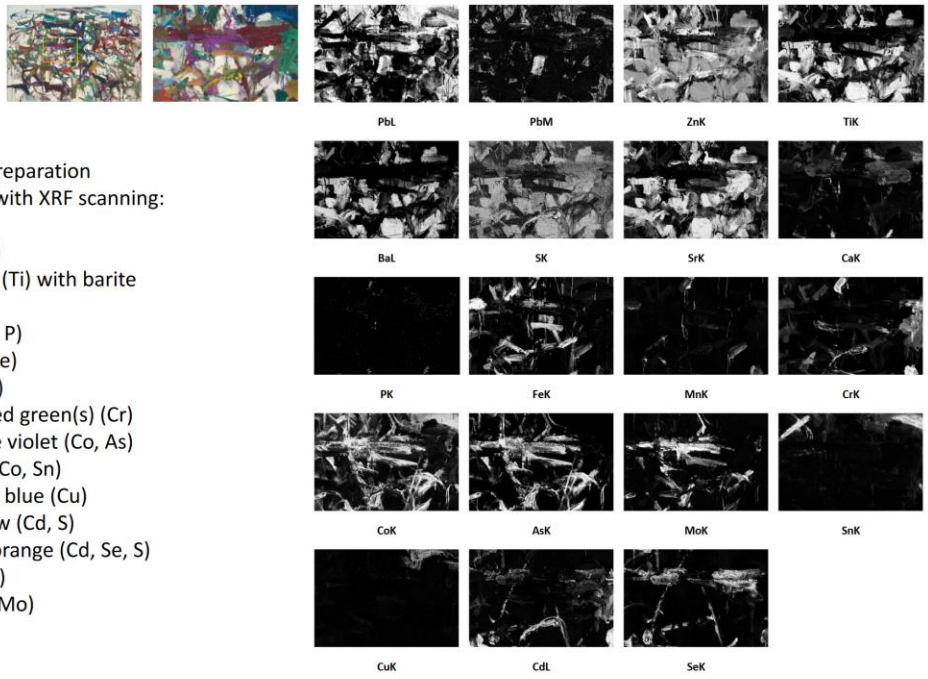
Yellowed paint was analyzed to determine the presence of other materials by:

- FTIR: Nicolet iS50-FTIR coupled with a Thermo Nicolet Continuum infrared microscope equipped with an MCT-A detector, 128 scans and 4cm-1 resolution

MFT was carried out on the crimson and violet paints to assess light sensitivity

- Instytut Fotonowy Automated MFT fitted with a 3000K LED lamp. Spectra were registered using a B&W Tek spectrometer. MFT was carried out over 600 seconds at 900 uA illumination.

**XRF Scanning analysis**




- Zinc white ground preparation
- Pigments identifies with XRF scanning:
  - Zinc white (Zn)
  - Lead white (Pb)
  - Titanium white (Ti) with barite filler (Ba, S, Sr)
  - Bone black (Ca, P)
  - Yellow Ochre (Fe)
  - Umber (Fe, Mn)
  - Chromium based green(s) (Cr)
  - Cobalt arsenate violet (Co, As)
  - Cerulean Blue (Co, Sn)
  - Phthalocyanine blue (Cu)
  - Cadmium yellow (Cd, S)
  - Cadmium red/orange (Cd, Se, S)
  - Organic red (Ca)
  - Organic violet (Mo)

[6] Pozzi, Federica, John R. Lombardi, Silvia Bruni, and Marco Leona. "Sample Treatment Considerations in the Analysis of Organic Colorants by Surface-Enhanced Raman Scattering." Analytical Chemistry 84, no. 8 (April 17, 2012): 3751–57. https://doi.org/10.1021/ac30038.

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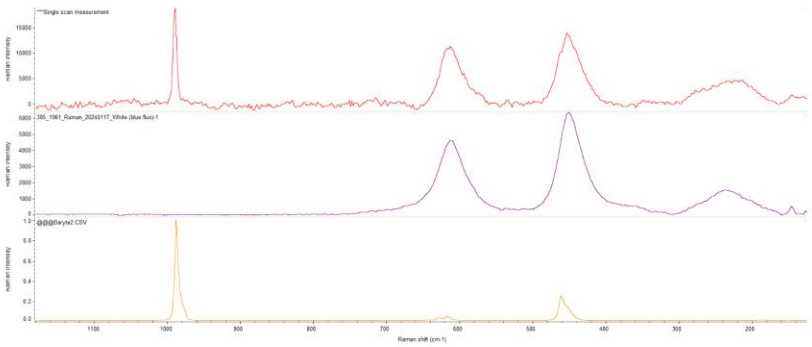
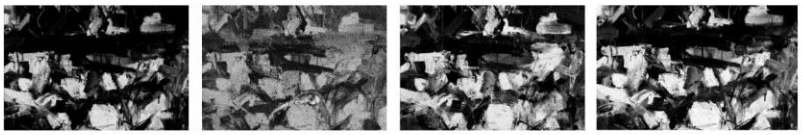
**White paint:** Raman indicates that this paint contains titanium white and barium sulfate, which was also confirmed with XRF scanning



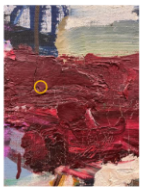


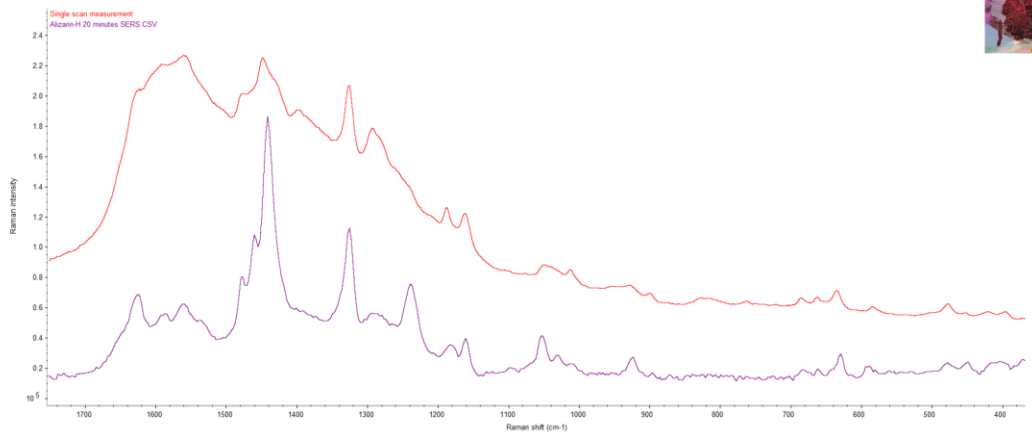
BaL SK SrK TiK

This white paint that fluoresces a deep purple shade under long wave UV, characteristic of $TiO_2$*

*Measday, Daneille, Charlotte Walker, and Briony Pemberton. "A Summary of Ultra-Violet Fluorescent Materials Relevant to Conservation." *AICCM National Newsletter*, 2017. https://aiccm.org.au/network-news/summary-ultra-violet-fluorescent-materials-relevant-conservation/.

**Crimson paint:** SERS analysis indicates that this paint contains alizarin crimson lake.





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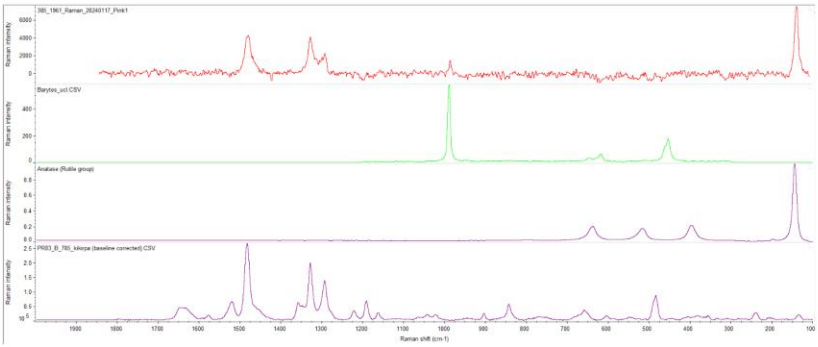
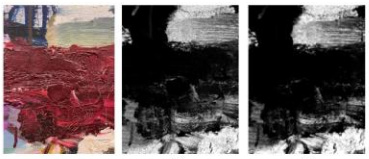
**Pink paint:** Raman indicates that this paint contains alizarin crimson lake, titanium white, and barite (the latter two are likely present in a single white paint)

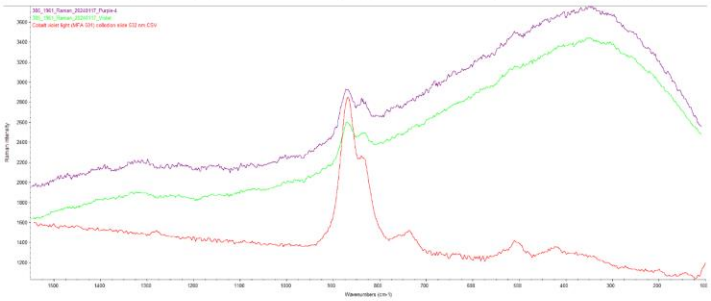


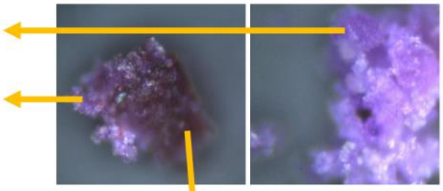



XRF scanning also confirm that the pink paint is a combination of an organic (alizarin crimson) and the titanium white (with barite filler) paint.

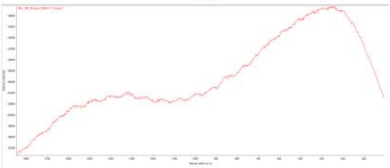
**Purple and Violet paints:** Raman shows that both of these paints contain cobalt arsenate violet, which was indicated by XRF scanning. However the presence of molybdenum, which can be found in hetropolyacids used in making lake pigments from synthetic dyes*, in combination with the fluorescence exhibited in the Raman spectra by the samples, points to the additional presence of an organic lake pigment.

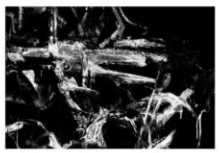
*Herbst, Willy, Klaus Hunger, and Gerhard Wilker. *Industrial Organic Pigments: Production, Properties, Applications*. 3rd ed. Weinheim: Wiley-VCH, 2004.





Raman analysis of this dark portion of the purple sample only produced fluorescence





**CoK** **AsK** **MoK**

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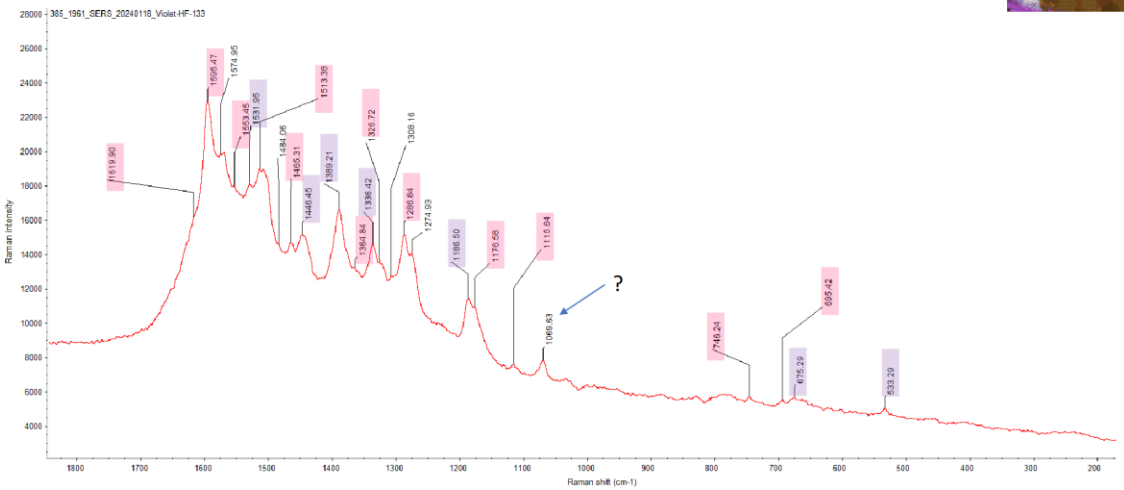
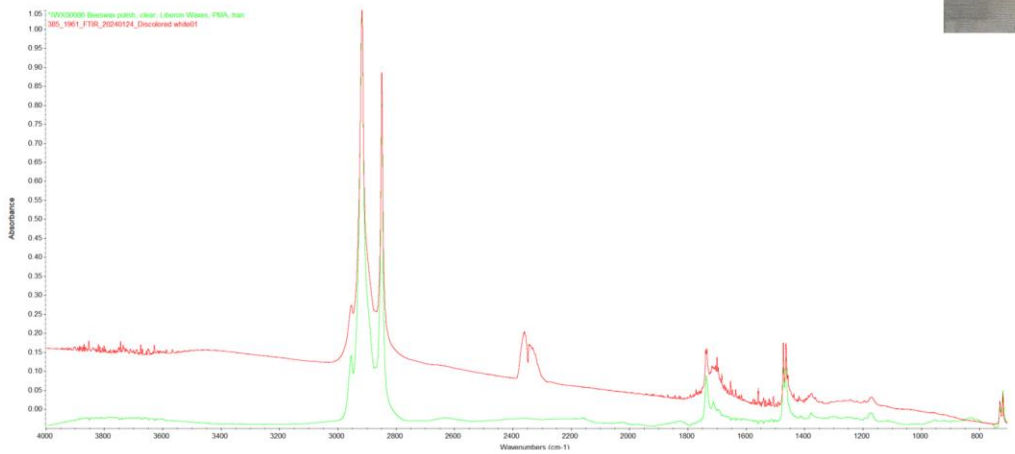
**SERS analysis of Violet paint:** the spectra show the presence of peaks related both crystal/methyl violet and new fuchsin, a homologue of a rosanline/pararosaniline. The new fuchsin can be a degradation product related to light-induced de-methylation of the crystal/methyl violet. While the relative intensity of the peak ca. 1596 in comparsion with the shoulder at ca. 1620 indicates extensive past light exposure during exhibition*, the extent of fading cannot be determined by SERS and requires further analysis with a cross section.




**FTIR analysis of discolored white paint:** the spectra show the presence of a waxy material, perhaps beeswax.

Discolored White



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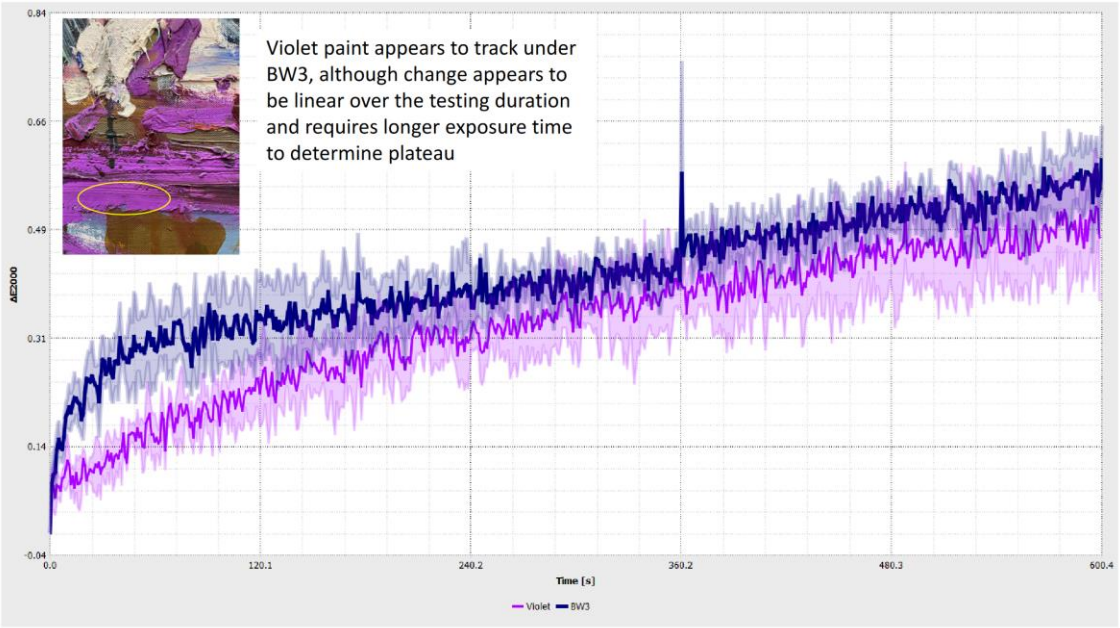
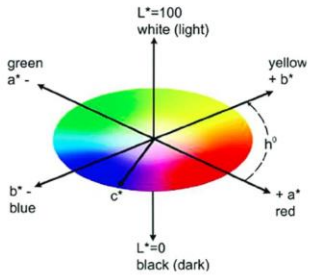
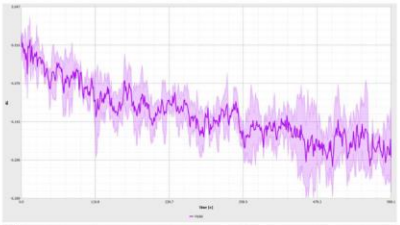


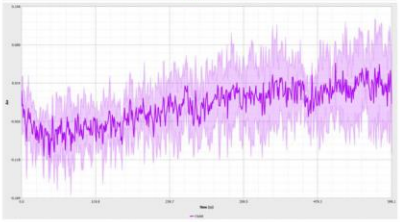

Violet paint appears to become more green/blue in color as it darkens with exposure



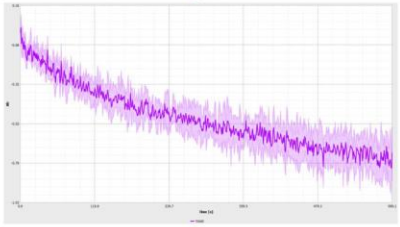

**ΔL**



**Δa**



**Δb**



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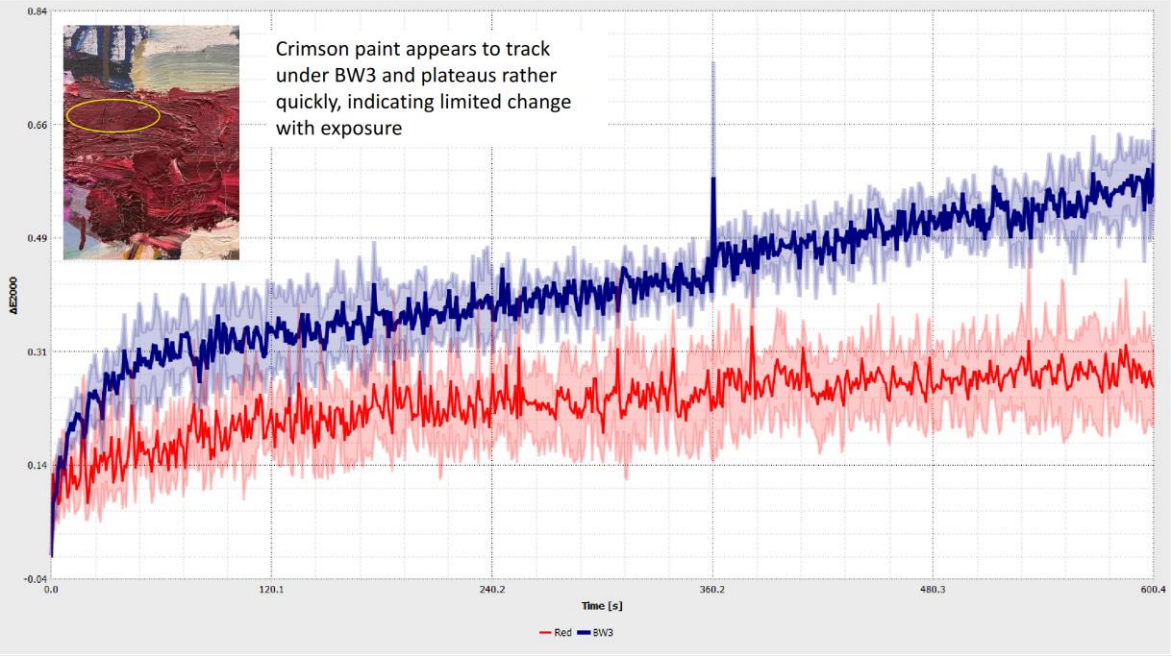
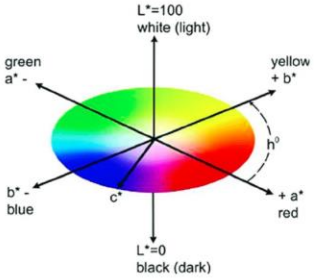
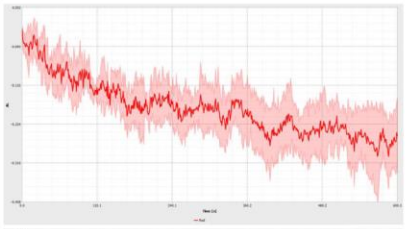


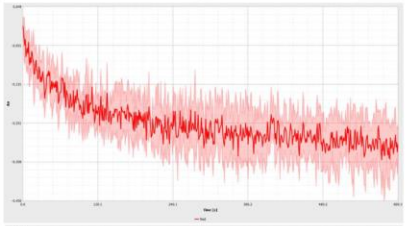

Crimson paint appears to become more green in color as it darkens with exposure. The b value is more or less the same with exposure.




**ΔL**



**Δa**



**Δb**