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## Assessment of lead pigments evolution in the domus Avinyó Roman wall paintings by $\mu$ SR-XRD and $\mu$ SR-XRF

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Wall painting is one of the most recognizable legacies from the Roman period. Though rather limited in their use, lead compounds were present in the elaboration of their pigments, such as sandyx, described by Pliny. In the inner and upper layers of Roman wall paintings from the domus Avinyó archaeological site in Barcelona, lead-phosphorus compounds, together with the degradation product plattnerite ( $\text{PbO}_2$ ) have been detected. This raises concerns about their provenance: are they original pigments, or degradation products of lead-based pigments?

To answer these questions, historical painting samples have been studied by synchrotron radiation-based micro X-ray diffraction ( $\mu$ SR-XRD) and micro X-ray fluorescence ( $\mu$ SR-XRF). The high brilliance of synchrotron radiation-based techniques has demonstrated remarkable efficacy not only in detecting compounds of interest, but also in elucidating their distribution across different pictorial layers of the wall paintings.

The results obtained by these techniques have been complemented by optical microscopy (OM), scanning electron microscopy with energy-dispersive X-ray spectrometry (SEM-EDX), Fourier-transform micro-infrared spectroscopy ( $\mu$ FTIR) and micro-Raman spectroscopy.

**Primary authors:** Mr ALBERT-TORTOSA, Francesc (Universitat Politècnica de Catalunya); Dr BELTRAN, Victoria (University of Antwerp); Dr BUTÍ, Salvador (Universitat Politècnica de Catalunya); Dr JIMÉNEZ, Núria (Universitat Politècnica de Catalunya); Dr PRADELL, Trinitat (Universitat Politècnica de Catalunya); FONT, Lúdia (Conservation and Restoration Department, Barcelona History Museum MUHBA); Dr SALVADÓ, Nati (Universitat Politècnica de Catalunya)

**Presenter:** Mr ALBERT-TORTOSA, Francesc (Universitat Politècnica de Catalunya)

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