


# An exploratory study for the noninvasive detection of metal soaps in paintings through optical coherence tomography

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## Paper Abstract

The formation and growth of metal soaps is of interest in heritage science, as soaps have been linked to a range of alteration and degradation phenomena potentially affecting works of art. However, current approaches detect metal soaps mainly in an invasive way or only at a late formation stage when the metal soaps are formed on the surface of the artwork. In contrast, Optical Coherence Tomography (OCT) has been proven to be a very suitable tool to obtain subsurface morphological information of complex multi-layered systems, such as paintings, in a non-invasive way. In this work, the capability of detecting metal soaps with an 810 nm ultra-high resolution (UHR) OCT in a selection of real and mock-up samples has been explored with OCT virtual cross-section images complemented with invasive structural and chemical analysis (SEMEDX and ATR-FTIR spectroscopy and imaging). Although the visualization of metal soaps with OCT was evident in some samples, we also show that this is not always the case. In addition, the results of this work show that extra care is needed when interpreting OCT cross-section images to avoid the risk of misinterpreting features present in the paint stratigraphy.

## Paper Details

Date Published: 17 July 2019
PDF: 9 pages
Proc. SPIE 11058, Optics for Arts, Architecture, and Archaeology VII, 1105805 (17 July 2019); doi: 10.1117/12.2527569


Published in SPIE Proceedings Vol. 11058:
**Optics for Arts, Architecture, and Archaeology VII**
Haida Liang; Roger Groves; Piotr Targowski, Editor(s)