MS43-1-1 New insights on the composition of complex-shape cultural heritage objects obtained with an X-ray mobile instrument
#MS43-1-1

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Abstract
Investigations in Cultural Heritage (CH) research have always been facing the major issue of the fragility of the objects studied. There is an utter need for developments in mobile non-invasive and non-destructive analysis. We will show the performances of a new mobile instrument using X-ray powder diffraction (XRPD) and fluorescence (XRF) at the same point in reflection geometry. These two techniques are well-known in the CH field allowing the identification of the elements and the resulting crystalline structures without disrupting the objects' integrity [1, 2]. Moreover, the joint use of a linear and 2D detector for XRPD allows to gain insight into the microstructure of the analysed phases. We first present the analysis of an unusual metallic cover found around the neck of a burried abbot recently found in the Saint-Médard-de-Soissons abbey (13th century) [3]. The complex-shape cover is made of several lead foils with areas showing evidences of soldered joints. 2D-XRPD investigations revealed the surface carbonatation of the lead foils and two different micro-structures of lead carbonate between the foils and the soldered joints with a brazing filler material made of Pb-Sn. In addition, we present the investigations of five late medieval polychrome sculptures with sophisticated relief decoration called "applied-brocade" [4]. The instrument allowed to detect/confirm the presence of these multilayered decorations, to identify the associated phases and the main differences between their stratigraphy [5, 6]. These results show the benefits of the combined use of XRPD (1D-2D) and XRF and the importance of well-designed degrees of freedom for in situ measurements of complex-shape objects.

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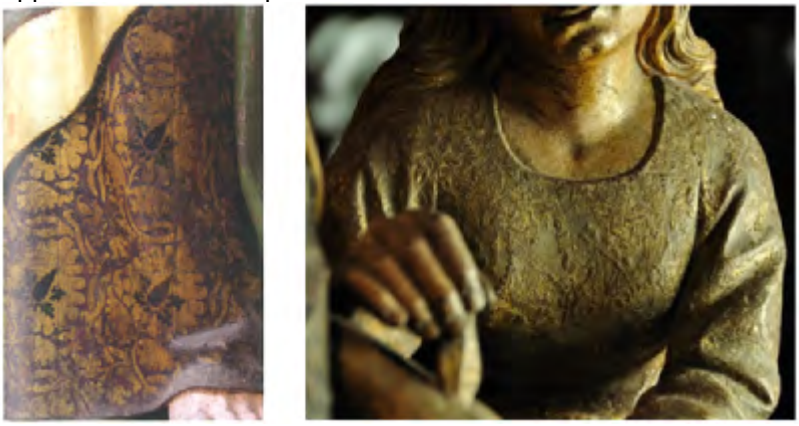
Applied brocade examples



Mobile instrument measuring the metallic cover