

Characterisation of ancient Roman wall painting fragments using non-destructive IBA and MA-XRF techniques

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Abstract:

Scientific investigation is very important in studies addressing issues of archaeological and historical objects. Ion Beam Analysis (IBA) and Macro X-Ray Fluorescence (MA-XRF) spectroscopy are remarkable tools to obtain information about elemental composition and imaging of historical artifacts with a non-invasive character.

These investigation techniques were employed in the framework of a project aimed at supporting the characterization of materials and techniques related with the Roman wall painting. The archaeological excavations at Villa della Piscina in Rome have revealed a luxury building with a large pool (about 50 m long) and thermal baths and numerous fragments of plaster, coming from intentional demolitions referable to two distinct architectural contexts of the villa during the imperial age, have been found.

This work deals with studying the interesting wall pictorial apparatus of great cultural value of the heritage inherited from the Roman age in the area of the ancient city of Rome.

The colour palette of the pigments investigated, in particular, by Particle Induced X-Ray Emission (PIXE) and MA-XRF has revealed Fe, Cu, Pb, Si, Hg as main elements. Traces of other constituents uncover the choice of the different colours chosen by the artists who had embellished the rooms of the Villa.

1. Introduction

Ancient Roman heritage has been subject to many studies, mostly focused on historic and artistic aspects with qualitative information on materials.

The increasing support of the modern analytical methods as part of the conservation and monitoring activities of the archaeological findings allows possible solutions to still open questions.

Ion Beam Analysis (IBA) and Macro X-Ray Fluorescence (MA-XRF) spectroscopy measurements employed in cultural heritage reveal many information about characteristics, provenance and manufacturing techniques of artworks, supporting the evaluation of conservation and restoration interventions.

In the framework of the ADAMO project [1] we have carried out external-beam IBA and MA-XRF elemental analyses for the pigment characterization of wall painting of the Roman *Villa della Piscina*, an ancient Roman residence dated back from the III century BC to the IV century AD, and located on the outskirts of Rome. The measurements were carried out on fragments found out of context in the deposits from the area of the thermal baths and the fill of the large pool in the garden of the Villa. This work is part of the extensive activity