



A non-destructive quantitative determination of the crystalline phase content in historical mosaic glasses through Time-Of-Flight Neutron Diffraction

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Time-Of-Flight Neutron Diffraction (TOF-ND) analysis was performed to obtain a quantitative identification of the mineralogical phase composition of historical mosaic glasses. The presented work is part of a multi-technique characterisation of such mosaic tesserae with the aim of obtaining a detailed quantitative description of the elemental and phase composition in a completely non-destructive way. In fact, in the Cultural Heritage research field, non-destructiveness is mandatory to prevent damage of unique archaeological objects during a scientific investigation.

Neutron-based analyses are a profitable tool to study the bulk of specimens, especially when superficial or spot measurements on heterogeneous samples (such as the mosaic glasses) return position-dependent results. As neutrons can penetrate deep into the material, they can be exploited to determine and quantify the glass composition averaged over the bulk. However, no works related to the application of TOF-ND to historical mosaic glasses are currently in the literature. Therefore, an attempt to quantitatively extrapolate the crystalline phase content within the amorphous matrix from the neutron diffraction data using the Rietveld analysis method will be presented. TOF-ND results will be discussed and compared to the information obtained through a previous combination of Raman spectroscopy investigation, Ion Beam Analysis, Neutron Resonance Capture Analysis and Prompt Gamma Activation Analysis.

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