Visualizing the dissipated polychromy of Greek Antiquities using MA-XRF imaging

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Macroscopic X-ray Fluorescence imaging (MA-XRF) has emerged during the last decade as an indispensable analytical tool for the non-invasive elemental imaging of historical and/or contemporary paintings. The ability of the technique to allow for simultaneous mapping of different chemical elements on a large dimension pictorial surface offers-through the produced elemental images- an immediate visual impression of how the different elements are distributed in close conjunction with the iconographic elements, thus, unravelling their possible associations. In this way, a more comprehensive interpretation can be achieved regarding the nature of materials employed and their application techniques, the technological and artistic choices, aesthetics, the artists' skills and likely overpainting. To date, the application of MA-XRF on archaeological artefacts is rather limited, since ancient polychromy is either poorly preserved or has entirely vanished [1]. In the present contribution, recent developments and results from the first applications of MAXRF imaging on Greek antiquities will be presented and discussed. All the measurements have been carried out in-situ, at different Greek museums and archaeological sites, using real-time technology optimized MA-XRF spectrometers developed by ISPC-CNR and INFN-LNS in Catania, Italy [2] and a modular one developed by the XRF laboratory of NCSR "Demokritos" in Greece. The obtained results have demonstrated undoubtedly the enhanced capabilities of the MA-XRF technique to analyze archaeological materials quite different in nature (gold alloys/pigments) or those composed of the same materials (pigments) on different substrate media and highlight the perspectives and future contribution of this groundbreaking technique to archaeological research and History of Art [3, 4].

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