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# P43 - Full field x-ray fluorescence for the two-dimensional micro imaging of painted artworks

*Friday, 11 July 2014 13:00 (1 hour)*

X-ray based techniques are particularly suited for the non-destructive investigation of Cultural Heritage and Archeological materials. An interesting case concerns the analysis of pigments that are often distributed on artworks in painted decorations of sub-millimeter dimensions. Moreover, the chemical associations among elements composing a given pigment can be often identified by investigating the elemental distribution in the micrometric scale.
Generally, the two-dimensional elemental mapping is obtained by the scanning micro-X-Ray fluorescence. The merits and limits in using this experimental approach were largely demonstrated. The recent advances in the development of the Full Field X-ray Fluorescence (FF-XRF) instruments provided a novel and promising alternative for performing the two-dimensional elemental imaging avoiding the scanning approach.
Recently we developed a novel Full Field X-ray Pinhole Camera (FF-XPC) presenting high-energy and high-spatial resolution. The FF-XPC consists of a back-illuminated and deep-cooled CCD detector coupled to a 50 micron pinhole-collimator, coaxially positioned between the sample and the CCD. A low-power X-ray tube is used as primary source for inducing the characteristic X-Ray fluorescence in the samples under investigation. A multi-image acquisition in single-photon counting and a real-time processing of each image-frame have enabled the use of the FF-XPC for the energy dispersive X-ray fluorescence imaging with an energy resolution down to 133 eV at 5.9 keV and spatial resolution down to 25 micron.
The FF-XPC can work with different magnifications (M) depending on the dimensions of the sample under measurement. This approach allows both the micro-FF-XRF imaging of small dimension samples (down to 2x2 mm2 at M=6) and the macro-FF-XRF of large samples (up to 5x5 cm2 at M=0.4).
The potential use of the FF-XPC for the two-dimensional imaging of pigments in polychrome archaeological pottery and paintings has been tested and verified. The macro-FF-XRF approach was used to obtain fast information on the global composition of the painted decorations on the samples; the micro-FF-XRF imaging and spectroscopy was applied with the aim of characterizing the pigment and to investigate the painting technique.

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