

Revealing artifacts manufacturing and understanding degradation phenomena thanks to micro-X ray absorption spectroscopy

Micro X-ray absorption spectroscopy is now a well-established technique for the study of cultural heritage. It can be used to gain insight into the manufacture of artifacts, particularly ceramics and glass. Indeed, many of these objects have an aesthetic value (color, transparency, luster effect) that is obtained by mastering the manufacturing process (ingredients, firing conditions). The speciation of constitutive elements (often 3D transition metals) usually keeps a record of these manufacturing processes and can provide insight into technological and scientific knowledge from the past.

μ XAS is also regularly used to trace chemical reactions that have altered works of art (corrosion, color changes...). Again, μ XAS is used to follow the change in speciation of key elements, in complex matrices, usually with the presence of crystallized and amorphous components.

Art materials are usually highly heterogeneous (due to fabrication or alteration), so the use of micro- or nano-beam is essential to follow local changes in chemical composition.

This talk will present recent analyses performed at the ESRF-EBS, in particular at the ID21 beamline, a beamline optimized for nano-XAS in the tender X-ray range (2.1-11 keV). The recent refurbishment of the beamline as well as ongoing developments for data management and data analysis will also be presented, with a special focus on their implications for the heritage community.