

**International Atomic Energy Agency / Department of Nuclear Applications /
Division of Nuclear Applications in Physics and Chemistry / Physics Section /
Nuclear Science and Instrumentation Laboratory (NSIL)**

Institution, Instituts-/Arbeitsgruppen-Bezeichnung

Kurzbeschreibung/Kernkompetenzen

NSIL provides expertise, training, and support in the effective utilization of nuclear instrumentation and analytical techniques in a broad range of applications, with a focus on mobile radiation monitoring, X-ray spectrometry, accelerator technologies, and compact neutron generators. It also provides training in the field of radiotracers and radiation technology applications.

Techniques based on X ray spectrometry are used as analytical tools to characterize different kinds of materials with applications in various fields and are used for the elemental, chemical, crystalline, structural, and dynamic analysis of a broad range of materials fulfilling a wide variety of requirements.

Training activities are regularly organized by the IAEA in Seibersdorf or in cooperation with other institutions, as well as with the International Centre for Theoretical Physics (ICTP). Collaborating agreements with the Elettra Sincrotrone in Trieste (Italy) and the Ruđer Bošković Institute (RBI) in Zagreb (Croatia) provide additional opportunities for hands-on training and research activities, including facilitated access to these facilities for international users.

The Laboratory also coordinates periodic proficiency tests compliant with ISO 17043 and ISO 13528, free of cost and ensuring full confidentiality of results to support national laboratories in assessing their own analytical performance.

Expertise (inkl. instrumenteller Ausstattung):

NSIL has been involved in the past in some projects related to the characterization of archaeological and art related samples in cooperation with the Kunsthistorisches Museum, the Weltmuseum, the Naturhistorisches Museum and the Institut für Konservierung und Restaurierung, Fachbereich Wandmalerei und Architekturoberfläche.

To support the characterization of valuable objects the laboratory can assist with:

- Elemental analysis using XRF (non-destructive and of powdered samples)
- 2D and 3D elemental distribution in small samples (20 x 20 mm)
- Optical and SEM-EDS inspection of minute samples
- Identification of minerals using XRD (powder analysis)
- X-ray and neutron radiography of small objects (under commissioning)

The instrumentation available in the laboratory include:

- Variable pressure SEM-EDS
- Secondary target (polarized radiation) Energy Dispersive XRF spectrometer
- Wavelength Dispersive XRF spectrometer
- Micro and Confocal XRF spectrometer
- Full Field XRF
- Transportable micro-XRF spectrometer
- Handheld XRF analyser
- Transportable X-ray Diffractometer for powder analysis

A Virtual Tour to the laboratory is possible by visiting virtual sibling rooms at:

<https://my.matterport.com/show/?m=27SbAzwypzW>

(Notice that a link to access the next room will be available by clicking on the yellow circles at the doors to each room)

Website:

At the IAEA official website:

<https://www.iaea.org/about/organizational-structure/department-of-nuclear-sciences-and-applications/division-of-physical-and-chemical-sciences/nuclear-science-and-instrumentation-laboratory-nsil>

At the NUCLEUS SharePoint hub:

<https://nucleus.iaea.org/sites/nuclear-instrumentation/Pages/Home.aspx>

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Fig. 1: Training on Handheld XRF analysis of mural paintings (in cooperation with Akademie der bildenden Künste Wien, Institut für Konservierung und Restaurierung, Fachbereich Wandmalerei und Architekturoberfläche, photography reproduced by courtesy of Old Gallery of the Universalmuseum Joanneum, Graz, Austria)

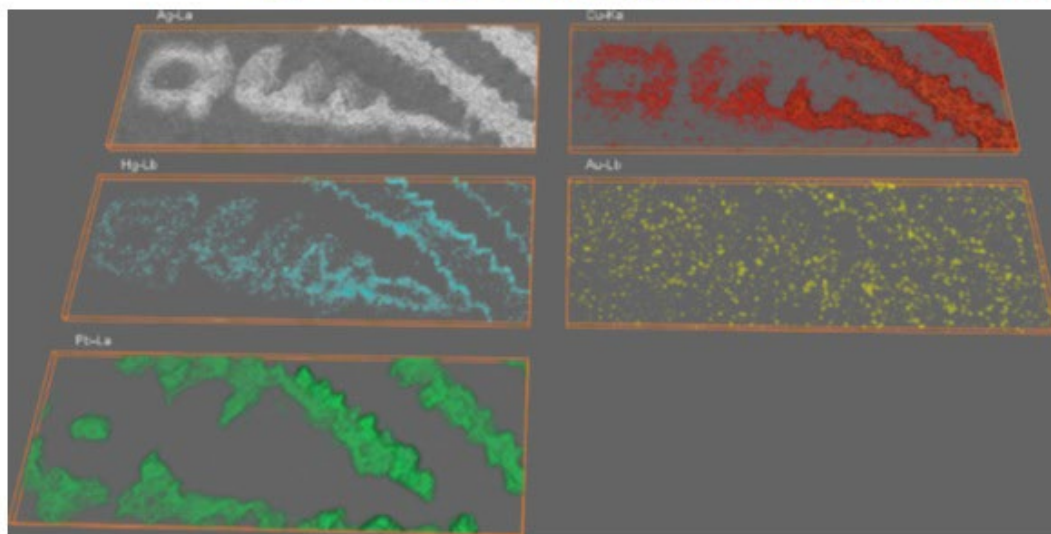
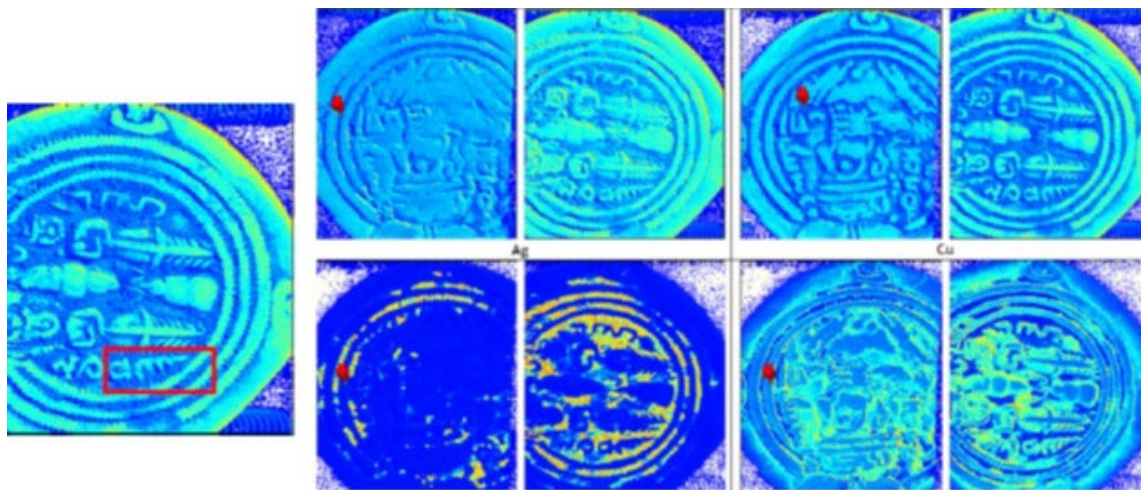


Fig. 2: Elemental distribution in Sasanian coins (in cooperation with Kunsthistorisches Museum, Vienna)

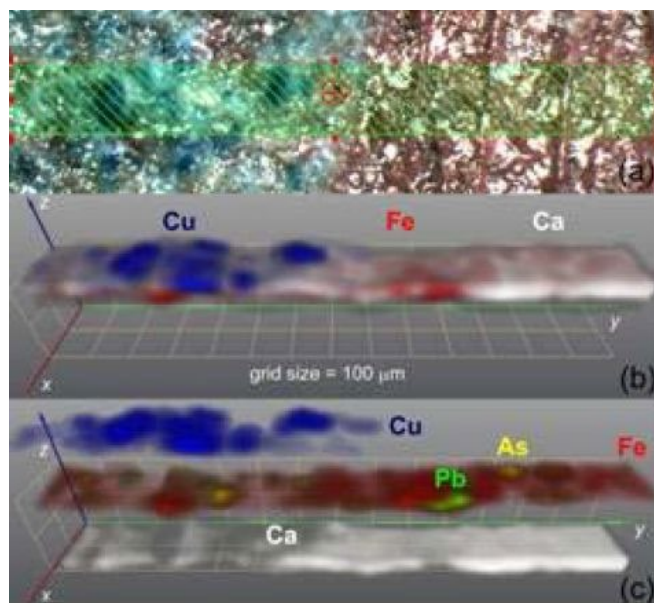


Fig. 3: 3D elemental distribution in a sample from wall painting to assist identification of pigments