MARS: Multi Analyses on Radioactives Samples

SOLEIL staff:
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Areas of application, instrumentation and methodologies used
Energy range: 3.5 - 36 keV. Focused beam 300 x 300 μm^2 and 10 x 10 μm^2

The aim of the MARS beamline is to extend research capabilities on radioactive matter (α, ß, γ and n emitters) towards the use of synchrotron radiation in multidisciplinary fields (biology, chemistry, physics), while respecting French and European safety laws. This beamline is authorized by the ASN (French Authority for Nuclear Security).
The design of the MARS beamline (infrastructure and optics) is also optimized to alternatively run two experimental stations in order to carry out experiments using transmission and high resolution X-ray powder diffraction (XRD), Wide Angle X-ray Scattering (WAXS), standard and high resolution X-ray absorption spectroscopy (XAS) and microbeam techniques (microXRF, XAS, XRD).

Sample environment: Cryostat- electrochemical cell –ovens- high-pressure diamond-anvil cells - Shielded containers - multiple sample holders.

Analysis techniques
X-ray absorption (XANES, EXAFS) X-ray fluorescence mapping (XRF), high and low-resolution X-ray diffraction.

Major disciplines
Environment and biology/health: pollution by radioactive elements - contamination of the environment and people (nuclear toxicology) - radiation hazards of radioactive products.
Chemistry and physics of nuclear materials: process of recycling and separation of spent nuclear fuel, characterization and behavior of nuclear fuels, characterization of irradiating material structure, studies on actinides and on radioisotopes.