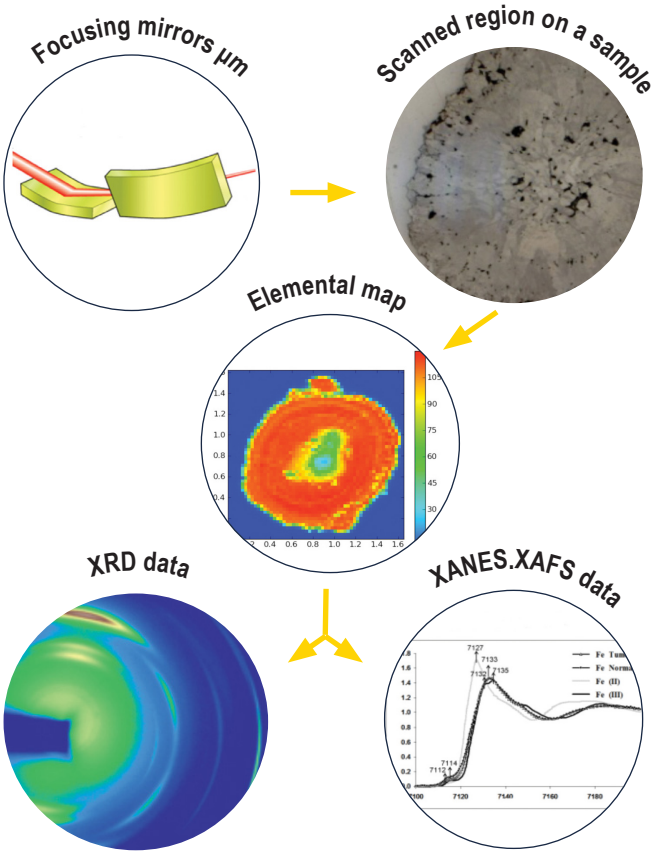
I18

Microfocus X-ray Absorption Spectroscopy

I18 is a versatile, microfocus medium energy X-ray beamline dedicated for X-ray spectroscopy and structural investigations of complex systems.

The XAS technique is complemented by microdiffraction and optical imaging methodology; therefore this beamline provides a world class facility, using high brightness microscale X-ray beams for the study of complex inhomogeneous materials and systems in their operating conditions as well as investigations of materials in hostile environments.

Dedicated optics for the μ-focus beam dimensions allow the mapping of elements in complex samples; subsequently the structure of the specific region of the studied material can be determined by μ-XRD or μ-XAS.



Beamline Specification

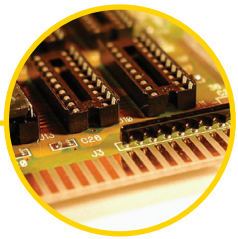
Energy range [keV]	2 – 20
Investigated elements	P – Mo (K edge) Tc – Am (L edges)
Beam size (μm) at sample	2-100 x 2-100 (H x V)
Sample size	Maximum dimension 25 mm to be measured in one run.
Sample environments	Linkam furnace (300 – 1650 K), Hot air blowers (heating up to 1650 K), He/LN_2 Cryostat, He enclosure for low energy, In situ Raman at 785 nm.
Techniques available	XRF tomography, XRD tomography, XRD, XAS/XRF (time-resolved & static), XRF/XRD mapping, ReflEXAFS.
Detector & analyser	4 element Si drift fluorescence detector for the range 2-5 keV Excalibur diffraction detector - low noise profile (an area of 115 x 100 mm^2). CCD detector for transmission diffraction experiments.

I18 APPLICATIONS

Chemistry

- Direct studies of the structure and interactions of catalysts with the chemical reagents under various environmental conditions – three-way catalysts, fuel cells;
- Understanding of the corrosion process;
- Study of solution chemistry.

Material Science



- Study samples under realistic conditions of high pressures and temperatures;
- Study kinetic processes in operating electrochemical cells;
- Design and characterisation of novel, advanced materials;
- Studies on the failure of various materials e.g. ceramic and composite materials.

Environmental

- Study the effect of drugs on living cells;
- Follow the effects of biological processes on the cell e.g. starvation;
- Monitor cell regulation processes;
- Investigate the impact of nanoparticles on cells.

Bio-Medicine

- Determination of the structure of metalloproteins;
- Study biochemical processes – the life mechanisms of photosynthesis or respiration;
- Study the interaction between implant nanoparticles and the surrounding tissues;
- Examination of the form in which metal is accumulated in tissues e.g. studies of diseases such as Alzheimer's and Parkinson's.

For further information

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