B18

X-ray Absorption Spectroscopy

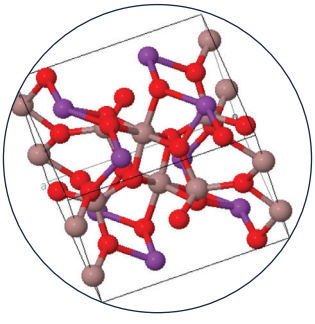
B18 is a general purpose XAS beamline at Diamond. This beamline is part of an integrated project devoted to XAS, which includes a microfocus XAS beamline (I18) and a high flux versatile scanning and dispersive XAS beamline (I20).

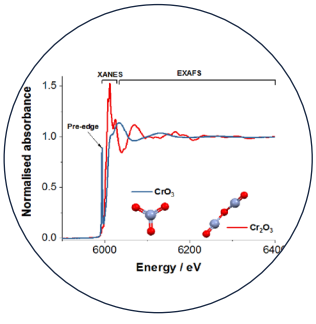
The beamline has developed the Quick EXAFS technique, where a single XAS spectrum can be collected in a few seconds to a few minutes.

The wide energy range (2-35 keV) provides access to all elements ranging from phosphorus and sulphur up to the actinides.

This beamline also provides the option of a combined set-up of XAS/XRD; other complementary techniques can be integrated to allow complex studies of various materials under time-resolved, *in situ* conditions.

The experimental area has sufficient space and flexibility to allow the use of sample environments such as high throughput chambers and other conventional spectroscopic probes e.g. IR, Raman.



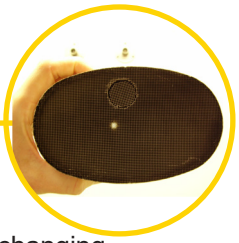


Beamline Specification

Energy range	2 – 35 keV
Investigated elements	P – I (K edge) Y – U (L edges) Pt – onwards (M edges)
Beam Size (µm) (at sample position)	200 µm x 250 µm up to 1 mm x 1 mm (H x V)
Sample environments	Cryostats (> 1.5 K) Furnaces (295 – 1173 K) Capillary-based sample cell (295-1173 K, 1 bar, gas flow) Mass spectroscopy Electrochemical cells Automated gas delivery
Techniques available	QEXAFS, Combined XAS/XRD Space for other complementary techniques
Detector & Analyser	Electron yield 4 element Si DRIFT detector for the range 2-15 keV (high count rate with XSPRESS2) 36 element Ge monolithic detector above 5 keV (high count rate with XSPRESS2)

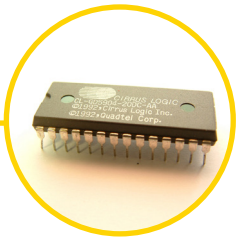
B18 APPLICATIONS

Catalysis



- Direct studies of the structure and interaction of catalysts with chemical reagents under rapidly changing environmental conditions – three-way catalysts, fuel cells;
- Characterisation of redox-active nanocrystalline oxides, microporous materials;
- Study solution chemistry;
- Investigations of materials during hydrothermal reactions.

Material Science



- Study materials e.g. semiconductors under realistic conditions of high pressures and temperatures;
- Study complex materials and catalysts by combined XAS/XRD to correlate changes in the short and long-range structures;
- Study kinetic processes in operating electrochemical cells;
- Design and characterise novel, advanced materials.

Environmental

- Study metal speciation of toxic materials to handle the remediation of environmental contamination;
- Study the formation of minerals by bacteria;
- Investigations on superhydrophobic coating for limestone protection.

Biology

- Determination of the structure of metalloproteins;
- Study biochemical processes – the life mechanisms of photosynthesis or respiration.

For further information

Diamond Industrial Liaison Team

+44 1235 778797
industry@diamond.ac.uk
diamond.ac.uk/industry
@DiamondILO

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