Spectroscopy | X-ray Absorption Spectroscopy (XAS) | Scanning X-ray Microscopy (SXM) | Imaging | X-ray Fluorescence

diamond

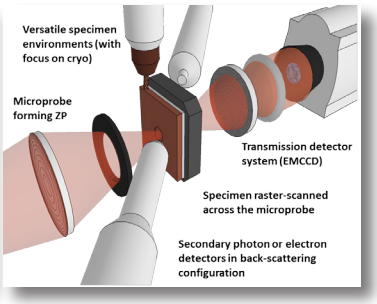
I08 Technical Information

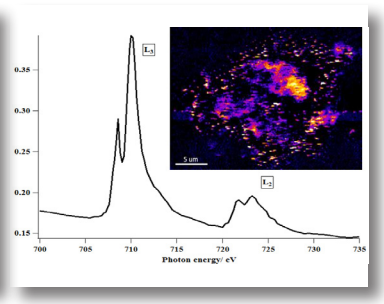
I08 – Scanning X-ray Microscopy beamline

I08 is dedicated to X-ray absorption and phase-sensitive imaging and spectroscopies in real and reciprocal space. These techniques cover elemental mapping as low-energy X-ray fluorescence (LEXRF) and chemical analysis by X-ray near edge absorption spectroscopy (XANES).

The beamline is equipped with an instrument that covers a broad photon energy range providing access to a significant number of K- and L-absorption edges for SXM (Scanning X-ray Microscopy). elemental and chemical analysis, which can be combined with complementary imaging and spectroscopic techniques.

The SXM combines good spatial resolution in 2D with the capability of producing high quality spectroscopic data (NEXAFS) for chemically-sensitive analysis and X-ray fluorescence mapping (XRF) when operating at the upper end of the photon energy range.





Beamline Specification

Energy range	250 – 4200 eV
Spatial resolution	>20 nm (depending on imaging mode)
Energy resolution (E/ΔE)	4000 – 10000 (depending on the photon energy)
Photon flux [photons/s]	Linear (horizontal/vertical) Circular
Energy range with polarisation	247 – 1200 eV
Detectors	Transmission EMCCD detector for simultaneous acquisition of absorption, differential phase & dark field images Low-energy X-ray fluorescence detector
Sample environments	LN_2 cryogenic system with semi-automated specimen transfer mode EM grid with C-clip ring Silicon nitride membranes

For further information please contact the Diamond Industrial Liaison Office on

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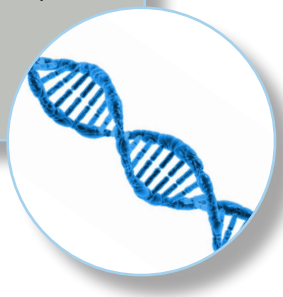
I08 Applications

Biomaterials

- Better understanding of mitosis which can contribute to new treatments for genetic diseases;
- Investigations on metal labelling and metal binding sites related to DNA and proteins;
- Quantitative chemical analysis of candidate biomaterials, adsorbed proteins or other biological species.



Medicine and Pharmacological

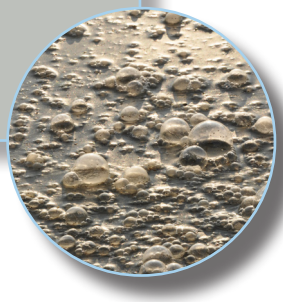
- Study the role and impact of nanoparticles on organisms;
- Better understanding of brain functionality, e.g. glucose transport from the eye to the brain;
- Studies on complex illnesses with social impact e.g. probing chemical changes of ferrihydrite after it has interacted with beta-amyloid peptide which play a key role in Alzheimer's disease.

Energy Storage and Catalysis

- Understanding fundamental chemical processes at the nanoscopic scale applied to the fields of batteries, fuel cells and catalysis;
- Probe the active metal within electrodes to establish pathways for electrochemical reactions at the single particle level;
- Structural and chemical analysis of catalyst-coated membranes for hydrogen-fuel cell applications.

Environmental

- Study transport mechanisms through soil which helps in understanding pollution and developing decontamination procedures;
- Probe metal interactions in metal-contaminated soil to find ways of recycling essential or toxic materials;
- Study the role of bacteria and other organisms in biogeochechemical cycling.



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