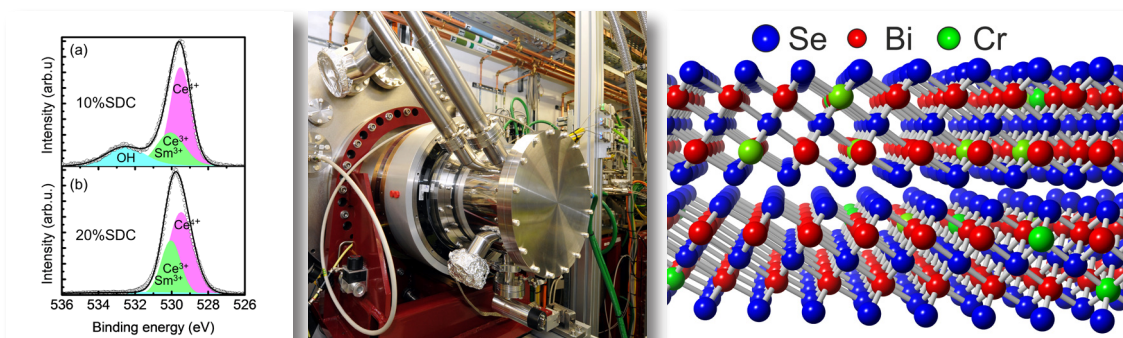


## 109 - Surface and Interface Structural Analysis Beamline

109 is dedicated to high-resolution studies of atomic and electronic structures of surfaces and interfaces in a wide range of applications. The main X-ray techniques include high resolution X-ray Photoelectron Spectroscopy (XPS), Hard X-ray Photoelectron Spectroscopy (HAXPES), Near Edge X-ray Absorption Fine Structure (NEXAFS), X-ray Standing Waves (XSW), Energy Scanned Photoelectron Diffraction (PhD).

A unique feature of this beamline is that sample characterisation for hard and soft X-rays measurements is carried out at the same end-station. This approach combines low energy and high energy beams focused on the same sample area, and achieves advances in structural determination of surfaces and interfaces, as well as in nano-structures, biological and complex materials research.



### Beamline Specification

Energy range and polarisations	Hard Soft	2.1 – 10 keV Linear horizontal: 100-1200 eV Vertical: 200 – 1200 eV Helical: 150 – 1200 eV
Beam Size at Sample [ $\mu\text{m}$ ]	Hard & Soft	Focused: 40 (H) x 20 (V) $\mu\text{m}^2$ Defocused: 300 (H) x 300 (V) $\mu\text{m}^2$
<i>In situ</i> surface preparation		Heating (e-beam or radiative) up to 1500 K Cooling < 60 K with LHe or < 135 K with LN <sub>2</sub> Ion sputtering Physical vapour deposition Gas dosing
<i>In situ</i> surface characterisation without SR		LEED and UPS (He lamp with monochromator)
Detectors		VG Scienta EW4000 HAXPRES Transmission and angular modes Ek up to 10 kV Analyzer-incident beam angle – 60° or 90° Sample drain currents Reflectivity screen for nominal incidence XSW

For further information please contact the Diamond Industrial Liaison Office on



+44 (0)1235 778797



industry@diamond.ac.uk



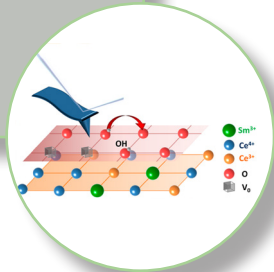
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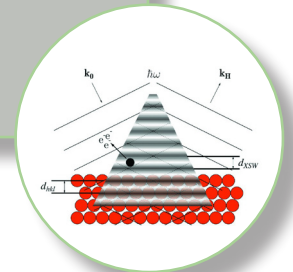
## Surface Science

- Study of interfacial structures and compositions of thin films and nanoparticles;
- Characterisation of heteroepitaxial growth in metals, semiconductors, functional alloys and metal oxides;
- Applications in information storage, spintronics, optoelectronics and sensor devices.



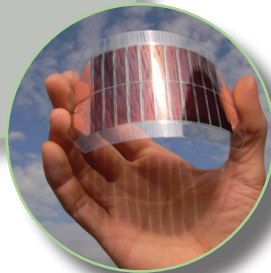
## Catalysis and Nanotechnology

- Study of surface reconstructions and monolayer adsorption of monatomic species or small molecules (e.g. CO, NO, amino acids, thiolates) on solid surfaces;
- Comprehensive descriptions of surface structure, in particular the orientation and deformation of adsorbed molecules.



## Molecules/Solid Interfaces

- Investigations of interfaces between organic and inorganic materials;
- Characterisation of the electron density of an organic layer on a solid surface combined with an element specific measurement;
- Exploration of surfaces of polymer films with specific heavy ions involved in biolubrication.



## Energy

- Studies on electronic properties of CdO used in solar cell applications;
- Probing the electronic properties of Li-based batteries;
- Characterisation of nuclear waste materials;
- Investigations on the doping interactions in electrolyte materials for solid oxide fuel cell applications.



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