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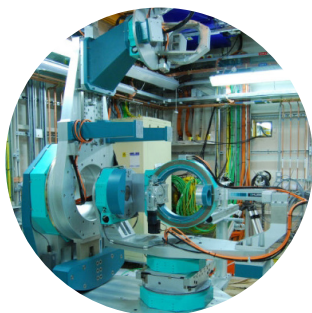
Surface and Interface Diffraction

Understanding interfacial phenomena is key to the development of many new technologies, answering vital questions relating to biological and chemical processes. I07 is a high-resolution X-ray scattering beamline for investigating the structure of surfaces and interfaces under different environmental conditions, including ultra-high vacuum and real-world controlled atmosphere and liquid environments.

The beamline capabilities include the X-ray Reflectivity (XRR) and Grazing Incidence X-ray Diffraction (GIXD) techniques in addition to Grazing Incidence Small Angle X-ray Scattering (GISAXS).

Structural investigations of solid, liquid and buried interfaces can be performed giving information on the number of layers, layer thickness, layer roughness (XRR) as well as in-plane and out-of-plane structure (GIXD, SXRD, GISAXS).

These techniques can be applied in diverse fields ranging from semiconductor design, polymer thin films, surfactants, coatings, corrosion and catalysis through to biological applications.

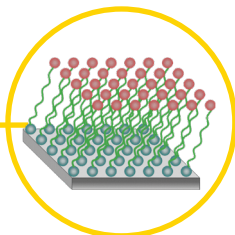


Beamline Specification

Energy range [keV] / Wavelength [Å]	8 – 30 / 0.41 – 1.55
Beam Size at Sample [µm]	100 x 60 (H x V)
Diffractometer and Sample Stages	2+3 circle diffractometer Double-crystal-deflector for studies of liquid interfaces Hexapod (up to 30 kg vertical, 50 kg horizontal)
Sample Environments	UHV chambers Controlled atmosphere environments Solid-Liquid cells Langmuir Trough Electrochemical cells Catalysis reactor
Detectors	Pilatus 2M, Pilatus 100K
GI-SAXS geometry	Sample-detector distance from 1.5 to 3 m angular range up to ~20°

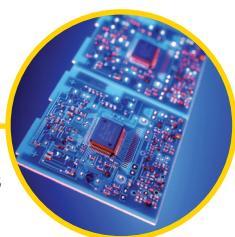
107 APPLICATIONS

Molecular Adsorption



- Investigation of the thermodynamic, structural and dynamic properties of adsorbed molecular films;
- Real-time structural information during templated growth and self-assembly processes;
- Molecular purification via selective surface adsorption (i.e. chiral specificity).

Structure of Solid Surfaces



- UHV measurements of materials with complex surface structures or containing weakly scattering atoms;
- Buried (solid-solid) interfaces such as the grain boundary between well ordered crystals or quantum dot interfaces;
- Multilayer structures which exhibit enhanced properties due to indirect coupling across the layers, e.g. photovoltaics.

Soft Matter & Biology



- Understanding interfacial interactions in surfactants and polymers at a molecular level;
- Physical influences on model membranes and their interactions with proteins;
- Surface structure and ordering in systems ranging from paints and coatings to cosmetics, drug delivery & organic photovoltaics.

Solid-Liquid & Air-Liquid Interfaces



- Studies of the surface structure of heterogeneous catalysts;
- *In situ* investigation of electrochemical processes (corrosion, electrocatalysis, electrodeposition, adsorption);
- Understanding interfacial phenomena relating to friction, lubrication and wear;
- Directly probe and obtain structural information from air-liquid and liquid interfaces.

For further information

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