I08-SXM: The scanning x-ray microscopy facility at the Diamond Light Source

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Scanning X-ray microscopes find applications in all major research fields, in many cases approaching ultimate diffraction-limited lateral resolutions and with unprecedented performance limited in the past by X-ray source properties, optics and detectors schemes. Missing in the general portfolio of scanning X-ray microscopes worldwide, and addressed by I08-SXM is an instrument that covers a broader photon energy range providing access to all major K- and L-absorption edges for SXM elemental and chemical analysis, combined with complementary imaging and spectro-microscopic techniques.

The central theme of the beamline is the ability to obtain morphological and chemically-specific information on a full range of materials (inorganic/organic) under real conditions, providing a facility that will be new not only to the UK. I08 will use radiation in the 250 to 4200 eV photon energy range, generated by an Apple II type insertion device. This X-ray source is optimised to enable studies exploiting linearly or circularly polarised radiation. The operating energy range encompasses a significant number of important K and L absorption edges for low- and medium-Z elements, and relatively thick (~10 – 20 μm) samples will be able to be studied with both absorption and phase contrast techniques, with lateral resolutions down to ~20 nm depending on the imaging mode.

I08-SXM entered user operation in July 2014 and is currently in its optimisation phase. The potential of the facility will be described and underlined with examples from different scientific research fields.