

Microscopy beamlines at SOLEIL

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Micro-focused beams and micro-imaging instruments are more and more requested from synchrotron radiation facilities. SOLEIL expects to be able to fulfill this demand in almost all the spectral range it covers from IR to hard X-rays. In the long wavelength range, two beamlines, SMIS and DISCO, will be equipped with spectromicroscopes respectively in the 1 - 10 μm and 200 – 900 nm ranges. In the short wavelength domain, an X-PEEM will be installed on a side branch of the μ focus beamline. The X-ray microscopy needs should be covered by three beamlines.

One of these, LUCIA, is already in operation at the SLS since 2004. It covers the 0.8 – 8 keV range with a DC monochromator, and delivers on the sample, by means of a bendable KB mirror pair, a medium focus probe whose minimum size is $\sim 2.5 \mu\text{m}$. The transfer of the beamline back to SOLEIL is scheduled for 2008.

Soft X-ray and hard X-ray beamlines are still in preliminary project state. The hard X-ray beamline will cover the 4 – 20 keV energy range. It will be a multi technique beamline, equipped for μ -XFS, μ -XAS, μ -XRD and micro tomography. Probe focusing will be primarily achieved by KB mirrors and produce μm sized spots. Producing smaller spots is still an issue due to the horizontal electron beam size and the available source to experiment distance. It will almost certainly require the use of hard x-ray zone plates.

In establishing a proposal of soft X-ray beamline, equal number of demands has been received from users for an Imaging Transmission Microscope TXM as for a scanning microscope STXM. The accepted project considers one microscope of each kind on two branch lines of the same beamline. The two microscopes will share the same APPLE II type undulator and the same grating monochromator. The spectral range will extend from 200 to 2000 eV with a moderate resolution of several thousands, by use of one standard lamellar grating and one multilayer grating. For the adequate illumination of the TXM from the small emittance beam of the undulator, a dynamic synthesis of the input aperture with flipping mirrors is foreseen. The performances of these microscopes will mainly depend on the quality of the zone plate that will be available. The procurement of these elements is still considered as a critical issue. French microfabrication facilities have been contacted, and have declared interested. Other collaboration offers will be welcomed.