

The new 1 – 5 keV high efficiency alternate multilayer grating for SOLEIL SIRIUS beamline.

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Sirius is a beamline designed for studying soft interfaces and semiconductor or magnetic nanostructures. It has recently got a new multilayer grating monochromator covering the 1 – 4 keV band which complements its already existing two crystal monochromator covering the 3 - 11 keV energy range. Besides the grating, this kind of monochromator requires a mirror with a matched multilayer coating to reflect the beam back in its initial direction at any wavelength. The grating and the matched mirrors of Sirius monochromator have been fabricated at the CeMOX facility of Laboratoire Charles Fabry (LCFIO) and characterized both there and on SOLEIL Metrologie beamline. The monochromator is under commissioning and its first results look very promising. A first experimental EXAFS spectrum will be presented.

Cr and B4C have been selected as a suitable couple of material for the targeted range. The characterization of the achieved ML grating with 35 periods of Cr (2.5 nm) /B4C (4.1 nm), showed a 1st order of diffraction efficiency of 55% at 4.4 keV. A very special care has been given to the optimal match between the grating and the deflecting mirror. A very high sensitivity to period mismatch has been simulated and measurements have been done in order to reduce the impact of period inhomogeneity along the 250 mm length of the mirror. Design simulations, reflectivity measurements of actual grating and mirrors will be shown and compared to fits with different multilayer and grating models.