STATE-OF-THE-ART MULTILAYER OPTICS FOR X-RAY ANALYTICS

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In this poster, we give an overview on current developments of multilayer optics for diffractometry in the lab as well as for synchrotron applications. We explain the manufacturing process of the optics, summarize the different types of optics and give some examples of typical applications which benefit from the new possibilities, especially in combination with modern microfocus X-ray sources.

The optics consist of bent substrates with shape tolerances below 100 nm, upon which multilayers are deposited with single layer thicknesses in the nanometer range and up to several hundreds of layer pairs. The multilayers were designed with lateral thickness gradients within ± 1% deviation of the ideal shape. We use sputtering technology for deposition, optical profilometry in order to characterize the shape and X-ray reflectometry in order to characterize the multilayer thickness distribution both laterally and as in-depth. The microstructure is investigated by transmission electron microscopy. The beam parameters like monochromaticity, flux, brilliance and divergence demonstrate the quality of the multilayer optics used for different applications in the home-lab as well as at synchrotrons.

We will present actual results of a combination of our new microfocus source IμS with a new type of 2-dimensional beam shaping multilayer optics. These so called Quasar Optics are now developed for different wavelengths like Cu, Mo, Ag and Cr. They shape a focused or a collimated beam with a very high flux density as well as an adequate divergence directly at the sample position. Optics are also available, which focuses in one dimension and collimates in the other. This delivers a line-shaped beam profile. Some applications realized with an IμS are (GI)SAXS, texture, stress analysis, μ-diffraction, single crystal diffraction to name but a few.