

# **State-of-the-art Thin Film X-ray Optics for Synchrotrons and Free-Electron Lasers**

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We will be presenting selected aspects of simulation, preparation and characterization of total reflection and multilayer X-ray optics. The optimum coating is found by calculating the optical properties. Sophisticated improvements in deposition technology allow the precise realization of the specified parameters when manufacturing the X-ray optics. Our capabilities for the production of multi stripe optics as well as for very long mirrors will be shown.

Two selected applications demonstrate our possibilities:

First of all we will be showing results of the development of carbon coatings as total reflection mirrors for the Free-Electron Laser in Hamburg (FLASH). Over the past years, we have developed optimized optics for the XUV range up to 200 eV. First investigations have shown that carbon coatings offer high reflectivity >95%, high radiation stability and good uniformity both in thickness and roughness.

Secondly, we will be presenting some results of the production of multi stripe optics for the use at different energies. One example shows a two-stripe optics for a tomography beamline. A Ru/C multilayer was chosen for energies between 10 and 22 keV and a W/Si multilayer for energies between 22 and 45 keV.