

Synchrotron Mirrors

Made in Geesthacht

Synchrotron



We are prepared for special solutions

- Total Reflection Mirrors
- Special Carbon Coatings for VUV and FEL
- Optics for imaging beamlines
- Multistripe monochromators
- X-ray Waveguides

Coatings up to 150 cm long



Synchrotron Mirrors: Made in Geesthacht

At Incoatec we produce a wide range of Total-Reflection as well as Multilayer Optics for Synchrotron Applications. Our broad knowledge of different materials and optics applications enables us to offer the best solution for your special requirements. We supply Zeiss and Jen-Optik, Germany with state-of-the-art optical coatings. Our synchrotron optics are used in various synchrotrons all over the world:

APS/ANL · Bessy · Desy/Hasylyab · SLS/PSI

Total Reflection Optics for FEL

FEL optics based on thin films have the following features:

- smooth surfaces
- high reflectivity
- high stability, high damage threshold

Together with GKSS Research Center, Incoatec has developed carbon coatings with optimized properties especially for the energy range of the 50-220 eV. The homogeneity achieved in films on 150 cm substrates is characterized by X-ray Reflectometry (XRR).

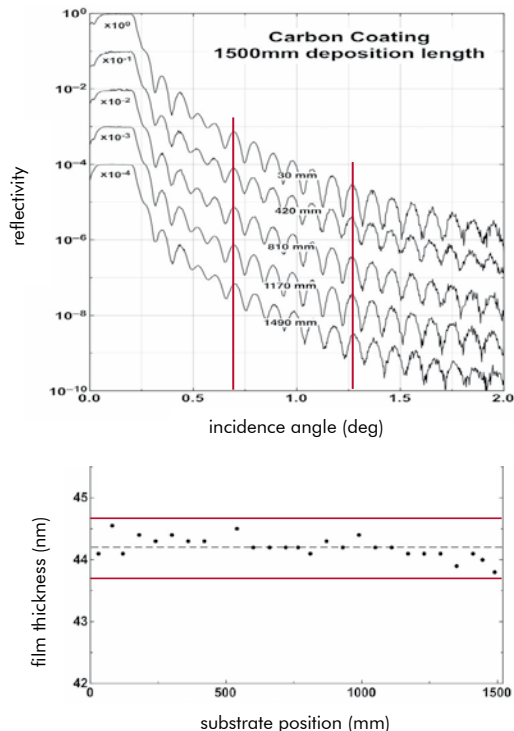


Fig. 1: 44.2 nm thick C-film on 150 cm substrate, above XRR measurements, below plot of thickness deviation: peak-to-valley < 1 nm, homogeneity better 2% (measured by M. Störmer, GKSS, SPIE proceedings 2008, 7077/4)

The high quality of the carbon mirrors is shown in Figure 2 (results in collaboration with Hasylyab at Desy).

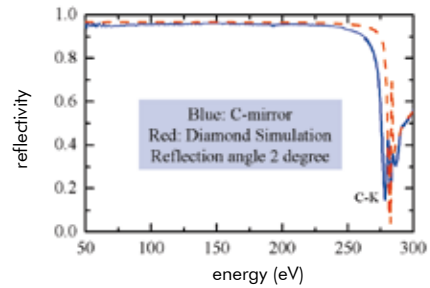


Fig 2: Energy scan: comparison of our carbon coating with a simulation of an ideal diamond, $R(E) \sim 95\text{-}96\%$ between 50-220 eV at a grazing incidence angle of 2 deg.

Multilayer Coating

We have experience with over 40 material combinations for example Ru/C, Cr/B₄C, W/Si, La/B₄C, Mo/B₄C, We are able to deposit uniform films with homogeneities < 0.1% as well as all kinds of gradients. A transmission electron microscopy micrograph is shown in Figure 3.

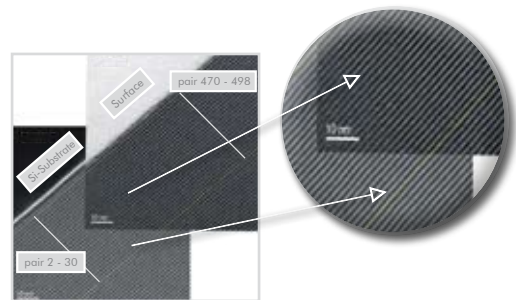


Fig. 3: TEM micrograph of a multilayer coating with a single layer thickness of 0.7 nm and 500 pairs. The magnification shows a perfect correspondence of the layer thickness over 500 pairs (courtesy by Prof. W. Jäger, University Kiel).

Optics for tomographic beamlines

Optics can be coated with single as well as multistripe multilayers.



Fig. 4: Three-striped beamline optics for tomographic microscopy and coherent radiology, M. Stampanoni (PSI, Switzerland)

Stripe A: [Ru/C]₁₀₀, $d=40 \text{ \AA}$, $\gamma=0.5$, $R > 80\%$ for $10 < E < 22 \text{ keV}$
 Midspace: Si 111, $\Delta_{\text{orientation}} < 0.01^\circ$, $\sigma=0.1 \text{ nm}$, slope error 0.04"
 Stripe B: [W/Si]₁₀₀, $d=30 \text{ \AA}$, $\gamma=0.5$, $R > 80\%$ for $22 < E < 45 \text{ keV}$