

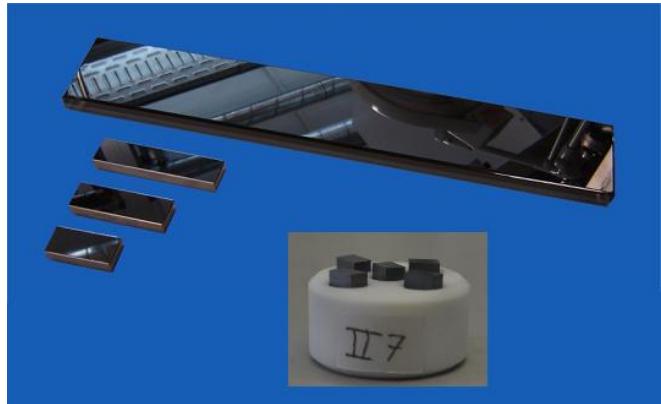
Multilayer monochromators

Multilayer monochromators can be used for the monochromatisation of X-rays similar to crystals. Various wave lengths and band widths can be regulated by choosing the multilayer material, the period thickness and the thickness gradient.

Typical photon energies of laboratory X-ray sources:

| | | | |
|---------------|----------|---------------|----------|
| Cu K α | 8041 eV | Mo K α | 17444 eV |
| Cr K α | 5412 eV | | |
| Co K α | 6926 eV | | |
| Cu K α | 8040 eV | | |
| W L α | 8392 eV | | |
| Ga K α | 9241 eV | | |
| Mo K α | 17444 eV | | |
| Rh K α | 20167 eV | | |
| Ag K α | 22103 eV | | |

Typical dimensions:



[Translate to English:] Foto typischer Multilayerspiegel-Abmessungen.

Multilayer monochromators can be produced in various sizes, from few square millimeters (e.g. 6 x 4 mm² like shown in the picture) to a length of 500mm (typically synchrotron reflectors) or a diameter of 8" (wafer).

Typical parameters for multilayer monochromators:

Spectral range: 50 eV - 100 keV

Resolution: $0.25\% < \Delta E/E < 2\%$ (periodic multilayers)

$\Delta E/E > 5\%$ on request (aperiodic multilayers)

Thickness homogeneity: $\Delta d/d < 0.02\%$

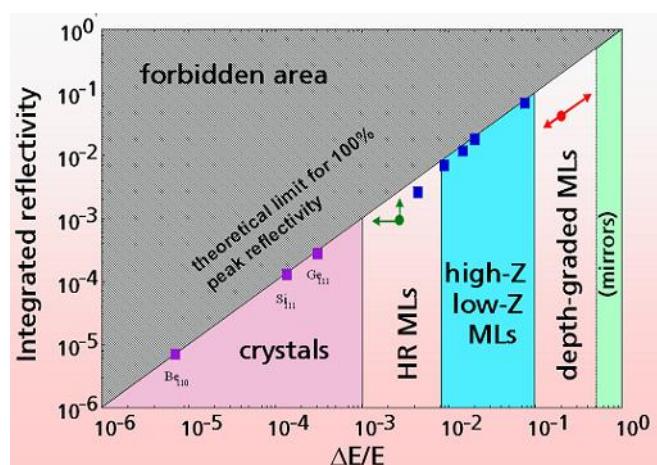
Material systems optimized on maximum peak reflectivity or desired spectral band width with given wave length or on customer's request.

Applications:

Monochromators for laboratory X-ray sources and synchrotrons

Polarizers in supple X-ray range (e.g. O-K, Fe-L, Ni-L)

Integral reflectivity vs. resolution:



[Translate to English:] (courtesy of C. Morawe, ESRF, Grenoble, France)

Integral reflectivity vs. resolution for crystals and various multilayer types. High resolution (HR) multilayer connect typical multilayer (resolution $\sim 1\text{-}3\%$) and crystals ($< 0.1\%$), depth graded multilayers factor total reflecting optics.

