

# Curved multilayers in synchrotron optics

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## Abstract

Hard x-ray focusing devices based on curved multilayers are key elements to fully exploit the advantages of 3<sup>rd</sup> generation synchrotron sources. These multilayers operate as artificial Bragg reflectors at small angles of incidence and they generally require a lateral gradient of the d-spacing to fulfill the Bragg condition at every point of the mirror. Multilayers are being used instead of crystals when high photon flux rather than high energy resolution is desired.

We have developed a sputter deposition technique that keeps the lateral thickness errors below 0.5% RMS over a total mirror length of 300 mm. This high accuracy together with an in-situ controlled bending technique enables us to obtain focal spot sizes of down to 1  $\mu\text{m}$  FWHM. The gain in flux can reach a factor of 1000 and the performance is largely limited by the synchrotron source size and the figure error of the substrate. Several examples of multilayer mirrors tested or installed at ESRF beamlines illustrate the achieved progress in this field.