

Multilayer Optics

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Research on multilayer coatings for x-ray mirrors is one of the principal activities of the Center for X-ray Optics. If you are not familiar with the principles of these optics, or would like to refresh your memory, you may want to have a look at this [mini-tutorial](#).

CXRO has been making, testing and utilizing multilayer x-ray mirrors since 1984, and has made major contributions to understanding the physics and chemistry of these devices, and to their utilization in optical systems for a variety of research fields, including x-ray astronomy, plasma spectroscopy, x-ray lasers and synchrotron radiation research. CXRO has constructed several beamlines at the Advanced Light Source which either utilize these optics or are designed to test them and evaluate their performance. The *X-ray Microprobe Beamline* is in the first category, while the *Calibration and Standards Beamline* and the *EUV Interferometry Beamline* are in the second. CXRO also maintains other instrumentation for the test and evaluation of multilayer mirrors, including a 2-circle x-ray diffractometer operating at 8.0 keV (Cu $K\alpha$ -rays), a soft x-ray reflectometer using a laser-produced plasma as a source, and instruments for the measurement of mechanical properties such as film stress.

Some of the advances made by CXRO in the past few years include:

- Completion of the *Calibration and Standards Beamline* at the Advanced Light Source for the measurement of the properties of multilayers and other x-ray optical components.
- Development of multilayer mirrors to focus x-rays to a 1 micron spot size in an x-ray microprobe.
- Mo/Be multilayers with high reflectance at 110 eV, in a joint development (with Lawrence Livermore National Lab.).
- Development of a dispersion element for the analysis of light elements in an x-ray electron microprobe.
- Coating of Schwarzschild optics for Super-Maximum photo-electron microscope at the Elettra synchrotron radiation facility in Trieste, Italy.
- Research on new combinations of materials to achieve multilayers with special properties or for particular spectral regions.

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