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Calibration and standards beamline 6.3.2 at the ALS

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This bending magnet beamline, which has been in operation since February 1995, was designed and built to carry out characterization of optical elements (mirrors, gratings, multilayers, detectors, etc.) in the energy range 50-1000 eV. In particular it was designed to make precision reflectance measurements on multilayer reflecting optics for EUV projection lithography. The beamline optics consist of a monochromator, a reflectometer and refocusing mirrors to provide a small spot on the sample. The monochromator is an entrance slitless, varied line spacing plane grating (VLS-PGM) design in which the grating operates in converging light produced by a spherical mirror working at high demagnification. This results in a very compact instrument. Aberrations of the mirror are corrected by the line spacing variation, so that the spectral resolving power can be as large as 7000. Wavelength is scanned by simple rotation of the grating, while the exit slit, and thus the focal spot on the sample, remain fixed in position. The reflectometer has the capability of positioning the sample to 10 microns and setting its angular position to 0.002 degree. LABVIEWÆ based software provides a convenient interface to the user. The reflectometer is separated from the beamline by a differential pump, and a large cryopump allows it to be pumped down in 1/2 hour. There is also provision for the mounting of auxiliary experimental stations behind the reflectometer. Results are shown which demonstrate the performance and operational convenience of the beamline.

References:
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