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Publication Date

2009-08-01

Ultra high density multilayer sliced grating for EUV and Soft X-rays: Recent Developments

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We report on the recent progress developing diffraction gratings which can potentially provide extremely high spectral resolution of 10^5 - 10^6 in the EUV and soft x-ray photon energy range. Such a grating is fabricated by deposition of a soft x-ray multilayer on a substrate which is a blazed grating (echellette) with a relatively low groove density. In order to obtain an oblique cut of the multilayer, a subsequent polish is applied to the coated grating substrate. The resulting sliced structure has a short-scale periodicity which is defined by the multilayer period and the slice angle. Based on the developed technology, a number of sliced gratings made of Sc/Si and Mo/Si multilayers deposited on echellettes with different groove periods were fabricated and tested. The result of diffraction experiments performed at the ALS beam line 6.3.2 in the EUV energy range are presented and discussed. This work was supported by the US Department of Energy under contract number DE-AC02-05CH11231.

Key words: diffraction grating, sliced grating, EUV, soft x-rays, echellette