Progress in large period multilayer coatings for high harmonic and solar applications

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Multilayer coatings for normal incidence optics designed for the long wavelength region (25 nm < λ < 50 nm) are particularly challenging due to the few number of layers that can be utilized in the reflection. Recently, Mg/SiC multilayers have been fabricated[1,2] [3]with normal incidence reflectivity in the vicinity of 40% for wavelengths near the He-II line at 30.4 nm. Motivated by this success we have investigated the use of a tri-band multilayer to increase the bandwidth while maintaining the reflectivity.

The multilayers were deposited by conventional magnetron sputtering. Using Mg/SiC bi-layers a reflectivity of 45% was achieved at 27 to 32 nm at an angle of 5 deg from normal. The Mg/Sc/SiC multilayer systems have also been investigated. It obtained a near normal incidence reflectivity of 35% while increasing the bandwidth by a factor of 2. These results are very encouraging for the possibility of more widespread applications of normal incidence optics in high harmonic applications.

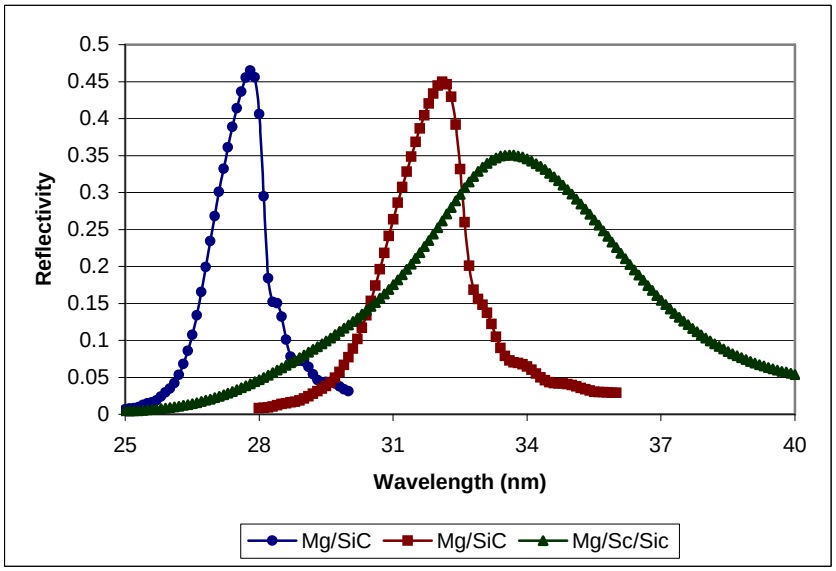

Fig. 1. The reflectivity measured for a Mg/SiC, Mg/Sc/SiC multilayer 5.0 degrees from normal incidence.

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