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Multilayers for 6.8 nm Wavelength

I.A. Makhotkin[1], E. Louis[1] ,E. Zoethout[1], R.W.E. van de Kruijs[1], Andrei M. Yakunin[2], Stephan Müllender[3] and F. Bijkerk[1,4]

[1] *FOM Institute DIFFER - Dutch Institute for Fundamental Energy Research, Nieuwegein, the Netherlands*
[2] *ASML, Veldhoven, the Netherlands*
[3] *Carl Zeiss SMT GmbH, Oberkochen, Germany*
[4] *MESA+ Institute for Nanotechnology, University of Twente, Enschede, the Netherlands*

Lithography based on the wavelength of 6.x nm is considered to be a potential extension of the current 13.5 nm EUV lithography. Light sources might be based on Tb or Gd. The published spectra of plasmas created from these materials show highest intensities at 6.5 and 6.8 nm respectively. Multilayer mirrors (MLMs) based on La and B show the highest optical contrast for the 6.6-7 nm wavelength range and a maximum reflectance at 6.64 nm, where the B absorption is minimal. It is not possible to design high reflective B-based mirrors for 6.5 nm because this would be below the B-K absorption edge. In theory the reflectivity of La/B MLMs at 6.8 nm is only a few percent lower than at the optimal wavelength of 6.64 nm, but measurements of real multilayer mirrors show a significantly larger reduction of reflectivity at 6.8 nm. The origin of this larger drop is the reduced optical contrast of the deposited La/B mirror with respect to theoretical case. In the presentation we will discuss how the multilayer structure influences its reflectivity profile and the ways to optimize La/B mirrors for 6.8 nm.

Presenting Author

Eric Louis is a senior scientist at FOM Rijnhuizen (the Netherlands) where he is involved in research and development of soft X-ray and EUV multilayer reflective coatings since 1992. He worked on multilayers for several applications such as space research and synchrotron beam lines, but focused his research primarily on multilayers for EUV lithography. As leader of the group 'Advanced applications of XUV Optics', Eric Louis has been responsible for research, development and coating of various optics for EUV lithography.
The extensive know how developed for this application is the basis for the development of multilayer coated optics for XUV and soft X-ray free electron lasers.