

Normal- and grazing incidence mirrors for 6.x nm wavelength

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For future projection lithography applications, the wavelength of 6.x nm may offer improved imaging resolution. For normal incidence, high-reflectance multilayer reflective mirrors based on LaN/B have been successfully synthesized. The record reflectivity of 64% at 6.65 nm at near normal incidence was achieved [1].

For the off-normal (grazing) incidence, 30 nm LaN single films covered with B cap were synthesized, however, those mirrors demonstrated quick complete oxidation accompanied by complete destruction of the surface. Notably, single films based on the elemental La showed good performance and no oxidation. Qualitatively similar behavior has been observed for grazing-incidence LaN/B and La/B multilayers. The surface of the multilayers based on LaN again showed strong oxidation. As a solution we successfully applied a surface La nitridation instead of a full passivation of La layer. Both single films and multilayered structures showed high resistance of the structures against oxidation.

1. D. S. Kuznetsov, A. E. Yakshin, J. M. Sturm, R. W. E. van de Kruijs, E. Louis and F. Bijkerk, "High-reflectance La/B-based multilayer mirror for 6.x nm wavelength", *Optics Letters*, Vol. 40, No. 60 (2015)