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Author
Wood, Obert

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At-wavelength imaging of EUV masks at the ALS

Yanwei Liu[1], Anton Barty[2], Kenneth A. Goldberg[1], Eric Gullikson[1]
John S. Taylor[1] and Obert Wood[3]

[1] Center for X-ray Optics, Lawrence Berkeley National Laboratory, 1 Cyclotron Road, Berkeley, CA 94720
[2] Lawrence Livermore National Laboratory, P.O. Box 808, Livermore, CA 94550
[3] International SEMATECH, 255 Fuller Road, Suite 309, Albany, NY 12203

ABSTRACT

The production of defect-free mask blanks remains a key challenge for EUV lithography, and accurate multilayer defect metrology is critical to advancing the production of defect-free mask blanks. We have recently deployed a unique dual-mode EUV mask inspection system on a bending-magnet beamline at the Advanced Light Source (ALS) synchrotron at Lawrence Berkeley National Laboratory. Capable of operating in two modes, as a high-speed scanning system and as an *at-wavelength* imaging microscope, probing the multilayer structure using 13.5-nm EUV light, this unique mask inspection system is designed to provide critical at-wavelength metrology on EUV mask defect numbers and printability.

A unique aspect of this tool is the incorporation of a full-field imaging-mode zone-plate microscope for defect imaging and review. This microscope emulates the mask-side illumination and clear aperture of a production stepper system. In this paper, we will review the optical system's design and performance, and present aerial images that demonstrate the spatial resolution and performance of this zone plate imaging system for the evaluation of both patterned EUV masks and defects on EUV mask blanks.

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