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Interferometry using undulator sources

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Optical systems for extreme ultraviolet (EUV) litho-graphy need to use optical components with sub-nanometer surface figure error tolerances to achieve diffraction-limited performance.[1,2] Also, multilayer coated optics require at-wavelength wavefront measurement to characterize phase effects which can not be measured by conventional optical interferometry. Furthermore, EUV optical systems will additionally require final testing and alignment at the operational wavelength for adjustment and reduction of the cumulative optical surface errors. Therefore, at-wavelength interferometric measurement of EUV optics will be the necessary metrology tool for the successful development of optics for EUV lithography.

An EUV point diffraction interferometer (PDI) has been developed at the Center for X-Ray Optics (CXRO) and has been already in operation for a year[3,4,5] using an undulator radiation source and coherent optics beam line at the Advanced Light Source (ALS) at Lawrence Berkeley National Laboratory. An overview of the PDI interferometer and some EUV wavefront measurements obtained with this instrument will be presented.
In addition, future developments planned for EUV interferometry at CXRO towards the measurement of actual EUV lithography optics will be shown.

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[3]K. Goldberg, et al, in Extreme Ultraviolet Lithography, D. T. Attwood and F. Zernike, eds. (OSA, Washington, D. C., 1994).
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