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Title

Actinic imaging of known native defects on a full-field mask

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Publication Date

2009-12-18

Title: Actinic imaging of known native defects on a full-field mask

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Abstract:

We report the use of high-resolution actinic (EUV-wavelength) imaging to inspect known native and programmed defects on a full-field EUV mask.

Following exposure in the ASML Alpha Demo Tool (ADT) at CNSE in Albany NY, an EUV reticle and its prints were inspected using KLA tools. Defects were also investigated using SEM, and a classification system was developed that separated the defects into the following categories: cleaning residue, particle, pattern defect, blank defects, and nuisance.

EUV imaging, performed with the SEMATECH Berkeley Actinic Inspection Tool, adds new information about the optical properties of these reticle defects. We observed that defects that appear opaque in the SEM can be highly transparent to EUV light, and inversely, defects that are mostly transparent to the SEM can be completely opaque. The EUV behavior of other defects, which are weakly observable in the SEM images, suggests that may be buried phase defects.

We will present the through-focus behavior of several interesting defects, and discuss both printability and detectability at EUV wavelengths.

This work was supported by the Director, Office of Science, Office of Basic Energy Sciences, of the U.S. Department of Energy under Contract No. DE-AC02-05CH11231.