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The SEMATECH Berkeley MET & DCT: a quest for 14-nm half-pitch in chemically amplified resist, OOB contrast of EUV resists, and 6.x-nm lithography

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In August 2011, the SEMATECH Berkeley Microfield Exposure Tool (BMET) introduced a reticle that is optimized for pseudo phase-shift-mask (pseudo-PSM) imaging, providing early access to an aerial image approaching 12-nm half-pitch with contrast above 60%. In this paper we report on a new champion chemically amplified (CA) resist and characterize several other high-performing CA EUV resists from 16-nm down to 12-nm half pitch, using the pseudo-PSM technique.

In September 2011, out-of-band (OOB) capabilities were added to the SEMATECH Berkeley Dose Calibration Tool (DCT) enabling the OOB sensitivity and OOB contrast of EUV resists to be measured. In this paper we report on the OOB sensitivity and OOB contrast of champion CA EUV resists and discuss the correlation between OOB contrast and the effects of OOB radiation during EUV exposure on patterning performance. In addition, we will report on the absolute sensitivity and contrast of several commercially available EUV resists at 6.x-nm.

Finally, we will provide an update on our progress towards building the 0.5-NA SEMATECH BMET

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