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Experiment and simulation of sub-0.25μm resist processes for 193nm lithography

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ABSTRACT

A model was developed to simulate the behavior of near-surface-imaged resist processes, with the emphasis on modeling of resist processes for 193 nm. Silylation, bilayer and additive resist processes can all be simulated using this model. For the silylation process, the model was found to be in excellent agreement with experimentally observed silylated resist profiles. This model was used in combination with existing programs that calculate aerial images and single-layer resist profiles to predict process margins for 193 nm (0.5 NA) lithography. The results of our simulations for 0.25 μm features indicate a depth of focus comparable to the Rayleigh limit ($\pm 0.4 \mu m$) for a single-layer resist process and up to two times this value for near-surface-imaged resists. Focus latitudes greater than the Rayleigh limit are predicted for 0.18 μm features when using near-surface-imaged resists in conjunction with annular illumination.