Dependence of PMMA Electron Beam Resist Sidewall Shape on Exposure Dose and Resist Thickness

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Abstract. The influence of electron beam lithography parameters (such as electron energy, resist thickness, the exposure dose) on the resist sidewall shape (profile) was studied for the PMMA (polymethyl-methacrylate) positive resist. The profile of the positive tone resist PMMA was investigated depending on varying exposure doses for the resist thicknesses 600 and 1300 nm, and electron energy 30 keV. Simulation results based on measurements along the resist profile depth are presented and discussed. The results obtained contribute to the knowledge on electron scattering in resist/substrate in electron beam lithography for the case of field emission cathode and Gaussian intensity distribution, and to the development and approval of models for the prediction and precise control of resist profiles in thick PMMA layers for 3D proximity effect simulation, the bilayer resist system, and the lift-off method.