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Directed self-assembly of block copolymers for resolution enhancement and pattern rectification JOY CHENG, CHARLES RETTNER, DANIEL SANDERS, ALSHAKIM NELSON, HOA TRUONG, HO-CHEOL KIM, WILLIAM HINSBERG, SELF-ASSEMBLY TEAM — Directed polymer self-assembly which combines lithographically defined substrates and self-assembled polymers has been considered as a potential candidate to extend conventional lithography techniques. Self-assembled block copolymer domains can multiply the spatial frequency and improve pattern quality of the underlying resist prepattern. Lamella-forming PS-b-PMMA is spin-cast on patterned substrate with alternating stripes of resist/ neutral underlayer and annealed to generate well-aligned microdomains. The performance of directed self-assembly depends on the pitch of resist prepattern and resist pattern quality. For linear line-space pattern, defect-free frequency doubling can be achieved within $\pm5\%$ mismatch between periodicity of block copolymers and pitch of resist patterns. Less mismatch tolerance was observed in concentric circular pattern. The self-healing capability of block copolymers has been explored by introducing dotted resist lines. Pattern rectification and frequency multiplication can be successfully achieved when sufficient local spatial information is given in the resist prepattern.

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