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Solvent Annealing Strategies for the Self-Assemblty of Low Molecular Weight Block Copolymers KEVIN GOTRIK, YEON SIK JUNG[1], JEONG GON SON, CAROLINE ROSS, Massachusetts Institute of Technology —
Templated self-assembly of block copolymer (BCP) films is of intrest for lithographic applications. As the drive for smaller features continues, we explore the extensibility of block copolymer microphase separation towards smaller periods in a series of low molecular weight (5 -15 kg/mol) poly(styrene-b-dimethylsiloxane) (PS-PDMS) diblock copolymers. This material exhibits a large segmental Flory-Huggins interaction parameter (0.26), enabling microphase separation with a periodicity of ¡10 nm in 5kg/mol PS- PDMS at room temperature. One of the challenges in low molecular weight systems is to obtain self-assembly while avoiding dewetting. Here we describe the use of solvent annealing and substrate functionalization processes to accomplish microphase separation. We also discuss the use of mixed solvents to selectively swell different blocks of the copolymer resulting in a change in the final morphology of the self-assembled features, e.g. a cylindrical-morphology BCP forming perforated lamellae.

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