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Direct solvent induced microphase separation, ordering and nanoparticles infusion of block copolymer thin films¹ ARVIND MODI, The University of Akron, ASHUTOSH SHARMA, Indian Institute of Technology Kanpur, ALAMGIR KARIM, The University of Akron — Kinetics of block copolymer (BCP) microphase separation by thermal annealing is often a challenge to low-cost and faster fabrication of devices because of the slow ordering. Towards the objective of rapid processing and accessing desired nanostructures, we are developing methods that enable a high degree of mobility of BCP phases while maintaining phase separation conditions via control of effective interaction parameter between the blocks in BCP thin films. We study the self-assembly of PS-P2VP thin films in various solvent mixtures. While non-solvent prevents dissolution of film into the bulk solution, the good solvent penetrates the film and makes polymer chains mobile. As a result of controlled swelling and mobility of BCP blocks, solvent annealing of pre-cast BCP thin films in liquid mixture of good solvent and non-solvent is a promising method for rapid patterning of nanostructures. Interestingly, we demonstrate simultaneous BCP microphase separation and infusion of gold nano-particles into selective phase offering a wide range of application from plasmonics to nanoelectronics.

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