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Exploring the Use of Additives to Optimize the Directed Self-Assembly of Block Copolymers via Self-Consistent Field Theory Simulations ADAM HANNON, DANIEL SUNDAY, R. JOSEPH KLINE, National Institute of Standards and Technology — The directed self-assembly (DSA) of block copolymers (BCPs) is being investigated for the fabrication of next generation memory and integrated circuit technologies. Much progress has been made showing how these materials can be processed to produce a variety of transferable patterned morphologies that meet the requirements for fabricating integrated circuit geometries. One lingering issue in using these materials to produce sub-10 nm structures is finding new BCPs with a high enough χFlory-Huggins interaction parameter to create small resolution features with low interfacial widths that are also easily processable. An alternative approach to synthesizing new materials is to instead blend the BCP with additives that strongly interacts with one of the blocks. Here we present findings on how the addition of a hydrogen bonding homopolymer affects the overall effective χ, the periodicity, and the morphology of the BCP. Self-consistent field theory simulations are used to explore how the relative χ values and degrees of polymerization between the BCP and homopolymer affect these parameters and suggest optimal blending conditions. Results are compared with experimental X-ray and neutron scattering studies of a polystyrene-*b*-poly(methyl methacrylate)/poly(vinyl phenol) blend.

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