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Topcoat approaches for directed-assembly of copolymer films with blocks exhibiting differences in surface energy HYO SEON SUH, The University of Chicago, JEONG IN LEE, University of Wisconsin-Madison, ABELARDO RAMIREZ-HERNANDEZ, The University of Chicago, YASUHIKO TADA, HIROSHI YOSHIDA, Hitachi Ltd., LEI WAN, RICARDO RUIZ, HGST a Western Digital company, JUAN DE PABLO, PAUL NEALEY, The University of Chicago — Fabricating patterns with feature dimensions smaller than 10 nm scale using block copolymer lithography requires the use of materials with large Flory-Huggins interaction parameters. Because such block copolymers (BCPs) typically show the large differences in surface energy between the blocks, one block (with lower surface energy) tends to segregate to the free surface of films and precludes the assembly of the desired through-film perpendicularly oriented structures. Here we describe a generalizable strategy to overcome this limitation. By coating the BCP film with an additional layer, a topcoat, thermodynamically favorable boundary conditions at the top surface of the film can be engineered for directed self-assembly. The allowable properties of the topcoats depend on the interfacial energies of the layer with the blocks of the copolymer, and the block-block interfacial energy. The strategy is demonstrated experimentally by directing the assembly of polystyrene-block-poly-2-vinylpyridine (PS-*b*-P2VP) films on chemically nanopatterned substrates with different topcoat materials.

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