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Directed self-assembly (DSA)of block copolymer-based supramolecular materials on chemically patterned surfaces GUANGPENG WU, PAUL NEALEY, University of Chicago — Supramolecular systems composed of coil-coil block copolymers in which small molecules are attached to the segments of one of the blocks through hydrogen-bonding interactions are of interest because they form well-defined hierarchical three-dimensional nanostructures, and the small molecules can be designed to impart functionality to the system. Previous studies have investigated the self-assembled structure-property relationships of these coil-comb molecules in the bulk and in thin films. Here we investigate the potential for directing the assembly of this class of materials on chemically nanopatterned surfaces. A lamellae-forming supramolecular system was created by attaching 3-pentadecylphenol (PDP) to the vinylpyridine segments of polystyrene-*block*-poly(4-vinylpyridine) (PS-*b*-P4VP) via hydrogen bonding. The period of the lamellar structure could be controlled between 35 nm to 40 nm by changing the volume fraction of PDP. The materials were solvent annealed on chemical patterns consisting of stripes of PS on silicon substrates. Analogous to the DSA of coil-coil block copolymers, the quality of the arrays of perpendicularly oriented through-film domains depended on the period of the chemical patterns, the PDP/4VP fraction, the width of the PS stripes, and the film thickness.

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