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Hierarchical Assembly of a Diblock Copolymer-based Supramolecule Containing Liquid Crystal Side Chains PETER BAI, MYUNG IM KIM, TING XU, University of California, Berkeley — Liquid crystalline side chain block copolymers (LCSCBCPs) are a novel class of soft materials that combine the rich morphology of block copolymers with the unique structural and electrooptical properties of liquid crystals. A supramolecular LCSCBCP composed of a cholesteric small molecule, 3-hydroxylphenyl cholesteryl succinate (ChHP) hydrogen bonded to a diblock copolymer, polystyrene-block-poly-4-vinylpyridine (PS-b-P4VP) was investigated for its structural and thermoresponsive properties using DSC, POM, DSC, TEM and SAXS. The supramolecule, PS-b-P4VP(ChHP), retained both block copolymer and liquid crystalline phase behavior in the form of hierarchical assembly on multiple length scales to form lamellar-within-lamellar and lamellar-within-cylinder morphologies. Upon thermal annealing, the supramolecule demonstrated thermoresponsive behavior in the form of a series of morphological transitions from a P4VP(ChHP) majority morphology to a P4VP(ChHP) minority morphology. The observed hierarchical assembly and thermoresponsiveness could potentially be applied towards templated assembly of nanomaterials with unique nanostructures for optical and photonic applications.

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