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Small Molecule-Guided Thermoresponsive Supramolecular Assemblies BENJAMIN J. RANCATORE, CLAYTON E. MAULDIN, Department of Chemistry, UC Berkeley, JEAN M.J. FRÉCHET, College of Chemistry, UC Berkeley, TING XU, Department of Materials Science and Engineering, UC Berkeley — Small organic molecules with strong intermolecular interactions have a wide range of desirable optical and electronic properties and rich phase behavior. Incorporating them into block copolymer (BCP)-based supramolecules opens a new route to generate functional responsive materials. A quaterthiophene semiconductor containing alkyl and phenolic moieties was hydrogen-bonded to the 4-vinylpyridine groups of a block copolymer, polystyrene-b-poly(4-vinylpyridine) or a homopolymer, poly(4-vinylpyridine) (1,2). Hierarchical co-assemblies of oligothiophene and BCP with a number of potentially useful morphologies for optoelectronic materials were obtained. Crystallization of the oligothiophene from a melt not only induced chain stretching of the BCP block the oligothiophene was hydrogen bonded to, but also changed the conformation of the other BCP coil block, which led to an over 70% change in the BCP periodicity. The present studies have demonstrated the experimental feasibility of generating thermoresponsive materials that convert heat into mechanical energy and provides access to large BCP periodicities using fairly low molecular weight BCP. References: (1) Rancatore et al., ACS Nano 2010, 4, 2721. (2) Rancatore et al., Macromolecules 2012, 45, 8292.

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