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Directed Self-Assembly of Cadmium Selenide Nanocrystals in Conjugated Rod-Coil Block Copolymers B. L. MCCULLOCH, Dept of Chemical Engineering, University of California-Berkeley, J. URBAN, Molecular Foundry, Lawrence Berkeley National Laboratory, R. A. SEGALMAN, Dept of Chemical Engineering, University of California-Berkeley — Semiconducting polymer/nanocrystal composites are attractive for many applications; however their performance relies crucially on nanoscale morphology. We demonstrate that a conjugated rod-coil diblock copolymer can be used both to absorb light and template the location of CdSe nanocrystals. A combination of the liquid crystallinity of the conjugated rod block and the interactions of the nanocrystal ligand coat with the block copolymer control self-assembly. For example, incorporation of the nanocrystal in the rod nanodomain disrupts liquid crystallinity. In the case of a poly(alkoxy-phenylene vinylene-b-2-vinyl pyridine) (PPV-b-P2VP) block copolymer and CdSe nanocrystals, self-assembly leads to a bulk lamellar structure on the 10nm length scale. Small angle X-ray scattering confirms the addition of nanocrystals swells the domain size. We demonstrate via transmission electron microscopy the nanocrystals reside preferentially in the P2VP domain, presumably due to the strong nanocrystal surface interactions with polar P2VP and exclusion effects of the crystalline PPV phase.

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