

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Hierarchical Helical-Assembly of Conjugated Poly(3-hexylthiophene)-*b*-poly(3-triethylene glycol-thiophene) Diblock Copolymers EUNJI LEE, BRENTON HAMMER, TODD EMRICK, RYAN C. HAYWARD, Department of Polymer Science and Engineering, University of Massachusetts, Amherst — One-dimensional crystalline fibrillar assemblies of poly(3-hexylthiophene) (P3HT)-based materials hold significant potential for fabrication of low-cost optoelectronic devices. We have studied the crystallization-driven assembly of a series of poly(3-hexylthiophene)-*block*-poly(3-triethylene glycol-thiophene) (P3HT-*b*-P3TEGT) diblock copolymers, which provide a large contrast in solubility due to the presence of non-polar (hexyl) and polar (TEG) side-chains. P3HT-*b*-P3TEGT diblock copolymers were found to form well-defined fibrillar structures in mixed solvents of chloroform and methanol, with lengths could be tuned easily by changing the solvent composition or relative block lengths. For polymers containing relatively short P3TEGT blocks, the resulting fibers show twisted ribbon-like structures. For appropriate block ratios, complexation of the TEG side chains to alkali metal cations drives formation of clearly defined single helical ribbons and superhelical structures.

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Date submitted: 26 Nov 2010

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