Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Hairy-rod Complexes of Conjugated Polymers for Solar Cells[1] S. ZHANG, Dept of Chemical Engineering, Yale University, E. BEACH, P. ANASTAS, Dept of Chemistry, Yale University, L. PFEFFERLE, C. OSUJI, Dept of Chemical Engineering, Yale University — The development of new high efficiency organic solar cells in many cases is largely predicated on the formation of ordered nanostructures in the active donor-acceptor layer. Hairy-rod conjugated polymers, consisting of a stiff conjugated backbone and flexible long side chains, self-assemble into ordered nanostructures via phase separation. In particular, they can form nematic, smectic and columnar phases depending on the volume fraction of side chains.[1] In combination with suitable second-phase semiconducting nanomaterials, they offer a potential route to the realization of ordered heterojunction devices. In this work, we report phase behaviors of novel hairy-rod complexes consisting of a polythiophene backbone with surfactant side chains. Two kinds of the complexes were prepared via ionic bonding: one contains the flexible hydrocarbon sequence in side chains whereas the other utilizes the rigid mesogenic moiety. The interactions between polythiophene and different surfactants were investigated. Phase transitions of the complexes were identified by a combination of various techniques including x-ray scattering and calorimetry. Both thermotropic and lyotropic liquid crystalline behaviors were observed. We discuss a simple model for the formation of the liquid crystalline mesophases in these supramolecular systems. Reference [1] R. Stepanyan, A. Subbotin, M. Knaapila, O. Ikkala, G. ten Brinke, Self-organization of hairy-rod polymers, Macromolecules, 2003, 36, 3758

[1]This work is funded by the NSF under DMR-0934520.

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Date submitted: 02 Dec 2009 Electronic form version 1.4