Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Self-Assembly of Conjugated Rod-Coil Block Copolymers for Photovoltaic Applications R. A. SEGALMAN, B.D. OLSEN, Y. TAO, B. MCCULLOCH, UC Berkeley and Lawrence Berkeley National Laboratories — The phase behavior of conjugated rod-coil block copolymers is significantly different from that of traditional block copolymers due to the interplay between liquid crystalline interactions of the rod blocks and microphase separation of the rods and coils. A universal phase diagram for rod-coil diblock copolymers depends on the strengths of the rod aligning interactions and the rod-coil repulsive interactions as well as the geometrical ratio of rod volume to coil and aspect ratios. In this talk, the experimental phase diagram of a weakly segregated model block copolymer will be compared to that predicted by self-consistent field theory. Conjugated rod-coil block copolymers with electron donating and accepting blocks are promising for photovoltaic applications. The self-assembly of poly(thiophene-b-acrylate perylene diimide) block copolymers as well as block copolymer-nanocrystal composites result in photovoltaic active layers with controllable degrees of order. We demonstrate that short range order on the nanoscale is beneficial to device performance.

R. A. Segalman
UC Berkeley and Lawrence Berkeley National Laboratories

Date submitted: 20 Nov 2008 Electronic form version 1.4