Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Charge Transport in Conjugated Block Copolymers BRANDON SMITH, THINH LE, YOUNGMIN LEE, ENRIQUE GOMEZ, Penn State University — Interest in conjugated block copolymers for high performance organic photovoltaic applications has increased considerably in recent years. Polymer/fullerene mixtures for conventional bulk heterojunction devices, such as P3HT:PCBM, are severely limited in control over interfaces and domain length scales. In contrast, microphase separated block copolymers self-assemble to form lamellar morphologies with alternating electron donor and acceptor domains, thereby maximizing electronic coupling and local order at interfaces. Efficiencies as high as 3% have been reported in solar cells for one block copolymer, P3HT-PFTBT, but the details concerning charge transport within copolymers have not been explored. To fill this gap, we probed the transport characteristics with thin-film transistors. Excellent charge mobility values for electron transport have been observed on aluminum source and drain contacts in a bottom gate, bottom contact transistor configuration. Evidence of high mobility in ordered PFTBT phases has also been obtained following thermal annealing. The insights gleaned from our investigation serve as useful guideposts, revealing the significance of the interplay between charge mobility, interfacial order, and optimal domain size in organic block copolymer semiconductors.

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Date submitted: 04 Nov 2015 Electronic form version 1.4