Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Charge Transport in Amorphous Polythiophene-Fullerene Blends KIARASH VAKHSHOURI, DEREK KOZUB, Department of Chemical Engineering, Pennsylvania State University, CHENCHEN WANG, ALBERTO SALLEO, Materials Science and Engineering, Stanford University, ENRIQUE GOMEZ, Department of Chemical Engineering and Materials Research Institute, Pennsylvania State University — Energy-filtered transmission electron microscopy studies revealed that amorphous mixed phases are ubiquitous within mesostructured polythiophene/fullerene mixtures. Nevertheless, the role of mixing within nanophases on charge transport of organic semiconductor mixtures is not fully understood. We have examined the electron mobility in amorphous blends of poly(3-hexylthiophene) and phenyl-C_{61}-butyric acid methyl ester. Our studies reveal that the miscibility of the components strongly affects electron transport within amorphous blends. Immiscibility promotes efficient electron transport by promoting percolating pathways within organic semiconductor mixtures. As a consequence, partial miscibility may be important for efficient charge transport in polythiophene/fullerene mixtures and organic solar cell performance.

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Date submitted: 25 Oct 2011 Electronic form version 1.4