Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Ultrafast Spectroscopy of Charge Generation in Polythiophene/Fullerene Blends for Organic Photovoltaic Applications[1] SANJEEV SINGH, University of Utah, JOSH HOLT, BILL PANDIT, ZEEV VARDENY, University of Utah — We present a detailed spectroscopy study of ultrafast photogeneration of charges in polymer/fullerene blends, such as regio-regular polythiophene (RR-P3HT), regio-random polythiophene (RRa-P3HT) and fullerene derivatives such as C_{61} (PCBM), using the transient pump-probe photomodulation (PM) spectroscopy with $\sim$ 100 fs resolution. These blends serve as active layers in organic photovoltaic devices with high power conversion quantum yield (up to 6 %), due to a photoinduced charge transfer (PCT) reaction between the polymer and the fullerene molecules. Our transient PM spectrum spans a broad energy range from 0.1-2.4 eV, and this allows us to monitor the transient behavior of the various photoinduced absorption (PA) bands of polarons and excitons; as well as photobleaching (PB) of the ground state. In order to understand the nano-morphology of these active layers, which also affects their photophysics, TEM images are also presented. Various processes such as PCT, geminate recombination, and energy transfer from the polymer to the fullerene phase are unraveled.

[1]Supported in part by the DOE grant 05-03172 and NSF DMR 08-03325.

Sanjeev Singh
University of Utah

Date submitted: 17 Nov 2009 Electronic form version 1.4