Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Influence of Amorphous PCPDTBT on the Morphology of Ternary Blend Solar Cell Based on P3HT/PCPDTBT/PCBM YU GU, Department of Polymer Science and Engineering, University of Massachusetts - Amherst, CHENG WANG, Advanced Light Source, Laurence Berkeley National Laboratory, FENG LIU, Department of Polymer Science and Engineering, University of Massachusetts - Amherst, JIHUA CHEN, Center for Nanophase Materials Sciences, Oak Ridge National Laboratory, ONDREJ DYCK, GERD DUSCHER, Department of Materials Science and Engineering, University of Tennessee, THOMAS RUSSELL, Department of Polymer Science and Engineering, University of Massachusetts - Amherst — To push the efficiency of organic photovoltaic devices to a higher level, ternary blend solar cells were fabricated. Only a few successful ternary systems have been reported, which have higher efficiency than the binary references. One of these is based on P3HT/PCPDTBT/PCBM. We used x-ray scattering methods in combination with transmission electron microscopies to determine the morphology of thin films of this blend. Different morphologies were generated by varying the molecular weight of P3HT, blending ratio and thermal annealing time. It was found that P3HT crystallized under the confinement of PCPDTBT. The bundles of P3HT fibrils, composed of the oriented P3HT crystal blocks, formed a network; and a PCBM-rich phase with amorphous PCPDTBT and P3HT filled in the space between the P3HT fibrils. Such a multi-length-scale morphology produced a parallel device structure. The extended absorption and the photosensitization of PCPDTBT at the interface were attributed to the improved device performance relative to the binary references.

Yu Gu
Department of Polymer Science and Engineering,
University of Massachusetts - Amherst

Date submitted: 10 Nov 2013 Electronic form version 1.4