Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Morphological Characterization of Low-Bandgap Crystalline Polymer:PCBM Bulk Heterojunction Solar Cells[1] HAIYUN LU, THOMAS RUSSELL, University of Massachusetts Amherst, UNIVERSITY OF MASSACHUSETTS AMHERST TEAM — Understanding the morphology of polymer-based bulk heterojunction (BHJ) solar cells is key to improving device efficiencies. Blends of a low-bandgap silole-containing conjugated polymer, poly[(4,4'-bis(2-ethylhexyl)dithieno[3,2-b;2',3'-d]silole)-2,6-diyl-alt-(4,7-bis(2-thienyl)-2,1,3-benzothiadiazole)-5,5'-diyl] (PSBTBT) with phenyl-C61-butyric acid methyl ester (PCBM) were investigated using different processing conditions. Scanning force microscopy, X-ray photoelectron spectroscopy, near-edge X-ray absorption fine structure spectroscopy, dynamic secondary ion mass spectrometry and neutron reflectivity studies showed that thermal annealing did not induce obvious changes in the structure of the active layer. Grazing-incidence X-ray diffraction and small-angle neutron scattering showed that the crystallization of PSBTBT and segregation of PCBM occurred during spin coating, and a brief thermal annealing increased the ordering of PSBTBT and enhanced the segregation of the PCBM, forming domains with 10-nm in size, leading to an improvement in photovoltaic performance.

[1]DOE and Konarka Inc. are acknowledged.

Haiyun Lu
University of Massachusetts Amherst

Date submitted: 10 Nov 2010 Electronic form version 1.4