Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Self-assembly Columnar Structure in Active Layer of Bulk Heterojunction Solar Cell[1] CHENG PAN, JENNIFER SEGUI, YINGJIE YU, HONGFEI LI, Stony Brook University, BULENT AKGUN, SUSHIL K. SATIJIA, National Institute of Standards and Technology, DILIP GERSAPPE, Stony Brook University, CHANG-YONG NAM, Brookhaven National Laboratory, MIRIAM RAFAILOVICH, Stony Brook University — Bulk Heterojunction (BHJ) polymer solar cells are an area of intense interest due to their flexibility and relatively low cost. However, due to the disordered inner structure in active layer, the power conversion efficiency of BHJ solar cell is relatively low. Our research provides the method to produce ordered self-assembly columnar structure within active layer of bulk heterojunction (BHJ) solar cell by introducing polystyrene (PS) into the active layer. The blend thin film of polystyrene, poly (3-hexylthiophene-2,5-diyl) (P3HT) and [6,6]-phenyl C_{61} butyric acid methyl ester (PCBM) at different ratio are spin coated on substrate and annealed in vacuum oven for certain time. Atomic force microscopy (AFM) images show uniform phase segregation on the surface of polymer blend thin film and highly ordered columnar structure is then proven by etching the film with ion sputtering. TEM cross-section technology is also used to investigate the column structure. Neutron reflectometry was taken to establish the confinement of PCBM at the interface of PS and P3HT. The different morphological structures formed via phase segregation will be correlated with the performance of the PEV cells to be fabricated at the BNL-CFN.

[1]NSF-DMR-MRSEC

Cheng Pan
Stony Brook University

Date submitted: 28 Jan 2012 Electronic form version 1.4