Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Conjugated block copolymer photovoltaics with near 3% efficiency CHANGHE GUO, The Pennsylvania State University, YEN-HAO LIN, Rice University, MATTHEW WITMAN, The Pennsylvania State University, KENDALL SMITH, Rice University, CHENG WANG, ALEXANDER HEXEMER, Lawrence Berkeley National Lab, RAFAEL VERDUZCO, Rice University, ENRIQUE GOMEZ, The Pennsylvania State University — Conjugated polymer blend solar cells are devices where the active layers are composed of polymer donor and polymer acceptor pairs. These devices suffer from macrophase separation in the active layer, limiting efficiency. The self-assembly properties of block copolymers have the potential to overcome the thermodynamic incompatibility between different polymers and form unique nanoscale structures for efficient photovoltaic operation. Using a poly(3-hexylthiophene) - poly((9,9-dioctylfluorene)-2,7-diyl-alt-[4,7-bis(thiophen-5-yl)-2,1,3-benzothiadiazole]-2',2"-diyl) conjugated block copolymer (P3HT-PFOTBT), we demonstrate for the first time that devices composed of donor-acceptor block copolymers can work as solar cells with efficiencies around 3%. Lamellar morphologies formed in block copolymer thin films have been characterized using resonant soft X-ray scattering.

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Date submitted: 07 Nov 2012 Electronic form version 1.4