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Ternary blend polymer solar cells with self-assembled structure for enhancing power conversion efficiency ZHENHUA YANG, HONGFEI LI, State Univ of NY- Stony Brook, CHANG-YONG NAM, KIM KISSLINGER, Brookhave national lab, SUSHIL SATIJA, National Institute of Standards and Technology, MIRIAM RAFAILOVICH, State Univ of NY- Stony Brook — Bulk heterojunction (BHJ) polymer solar cells are an area of intense interest due to their advantages such as mechanical flexibility. The active layer is typically spin coated from the solution of polythiophene derivatives (donor) and fullerenes (acceptor) and interconnected domains are formed because of phase separation. However, the power conversion efficiency (PCE) of BHJ solar cell is restricted by the disordered inner structures in the active layer, donor or acceptor domains isolated from electrodes. Here we report a self-assembled columnar structure formed by phase separation between (PCDTBT) and polystyrene (PS) for the active layer morphology optimization. The BHJ solar cell device based on this structure is promising for exhibiting higher performance due to the shorter carrier transportation pathway and larger interfacial area between donor and acceptor. The surface morphology is investigated with atomic force microscopy (AFM) and the columnar structure is studied by investigation of cross-section of the blend thin film of PCDTBT and PS under the transmission electron microscopy (TEM). The different morphological structures formed via phase segregation are correlated with the performance of the BHJ solar cells.

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