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The Miscibility of PCBM in Low Band-Gap Conjugated Polymers in Organic Photovoltaics HUIPENG CHEN, Department of Chemistry, University of Tennessee, WEI YOU, Department of Chemistry, University of North Carolina, JEFF PEET, Konarka Technologies, JASON AZOULAY, GUILLERMO BAZAN, Center for Polymers and Organic Solids The University of California, Santa Barbara, MARK DADMUN, Department of Chemistry, University of Tennessee —
Understanding the morphology of the photoactive layer in organic photovoltaics (OPVs) is essential to optimizing conjugated polymer-based solar cells to meet the targeted efficiency of 10%. The miscibility and interdiffusion of components are among the key elements that impact the development of morphology and structure in OPV active layers. This study uses neutron reflectivity to correlate the structure of low band gap polymers to their miscibility with PCBM. Several low band gap polymers that exhibit power conversion efficiencies exceeding 7%, including PBnDT-DTffBT were examined. The intermixing of low band-gap polymer and PCBM bilayers was monitored by neutron reflectivity before and after thermal annealing, providing quantification of the miscibility and interdiffusion of PCBM within the low band gap polymer layer. These results indicate that the miscibility of PCBM ranges from 3% to 26% with the low band-gap polymers studied. The correlation between low band gap polymer structure and miscibility of PCBM will also be discussed.

Huipeng Chen
University of Tennessee

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