

On the morphology of PCPDTBT:PC71BM thin blend films for organic photovoltaics

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The use of solvent additives provides a route to strongly improve the performance of polymer:fullerene based organic solar cells (OSC). In case of PCPDTBT:PC71BM, the use of 1,8-octanedthiol (ODT) has been reported to boost the power conversion efficiency from 2.8% to 5.5%. However, the physical mechanism of this improvement, as well as the impact on degradation behavior, when ODT is used is not yet fully understood. In the present work, we illuminate how ODT affects the nanometer scaled morphology of thin PCPDTBT:PC71BM thin films. Using grazing incidence small and wide angle X-ray scattering methods, and optical spectroscopy, ODT is found to enhance polymer crystallization and phase separation on a nanometer scale. The formation of a fullerene rich topping layer is observed by X-ray reflectivity. When ODT is used, the influence of blend composition is lost. This knowledge paves the pathway for studying the degradation behavior of PCPDTBT based solar cells.

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