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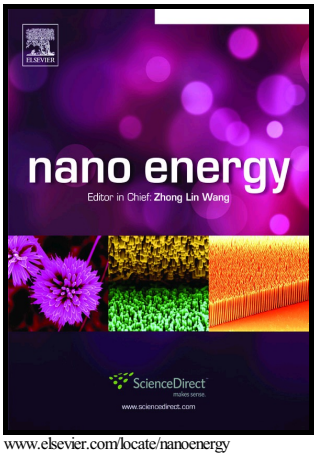

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Optimized Phase Separation in Low-bandgap Polymer:Fullerene Bulk Heterojunction Solar Cells with Criteria of Solvent Additives

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Abstract

We investigate a correlation between the type of solvent additives (SAs) with specific criteria such as aromatic additives (AAs) and non-aromatic additives (NAAs) and phase separation in the bulk heterojunction (BHJ) films comprising low-band gap polymer and fullerene derivatives. When AAs are used as SAs, the geometrical structures (π-π and lamellar stacking) of aggregated polymer chains do not significantly change. However, NAAs increase the lamellar stacking distance through a strong interaction with non-aromatic segments of polymers. Therefore, a well-phase separated BHJ morphology with the finer fibrils is developed, thereby leading to balanced charge mobilities and a reduced charge recombination in BHJ solar cells. Finally, the optimized solar cell exhibits a high power conversion efficiency of 7.9%.

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