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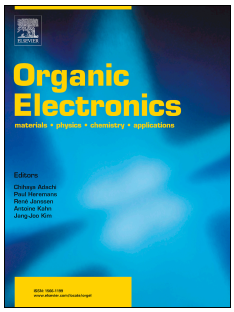

Rubrene-based interfacial engineering toward enhanced performance in inverted polymer solar cells

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Rubrene-based interfacial engineering toward enhanced performance in inverted polymer solar cells

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ABSTACT: Rubrene, an organic semiconductor having stable fused-ring molecular structure was used as a double interfacial layer in inverted organic solar cells. When a thin, 3 nm-thick layer of rubrene was introduced between a MoO_3-based hole-collecting layer and a bulk-heterojunction (BHJ) photo-active layer consisting of poly{4,8-bis[(2-ethylhexyl)oxy]benzo[1,2-b:4,5-b']dithiophene-2,6-diyl-alt-3-fluoro-2-[(2-ethylhexyl)carbonyl]thieno[3,4-b]thiophene-4,6-diyl} (PTB7) and [6,6]-phenyl C_{71}-butyric acid methyl ester ($PC_{71}BM$), the power conversion efficiency was improved over 12% (from 7.2% to 8.1%). It was demonstrated that the insertion of thin rubrene layer showed suppressed exciton quenching and improved exciton dissociation, resulting in more efficient charge carrier collection and weaker charge recombination, thus improving the device performance.