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Synthesis and characterization of a donor-acceptor type copolymer containing ester-functionalized benzo[*c*][1,2,5]thiadiazole as an accepting building block for organic photovoltaics

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Abstract

The benzo[*c*][1,2,5]thiadiazole (BT) based copolymer, poly[(4,8-bis(5-(2-ethylhexyl)thiophen-2-yl)benzo[1,2-*b*:4,5-*b'*]dithiophene)-*alt*-(diethyl 4,7-di(thiophen-2-yl)benzo[*c*][1,2,5]thiadiazole-5,6-dicarboxylate)] (PBDTBT-COOR), was synthesized by Stille polycondensation. The BT unit with carboxylate ester groups was designed and synthesized as an electron-withdrawing building block for donor-acceptor type copolymers with the aim of achieving good solubility and low-lying highest occupied molecular orbital energy levels of the synthesized polymer. Consequently, the synthesized PBDTBT-COOR copolymer showed excellent solubility in common organic solvents and a relatively deep HOMO energy level. An inverted organic photovoltaic device was fabricated using PBDTBT-COOR and [6,6]-phenyl C₇₁ butyric acid methyl ester as the electron donor and the

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