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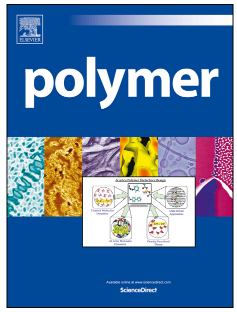

Efficient alternating polymer based on benzodithiophene and di-fluorinated quinoxaline derivatives for bulk heterojunction photovoltaic cells

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Efficient alternating polymer based on benzodithiophene and di-fluorinated quinoxaline derivatives for bulk heterojunction photovoltaic cells

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Abstract: A new donor-acceptor polymer (**PBDTT-DFTQ**) based on two-dimensional conjugated alkylthienyl substituted benzo[1,2-b:4,5-b']dithiophene and two fluorine substituted quinoxaline derivatives was synthesized and applied as donor materials for bulk heterojunction solar cells. Thermal stability, absorption properties, energy levels and photovoltaic properties of the polymer were intensively investigated. This polymer exhibited an optical bandgap of 1.76 eV and a deep highest occupied molecular orbital (HOMO) energy level (-5.45 eV). Conventional devices were fabricated using **PBDTT-DFTQ** as donor blending with [6,6]-phenyl-C71 butyric acid methyl ester ($PC_{71}BM$) as acceptor, a high open-circuit voltage (V_{oc}) 0.95 V and a power conversion efficiency (PCE) of 5.52% were obtained for the optimal donor and acceptor weight ratio (1:3). After tetrahydrofuran vapor annealing, the device delivers balanced charge transport property and enhanced absorption in the visible region, which are benefit to obtain improved short-circuit current density (J_{sc}) and fill factor (FF). Consequently, an enhanced power conversion efficiency

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