

밴드갭이 낮은 공액고분자의 합성과 특징

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Synthesis and Characteristic of a Low-Bandgap Conjugated Polymer

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Abstract : The photovoltaic properties of a novel low-bandgap conjugated polymer, poly[4,7-bis(3',3'-diheptyl-3,4-propylenedioxythienyl)-2,1,3-benzothiadiazole] [poly(heptyl₄-PTBT)], with an optical energy gap of $E_g = 1.55$ eV, have been studied. The spectral photocurrent of the poly(heptyl₄-PTBT)/methanofullerene [6,6]-phenyl-C₆₁-butyric acid methyl ester (PCBM) composite peak at 600nm and the contribution to the IPCE can be observed down to 750 nm, and this indicates the low bandgap of poly(heptyl₄-PTBT). The full coverage of the visible region of the poly(heptyl₄-PTBT)/PCBM composite, proved the efficient photogeneration of charge carries. Poly(heptyl₄-PTBT) is used as an electron donor together with PCBM as an electron acceptor in low bandgap bulk heterojunction polymer solar cell. Poly(heptyl₄-PTBT)/PCBM device showed an open-circuit voltage, short-circuit current density, and power conversion efficiency of 0.37 V, 3.15 mA/cm², and 0.35% under air mass 1.5 (AM1.5G) illumination (100mW/cm²), respectively.

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