

Novel Water-Soluble Polyfluorenes as an Interfacial layer leading to Cathodes-Independent High Performance of Organic Solar Cells

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Abstract : Water solubility of conjugated polymers may offer many applications. Potential applications of water-soluble conjugated polymers include the polymer light-emitting diode and new materials for nano and micro hollow-capsules, and bio- or chemo-sensors. We synthesized neutral polyfluorenes containing bromo-alkyl groups by the palladium catalyzed Suzuki coupling reaction. Bromo-alkyl side groups in neutral polyfluorenes were quaternized by tri-methyl amine solution. The electrochemical and optical properties of water-soluble conjugated polymers are discussed. This novel synthesized water-soluble conjugated polymers were used as a interfacial dipole layer between active layer and metal cathode in polymer solar cell for enhancement of open-circuit voltage (Voc), which is one of the most critical factors in determining device characteristics. We also investigated the device performance of polymer solar cell with different metal cathode such as Al, Ag, Au and Cu. In polymer solar cell, novel cationic water-soluble conjugated polymers were inserted between active layer and high-work function cathode (Al, Ag, Au and Cu).

Key words : water-soluble polyfluorene(수용성 폴리플루오렌), open-circuit voltage(개방전압), interfacial dipole(계면쌍극자), high work-function metal cathode(높은 일함수의 전극), organic solar cells(유기태양전지)

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