

Design and Preparation of D-A Conjugated Copolymers for Efficient Polymer Solar Cells

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Polymer solar cells (PSCs) have attracted considerable attention because of their potential advantages of low cost, light weight, flexible fabrication and low-temperature solution processing technique. After the bulk heterojunction (BHJ) architecture was introduced into PSCs, the PCE had promptly increased quickly from 1% to 10% by designing polymer structures and optimizing device fabrication technologies. Typically, the active layer of BHJ PSCs contains a phase-separated blend of a donor (D) material and an acceptor (A) material. In most cases, fullerene derivatives were chosen as the acceptor material, such as PC₆₁BM or PC₇₁BM, which showed relatively weak light-harvest ability in visible light range. Because most of solar flux will be harvested by the donor materials, research efforts on developing new conjugated polymer donors are the main streams in this field. In this presentation, we will talk about our recent progress in conjugated polymer donors for efficient PSCs. Some design strategy will be mentioned to design the efficient conjugated copolymers with improved V_{oc}, J_{sc} and FF, including extending conjugated plane, heteroatom effect, side chain engineering and fluorination effect. Based on the different strategies, the relationships between the molecular structures and absorption, energy levels, carrier mobility as well as photovoltaic property.

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