

Photovoltaic Properties of Organic Solar Cells with Donor-acceptor Heterojunctions

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Organic solar cells attract significant research interests since they offer advantages of low-cost, large-area deposition, and the compatibility with flexible plastic substrates. However, the power conversion efficiency of organic solar cells is still very low for practical applications. The low efficiency arises from low efficiency of free charge carriers and poor mobilities in organic materials. It has been found that the photoinduced electron transfer from conjugated polymers to fullerenes (C_{60}) occurs in the subpicosecond time scale, resulting in an efficient generation of free charge carriers. In this work, we report the photovoltaic properties of organic solar cells with polymer- C_{60} blends and Cu-phthalocyanine/ C_{60} heterojunctions. The photovoltaic properties of the cells were investigated by measurements of the current-voltage dependences under dark and illumination, photovoltaic spectral response, and the power conversion efficiency. The temperature dependence of various photovoltaic parameters was also studied to understand the mechanism of device operation.