

Materials and Devices for the Interface Engineering of High-Performance Polymer Solar Cells and Perovskite Solar Cells

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Polymeric solar cells (PSCs) have attracted considerable attention due to their unique characteristics, such as low cost, light weight, and possible flexibility and large-area coverage. In order to obtain high efficiency PSCs, both high performance active materials and interfacial materials are needed. Herein, we report our efforts on the development new conjugated polymer donor and interfacial materials for the interface engineering of high performance PSCs. A series of new Donor-Acceptor (D-A) conjugated polymers with alternating electron-rich and electron-deficient units along their backbone were synthesized and characterized, where absorption spectra and band gaps of the resulting polymers can be effectively tuned by controlling the intramolecular charge transfer between different donor and acceptor units. Besides, water/alcohol soluble conjugated polymers (WSCPs) were developed as highly efficient interfacial materials for PSCs, which can enhance short-circuit current density (J_{sc}), open-circuit voltage (V_{oc}), and fill factor (FF), thus improve power conversion efficiency (PCE) of the resulting PSCs. Based on these newly developed WSCPs interlayer materials, both high performance PSCs and Perovskite Solar cells were realized.

References

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