

Spectroscopic Investigations of Transfer and Transport of Charge Carriers in the Donor/Acceptor Network of Organic Solar Cells



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Fraunhofer Verlag Sep 2014, 2014. Taschenbuch. Condition: Neu. Neuware - The performance of organic solar cells strongly depends on the interpenetrating network of electron donor and electron acceptor phases. This morphology affects both charge carrier generation and transport, and therefore the efficiency of the cell. The first part of this work addresses the influence of process parameters on the morphology of the photoactive layer in polymer solar cells. The most investigated donor/acceptor combination P3HT:PCBM is analyzed for absorption, photoluminescence, transient absorption, and current-voltage characteristics. The second part presents optical and electrical analyses of the novel polymers HXS-1 and PTB7 in pristine films as well as in blends with different fullerenes. When the fullerene PCBM is exchanged by ICBA, the open circuit voltage increases because of the higher electron transport level of ICBA. In contrast to P3HT:ICBA, HXS-1:ICBA and PTB7:ICBA cells have a lower short circuit current density and fill factor than the respective cells with PCBM, however. The reason for the lower efficiency is found to be poor charge carrier transport by using several electrical and spectroscopic measurement techniques. The poor charge carrier transport is concluded to be a consequence of high intermixing of polymer and fullerene phases in the photoactive layer. 137 pp. Englisch.



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