

Influence of polymer ionization potential on the open-circuit voltage of hybrid polymer/ Ti O₂ solar cells

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Abstract

We report studies of the dependence of the open-circuit voltage (VOC) of polymer/titanium dioxide hybrid devices on the ionization potential of the polymer (IP). Once corrected for differences in photocarrier generation by the polymers, the measured VOC values vary linearly with the polymer IP, with a slope of 0.8 ± 0.1 . This behavior agrees with recent studies of polymer/fullerene photovoltaic devices and is consistent with the hypothesis that VOC of an organic donor-acceptor solar cell is limited by the energy difference between the highest occupied molecular orbital of the donor (in this case, the polymer) and the lowest unoccupied electronic level of the acceptor (in this case, the conduction band edge of the Ti O₂).

Indexed keywords

Engineering controlled terms: Conduction bands; Ionization potential; Molecular orbitals; Open circuit voltage; Photovoltaic cells; Titanium dioxide

Engineering uncontrolled terms: Conduction band edge; Energy difference; Photovoltaic devices; Polymer ionization potential

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