

Joint CQSE and CASTS Seminar

Weekly Seminar
May 29, 2015 (Friday)

TIME May 29, 2015, 14:30 ~ 15:30
TITLE Interface engineering for high performance inverted solar cells
SPEAKER Prof. Fang-Chi Hsu
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Abstract

Interface control is an important issue in polymer based solar cells because the influence of interface property on bulk heterojunction transport can govern the device performance. We systematically select a series of thioaromatic molecules to tune the surface characters of the metal-oxide array in inverted ZnO-nanorod/poly(3-hexythiophene):(6,6)-phenyl C61 butyric acid methyl ester (P3HT:PCBM)/Ag devices. In addition to physically improving the compatibility between ZnO-nanorod and polymer blend contact junction, those conjugated thioaromatic molecules slightly modulate the nanostructured donor and acceptor percolated networks as revealed by the measured carrier mobility values whereas the modulations of photon absorption efficiency and the exciton dissociation rate are negligible. The balanced charge transport architecture can be obtained by using longer and linearly arranged aromatic rings. As high as ~80% enhancement in power conversion efficiency of the device has been achieved. The result decouples the contribution of the exciton dissociation rate from the bulk heterojunction charge transport process to device performance in inverted polymer solar cells and can be generalized to hybrid polymer-nanocrystal systems as well.

