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Molecular Control of Charge Transfer from Organic Semiconductors to ZnO[1] JOSEF SPALENKA, PEERASAK PAOPRASERT, RYAN FRANKING, DOMINIC BINDL, MICHAEL ARNOLD, ROBERT HAMERS, PADMA GOPALAN, PAUL EVANS, University of Wisconsin-Madison — The transfer of charge at organic-inorganic semiconductor interfaces is relevant for a range of applications such as organic light emitting diodes and photovoltaics. We investigate exciton dissociation and charge transfer using a novel probe based on a modified pentacene phototransistor with ZnO nanoparticles at the gate dielectric interface. We observe a large threshold voltage shift (+33 V) upon illumination of samples with ZnO, and no comparably large shift in samples without ZnO. This large threshold voltage shift arises from photoinduced charge transfer at the pentacene-ZnO interface and charge trapping on the nanoparticles. We further find that modifying the ZnO surface with a layer of organic molecules using a carboxylic acid binding chemistry can tune the threshold voltage, and therefore the density of charge transferred to ZnO. The effect of absorbing incident photons with varying energy will also be discussed.

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