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Photogenerated charge transfer between conducting polymer and oxide L.N.S. MURTHY, L. XU, T.B DAUNIS, J.W.P HSU, UT Dallas, F.Y CAO, Y.J CHENG, N.Chiao Tung U. — Sensitized photodetectors separate the photon detection from electrical signal processing and can broaden the spectral range on the same detection platform. Here, we study a sensitized phototransistor with n-type oxides (InO_x, ZnO) as the channel layer and polymers (P3HT, $PFBT_2Se_2Th$) as the absorber. The transfer of photogenerated charges from the absorber to the channel is critical for the functioning of these devices. Magnitude of surface photovoltage (SPV), change in the Fermi level with illumination, reflects the efficiency of the charge transfer, and its spectrum shows the detectable energy range. We confirm that the spectrum is determined by the absorber; hence SPV spectrum is similar for P3HT/InO_x and P3HT/ZnO, and is larger using $PFBT_2Se_2Th$/InO_x than P3HT/InO_x because $PFBT_2Se_2Th$ has a smaller bandgap. We find the magnitude of SPV is larger in P3HT/InO_x compared with $PFBT_2Se_2Th$/InO_x and larger even in P3HT/ZnO. The recombination time of photogenerated charges are studied by making bilayer devices with top electrodes. The insight gained in these studies is critical for realization of sensitized phototransistors.

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