Performance Characteristics of p-i-n type Organic Thin-film Photovoltaic Cell with CuPc:F4-TCNQ Hole Transport Layer

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We have investigated the effect of strong p type organic semiconductor F4-TCNQ-doped CuPc hole transport layer on the performance of p-i-n type bulk hetero-junction photovoltaic device from ITO/ PEDOT:PSS/ CuPc:F4-TCNQ(5wt%) /CuPc:C60(blending ratio 1:1)/C60/BCP/LiF/Al, fabricated via vacuum deposition process, and have evaluated the J-V characteristics, short current(Jsc), open voltage(Voc), fill factor(FF), and energy conversion efficiency(ηe) of the device. By doping of F4-TCNQ into CuPc hole transport layer, increased absorption intensity in absorption spectra, uniform dispersion of organic molecules in the layer, uniform surface of the layer, and enhanced injection currents have been obtained to improve the performance of the current photovoltaic device with improved energy conversion efficiency(ηe) which is still low value compared to silicone solar cell and many efforts should be made to improve organic photovoltaic devices in coming days.