ADVANCED OPTICAL MATERIALS

Supporting Information

for *Adv. Optical Mater.*, DOI: 10.1002/adom.201600784

Bilayer Interdiffused Heterojunction Organic Photodiodes Fabricated by Double Transfer Stamping

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OPD Figures of Merits

The responsivity of the OPD can be defined as the photocurrent per unit incident optical power, which gives the equation[34],

$$\mathcal{R} = \frac{i_{ph}}{P_{opt}} = \frac{\eta q \lambda}{hc} = \frac{\eta \lambda[nm]}{1239.89[nmW/A]} \text{ [A/W]} \quad \text{(S1)}$$

where i_{ph} is the output photocurrent of the detector, P_{opt} is the incident optical power on the detector, η is quantum efficiency, q is electron charge, λ is wavelength of interest, h is plank constant, and c is the light velocity.

Noise equivalent power (NEP, in W/Hz$^{1/2}$) is defined as the incident power at a particular wavelength required to produce a photodetector current equal to the rms noise current in a

photodetector.[40] When we assume that the shot noise current associated to the dark current is dominant over the thermal noise under reverse bias, NEP can be simplified as,

$$NEP = \frac{\sqrt{\langle I_N^2 \rangle}}{R} = \frac{\sqrt{2qI_D}}{R} \text{ [W/Hz}^{1/2}\text{]} \quad \text{(S2)}$$

where I_N is noise current, I_D is the dark current of the photodetector and $2qI_D$ is the shot noise power spectral density.

The specific detectivity D*, which is normalized by the area of the photodetector can be expressed as

$$D^* = \frac{\sqrt{A}}{NEP} \quad \text{(S3)}$$

expressed in Jones or cm$\sqrt{Hz}$/W, where A is the area of the photodetector.

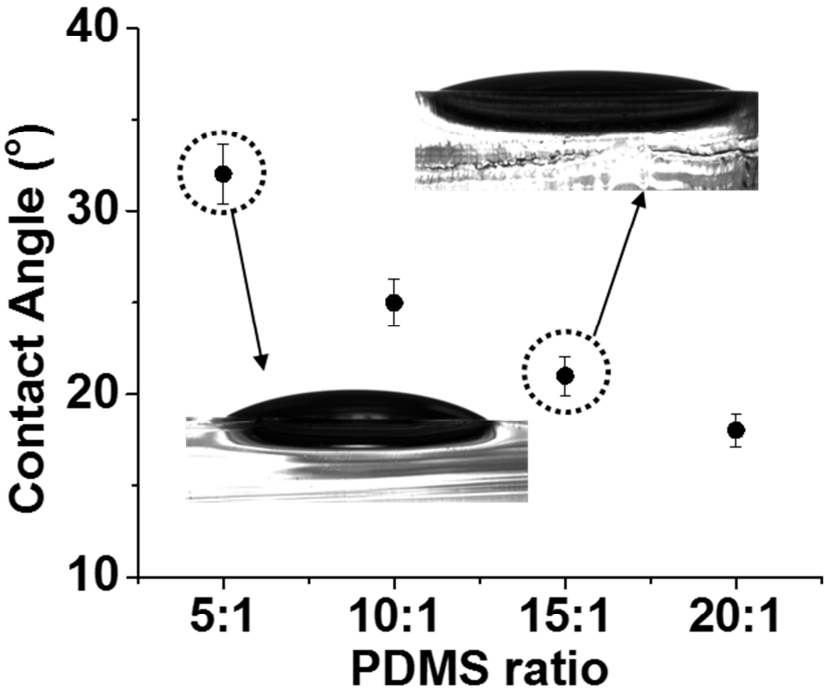

Figure S1. Advancing contact angle measurement on PDMS stamps with different mixing ratio of PDMS to Sylgard and curing agent combined. The P3HT dissolved in CB was used for these measurements.

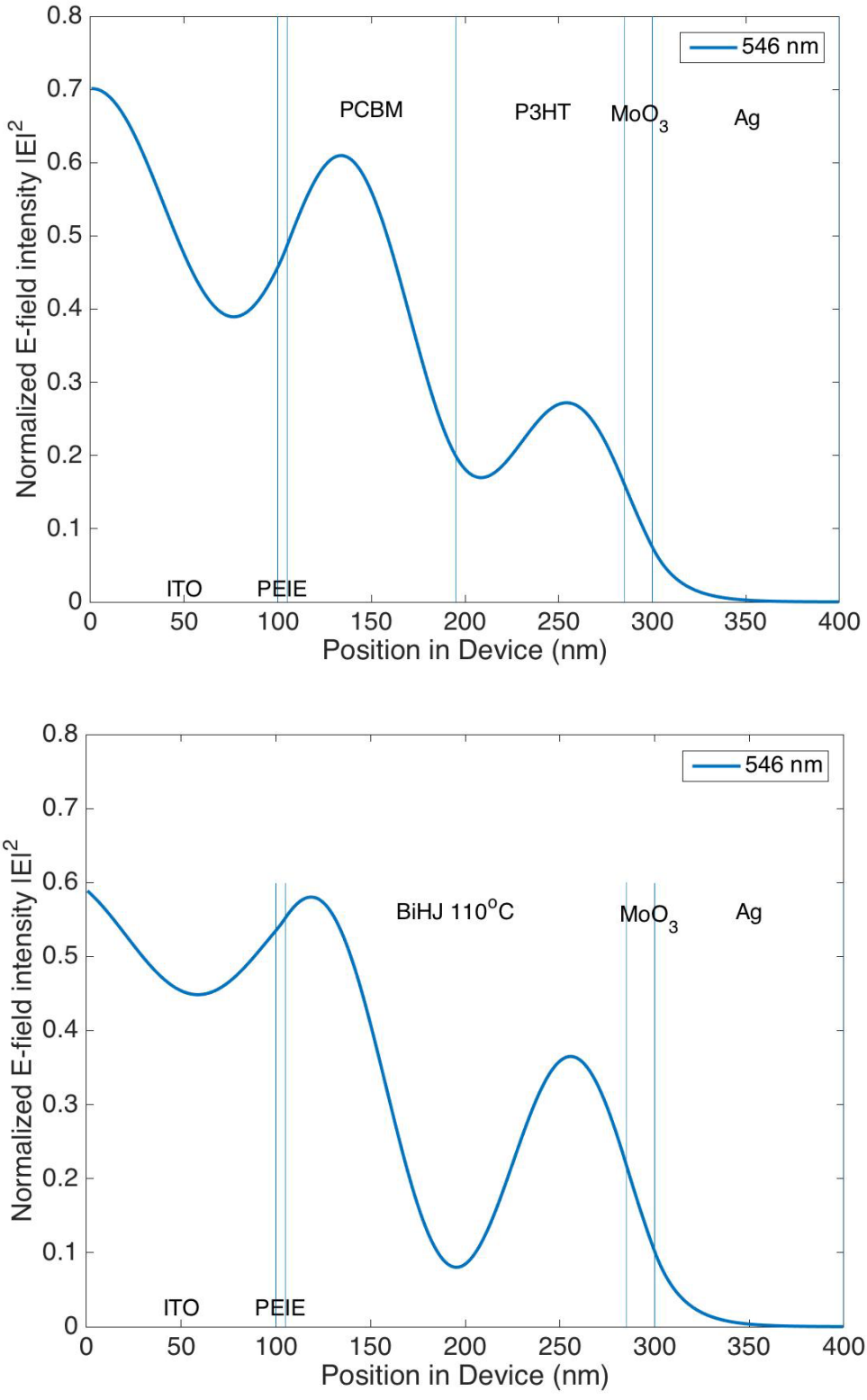

Figure S2. Simulated distribution profiles for the E-field intensities in the as-cast (top) and BiHJ 110 ^{o}C (bottom) OPDs. The excitation wavelength was fixed to 546 nm.

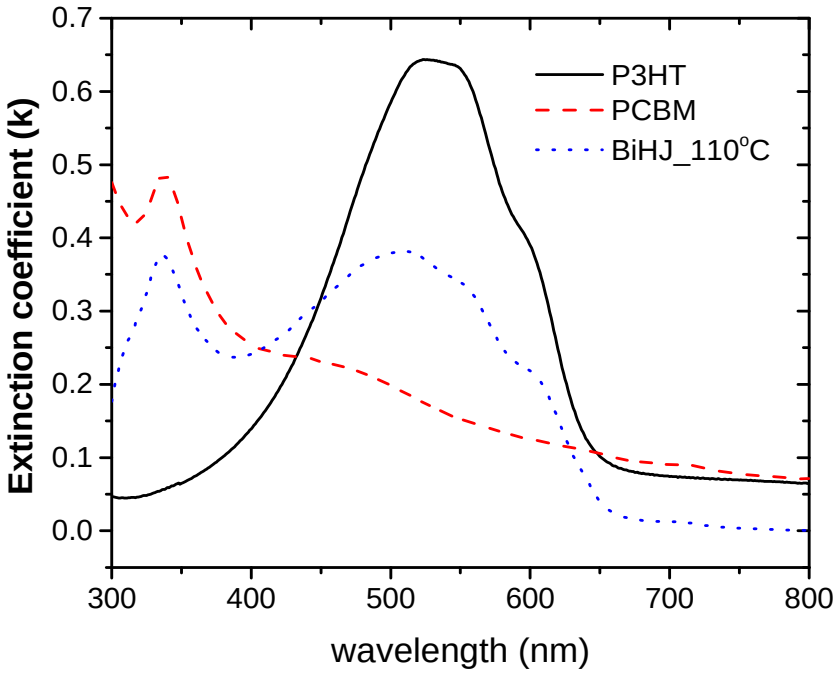

Figure S3. Extinction coefficient versus wavelength plot of P3HT, PCBM and BiHJ 110 ^{o}C film