

## Supplementary Information

### One-step Processing of multilayers in organic solar cells

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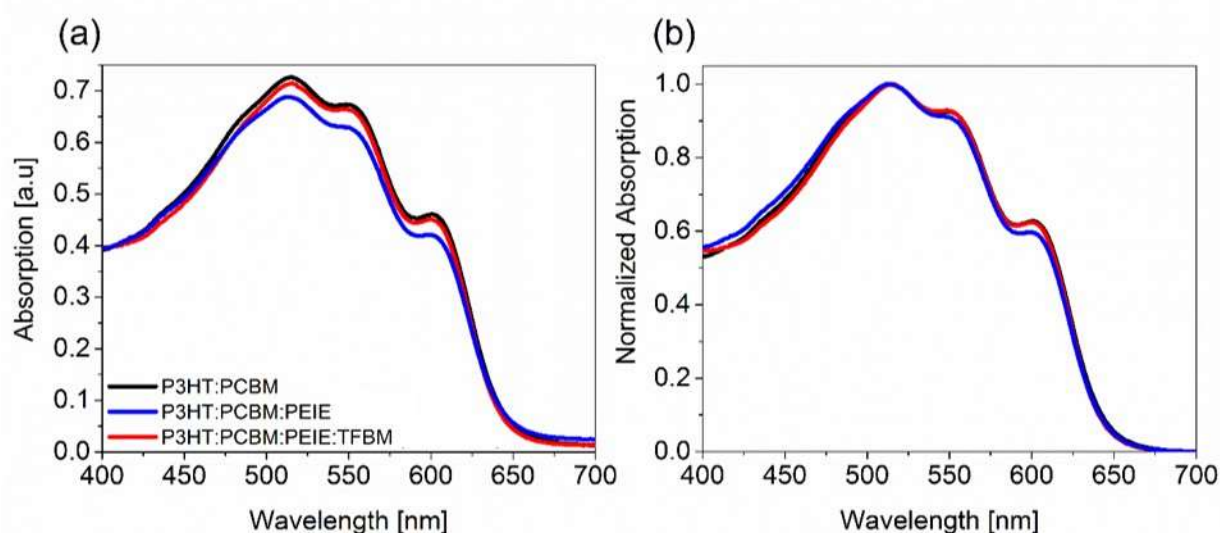


Figure S1: Optical absorption of P3HT:PC<sub>61</sub>BM films spun from solutions including, no, one or two additives (a) as-measured, and (b) normalized.

The UV-vis absorption spectra shown in figure S1a indicates that adding PEIE or an additive mixture of PEIE and TFBM to a P3HT:PC<sub>61</sub>BM blend has a negligible effect on film thickness and absorption features. The transitions at 520 and 560 nm, and shoulder at 605 nm are associated with of P3HT; and the signal at 335 nm is of PC<sub>61</sub>BM.

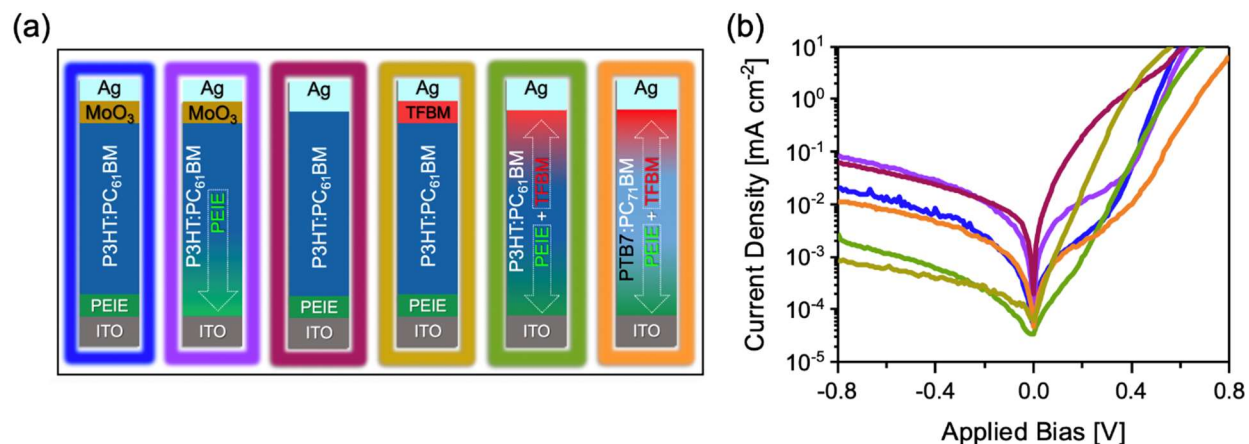


Figure S2: (a) Schematic illustration of inverted P3HT:PC<sub>61</sub>BM and PTB7:PC<sub>71</sub>BM OSC device structures with distinctly processed interlayers (blue, purple, red and yellow framed structure) or self-generated (green and orange framed devices) interlayers, and (b) averaged J-V curves measured in the dark of the same devices illustrated in (a). Note that the color of the JV curve in (b) is associated with the device in (a) with the frame of the same color.

Table S1: Averaged performance parameters of the devices presented in Figure 4. Note that the color of the writing is associated with the device illustration frame in (a) and curve in (b) of the same color.

Sample	Jsc [mA cm <sup>-2</sup> ]	Voc [V]	FF	Efficiency [%]
PEIE/P3HT:PCBM/MoO <sub>3</sub> /Ag	6.71 ± 0.65	0.52 ± 0.01	0.63 ± 0.02	2.19 ± 0.17
P3HT:PCBM:PEIE/MoO <sub>3</sub> /Ag	6.73 ± 0.64	0.57 ± 0.01	0.67 ± 0.01	2.55 ± 0.21
PEIE/P3HT:PCBM/Ag	7.56 ± 0.68	0.30 ± 0.01	0.43 ± 0.01	0.98 ± 0.10
PEIE/P3HT:PCBM/TFBM/Ag	6.45 ± 0.64	0.48 ± 0.01	0.53 ± 0.01	1.66 ± 0.19
P3HT:PCBM:PEIE:TFBM/Ag	7.87 ± 0.66	0.58 ± 0.01	0.60 ± 0.01	2.79 ± 0.27
PTB7:PCBM: PEIE:TFBM/Ag	11.85 ± 0.85	0.70 ± 0.01	0.53 ± 0.02	4.45 ± 0.36