Electronic Supplementary Information

Interfacial Disorder in Efficient Polymer Solar Cells: Impact of Donor Molecular Structure and Solvent Additive

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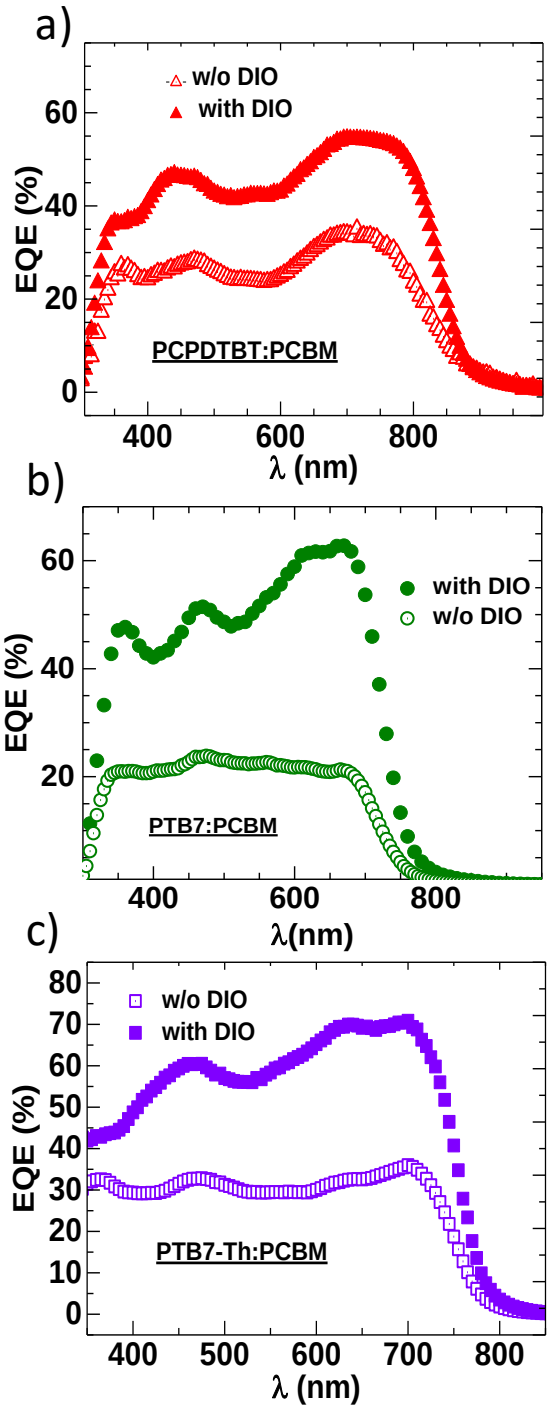

Figure S1: EQE spectrum of BHJ OSCs.

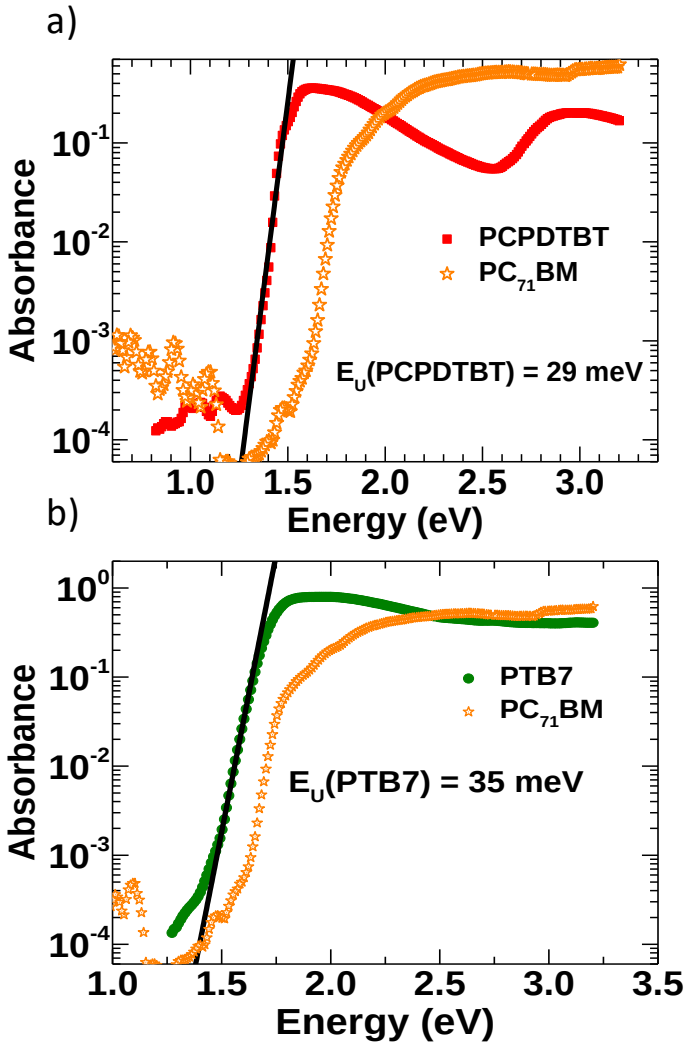

Figure S2: Absorption spectra for neat PCPDTBT, PTB7, and $PC_{71}BM$ films that were measured using PDS.

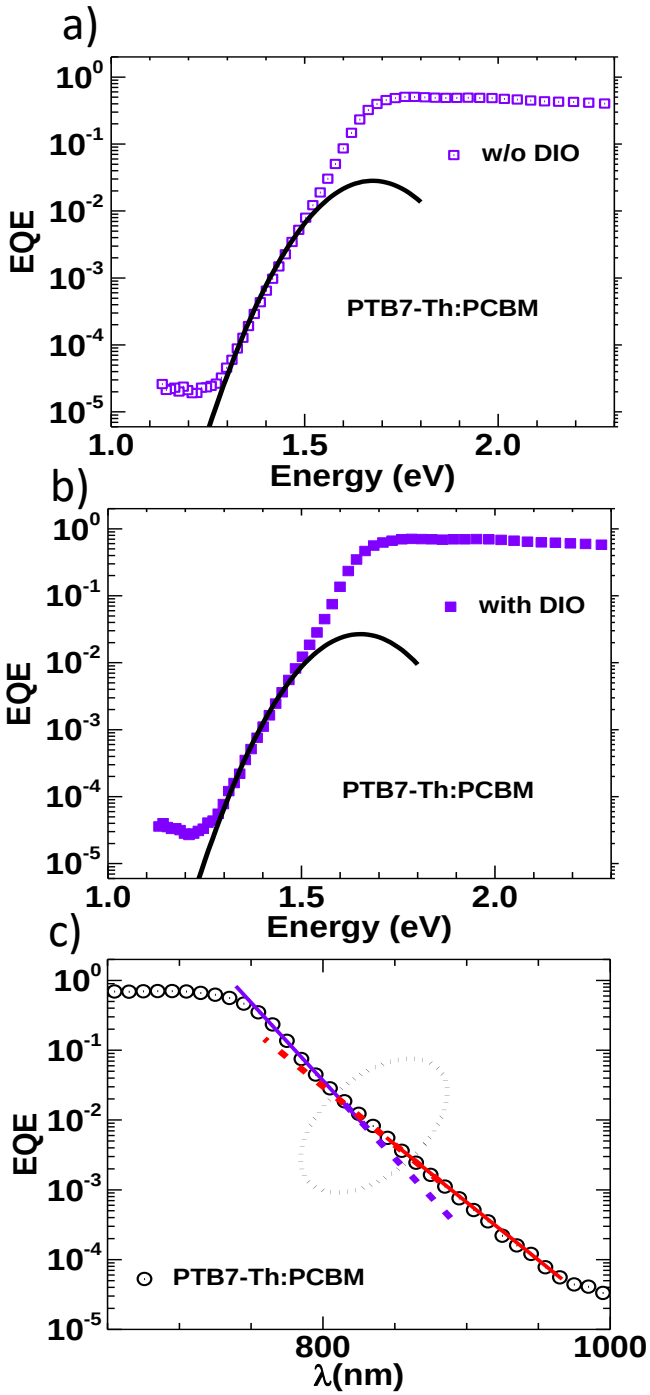

Figure S3: a) and b) Reduced EQE spectrum of without- and with-DIO PTB7-Th:$PC_{71}BM$ devices, respectively; c) Reduced EQE spectrum of with-DIO PTB7-Th:$PC_{71}BM$ cell in wavelength scale to differentiate between the bulk and CT photocurrent regions.

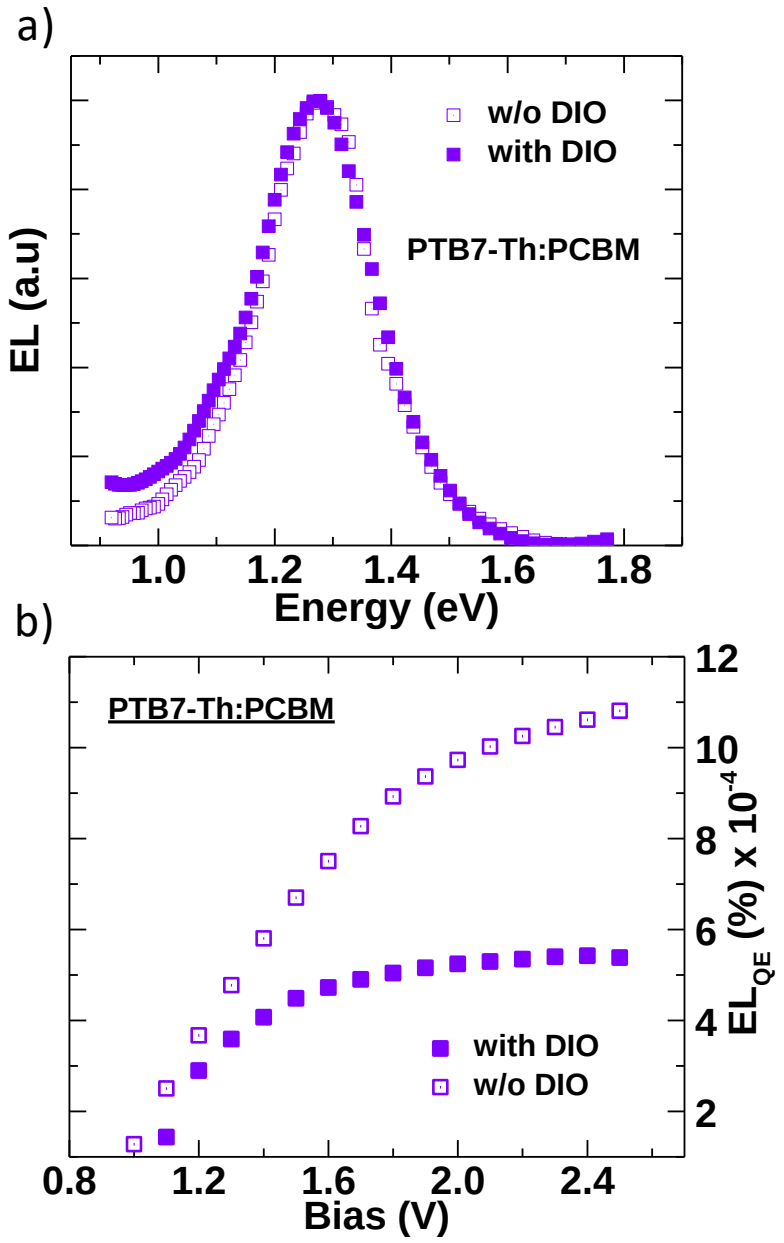

Figure S4- a) EL spectrum of PTB7-Th:$PC_{71}BM$ solar cells and b) Bias-dependent ELQE measurement of PTH7-Th:$PC_{71}BM$ devices.

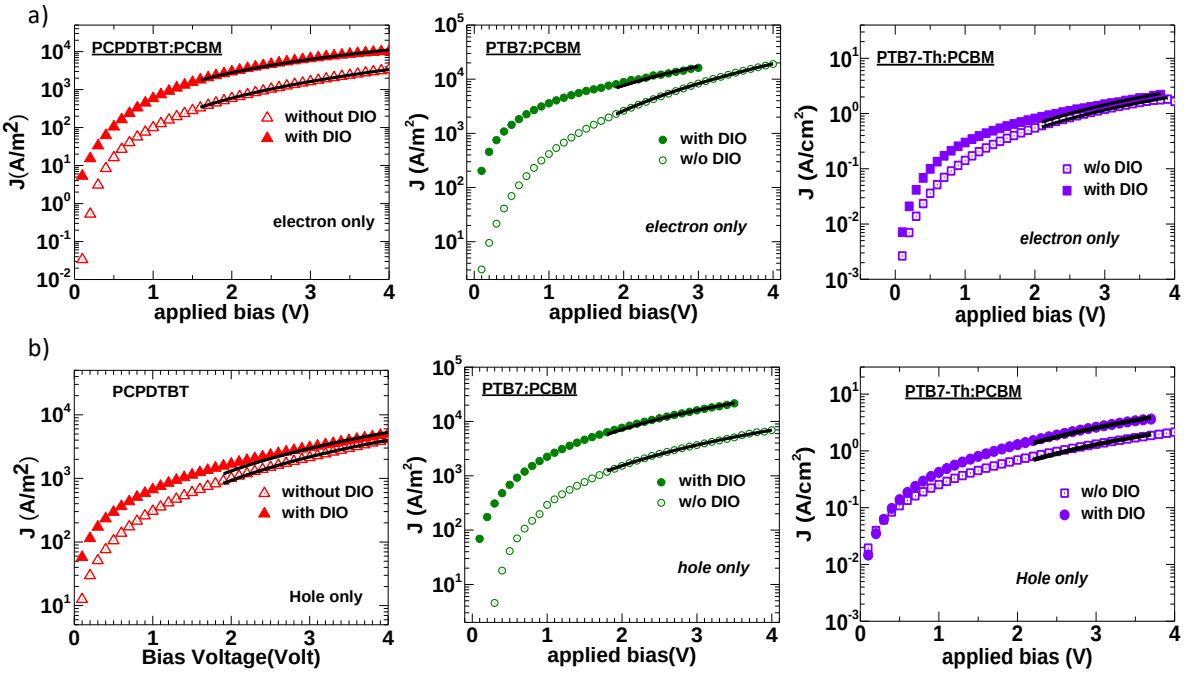

Figure S5: J-V curve to calculate the mobility of PCPDTBT:$PC_{71}BM$, PTB7:$PC_{71}BM$, PTB7-Th:$PC_{71}BM$ with and w/o DIO a) electron only and b) hole only.

Table S1: Electron and hole mobility values for the BHJ solar cells that were used in this study.

Device	**Processing condition**	**μ_h (cm^2/v-s)**	**μ_e (cm^2/v-s)**
PCPDTBT:$PC_{71}BM$	w/o DIO	2.07E-4	6.5E-5
	w/ DIO	3.42E-4	7.1E-4
PTB7:$PC_{71}BM$	w/o DIO	8.2E-5	6.05E-5
	w/ DIO	3.3E-4	5.5E-4
PTB7-Th:$PC_{71}BM$	w/o DIO	4.1E-4	3.68E-4
	w/ DIO	8.1E-4	4.58E4

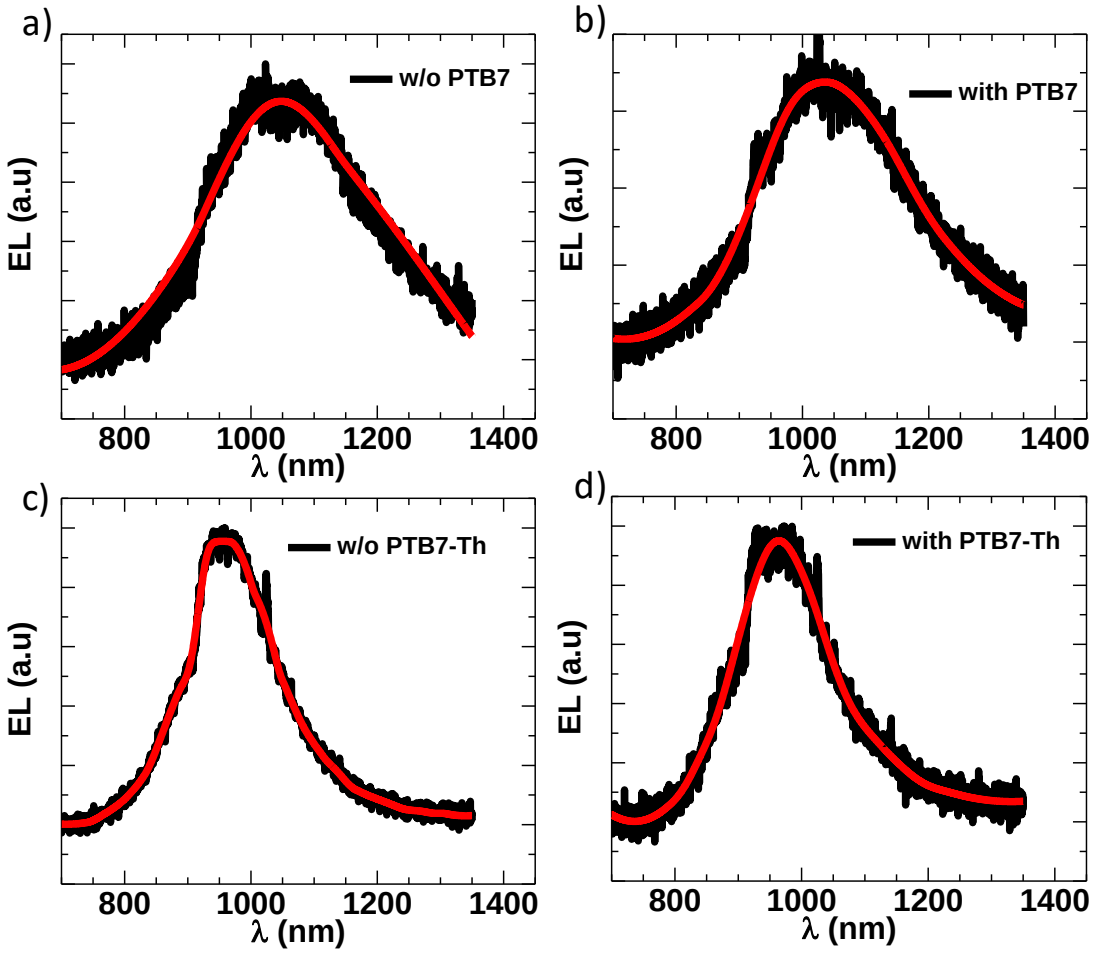

Figure S6: Raw data of Electroluminescence spectra with smoothened data of a) PTB7:$PC_{71}BM$ w/o DIO b) PTB7:$PC_{71}BM$ with DIO c) PTB7-Th:$PC_{71}BM$ w/o DIO and d) PTB7-Th:$PC_{71}BM$ with DIO.

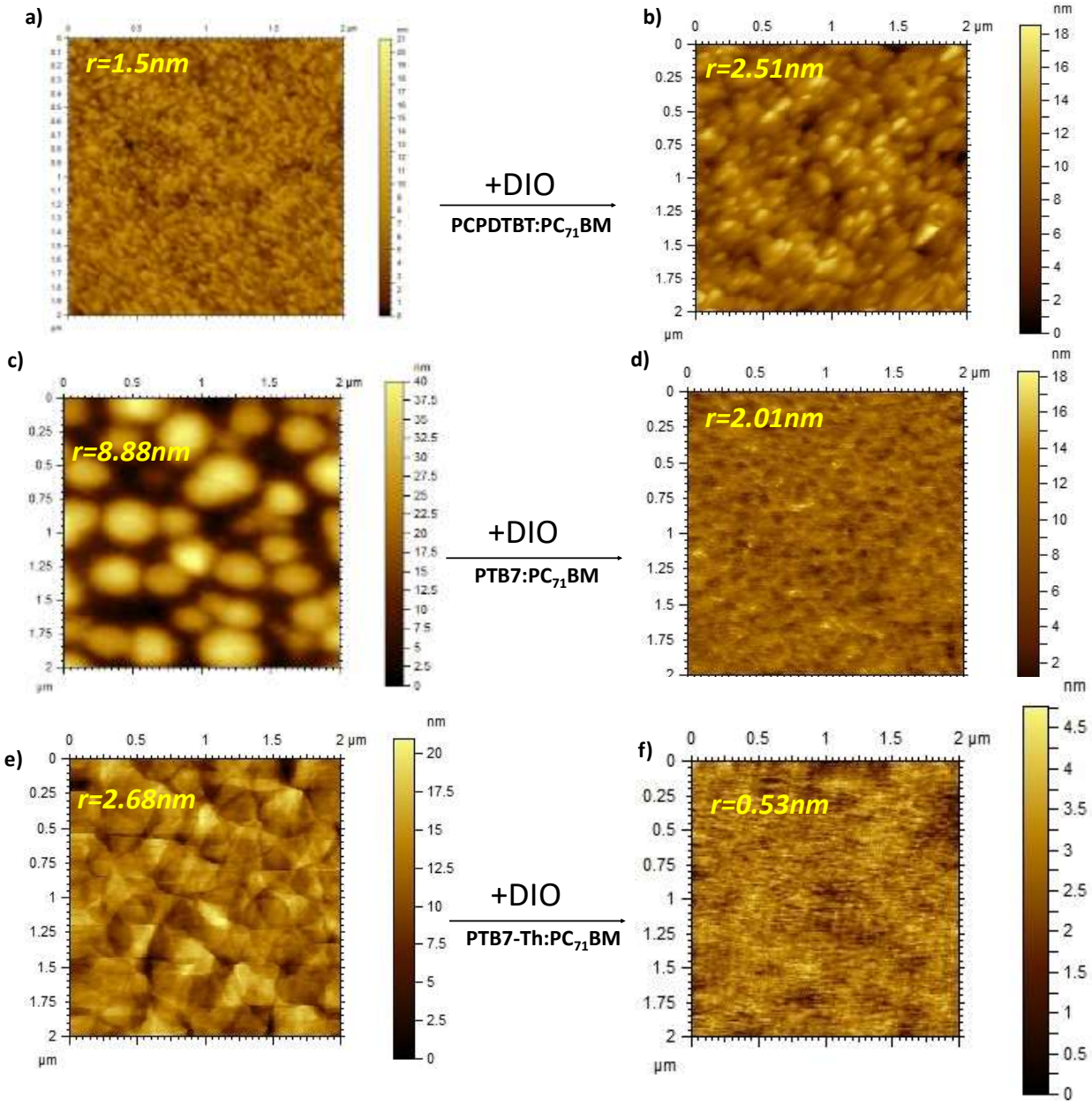

Figure S7: AFM images of a) PCPDTBT:$PC_{71}BM$, c) PTB7:$PC_{71}BM$, e) PTB7-Th:$PC_{71}BM$ w/o DIO and b) PCPDTBT:$PC_{71}BM$, d) PTB7:$PC_{71}BM$, f) PTB7-Th:$PC_{71}BM$ with DIO additive thin films.