

Electronic Supplementary Information For:

**Diluting concentrated solution: A general, simple and effective approach to enhance efficiency of polymer solar cells**

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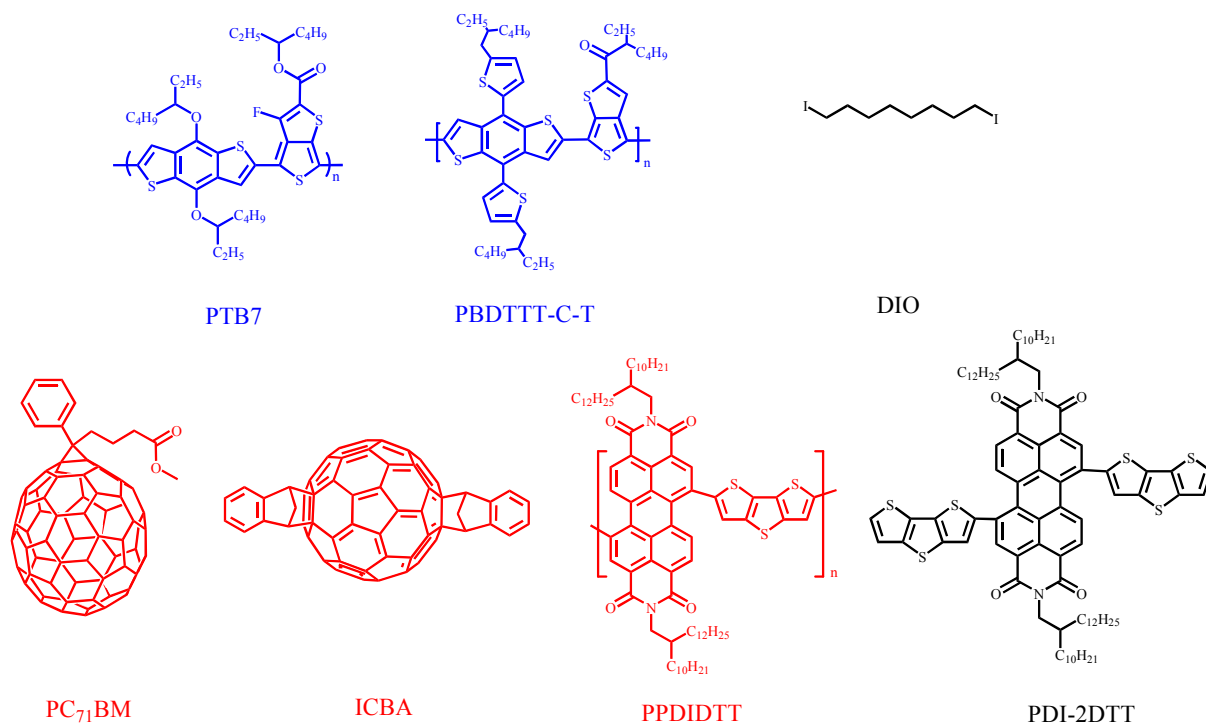
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## 1. Molecular structures



**Fig. S1** Molecular structures of PTB7, PBDTTT-C-T, PC<sub>71</sub>BM, ICBA, PPIDTT, DIO and PDI-2DTT.

## 2. Photovoltaic properties with different processing time

**Table S1** Average PCEs for different processing time

Active layer	Polymer concentration (mg/ml)	Time 1 (h) <sup>a</sup>	Time 2 (h) <sup>b</sup>	PCE (%)
PTB7:ICBA:PC <sub>71</sub> BM	70	8	2	8.39
PTB7:ICBA:PC <sub>71</sub> BM	70	8	3	8.52
PTB7:ICBA:PC <sub>71</sub> BM	70	8	4	8.56
PTB7:ICBA:PC <sub>71</sub> BM	70	12	2	8.55
PTB7:ICBA:PC <sub>71</sub> BM	70	12	3	8.73
PTB7:ICBA:PC <sub>71</sub> BM	70	12	4	8.71
PTB7:ICBA:PC <sub>71</sub> BM	70	16	2	8.61
PTB7:ICBA:PC <sub>71</sub> BM	70	16	3	8.70
PTB7:ICBA:PC <sub>71</sub> BM	70	16	4	8.72

<sup>a</sup> Stirring time of concentrated solution, <sup>b</sup> the time between dilution and spin-coating.

### 3. Calculation of the surface compositions

$$\begin{aligned} \text{PTB7 weight content} &= \frac{\text{Polymer weight}}{\text{Polymer weight} + \text{PCBM weight}} \\ &= \frac{n_{\text{polymer}} M_{\text{polymer}}}{n_{\text{polymer}} M_{\text{polymer}} + n_{\text{PCBM}} M_{\text{PCBM}}} \\ &= \frac{1}{1 + \frac{n_{\text{PCBM}} M_{\text{PCBM}}}{n_{\text{polymer}} M_{\text{polymer}}}} \end{aligned}$$

$$\frac{4n_{\text{polymer}} + 2n_{\text{PCBM}}}{4n_{\text{polymer}}} = \frac{O}{S}$$

$$\frac{n_{\text{PCBM}}}{n_{\text{polymer}}} = 2 \left( \frac{O}{S} - 1 \right) = 2 \frac{O}{S} - 2$$

$$\text{PTB7 weight content} = \frac{1}{\left( \frac{M_{\text{PCBM}}}{M_{\text{polymer}}} \right) \left( 2 \frac{O}{S} - 2 \right) + 1}$$

$M_{\text{PCBM}}$  is the molecular weight of PC<sub>71</sub>BM (1016);

$M_{\text{polymer}}$  is the molecular weight of repeat unit of PTB7 (714);

$n_{\text{PCBM}}$  is the mole number of PC<sub>71</sub>BM;

$n_{\text{polymer}}$  is the mole number of repeat unit of PTB7;

$\frac{O}{S}$  is the atom ratio of O/S.