Supplementary Information

Efficient device engineering for inverted non-fullerene organic solar cells with low energy loss

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Figure S1. J – V curves of studied devices under the illumination of AM 1.5G, 100mW/cm².



Figure S2. Absorption spectra of neat PTB7-Th, neat IDT-BT-R and PTB7-Th:IDT-BT-R blend films with or without thermal annealing.



Figure S3. AFM images of PTB7-Th:PC₇₁BM blend film before (a) and after (b) thermal annealing; TEM images of PTB7-Th:PC₇₁BM blend film before (c) and after (d) thermal annealing.

S4. High sensitive EQE fitting:

Charge transfer (CT) states energy and reorganization energy can be extracted by fitting

the shoulder of EQE curve in lower energy regime by the function as follow:

 $EQE_{PV}(E) = \frac{f}{E\sqrt{4\pi\lambda kT}}exp\left(\frac{-\left(E_{CT}+\lambda-E\right)^{2}}{4\lambda kT}\right)$

where k is the Boltzmann's constant, T is the absolute temperature, E_{CT} is the energy of CT states, λ represents the reorganization energy and E is the photon energy.¹⁻³

References

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