Supporting Information:

Impacts of a Second Acceptor on Energy Loss, Blend Morphology and Carrier Dynamics in Non-Fullerene Ternary Polymer Solar Cells

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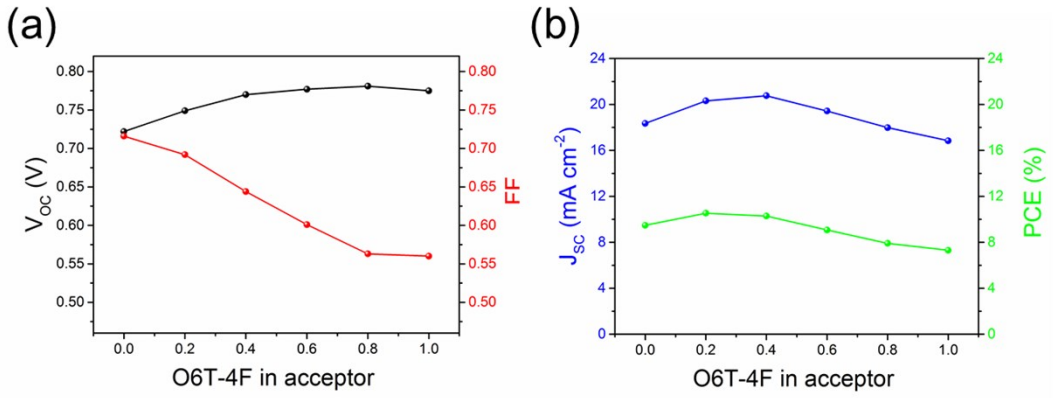

Fig.S1 (a) V_{OC} and FF, (b) J_{SC} and PCE changes for the binary or ternary PSCs as a function of O6T-4F content in acceptor moiety.

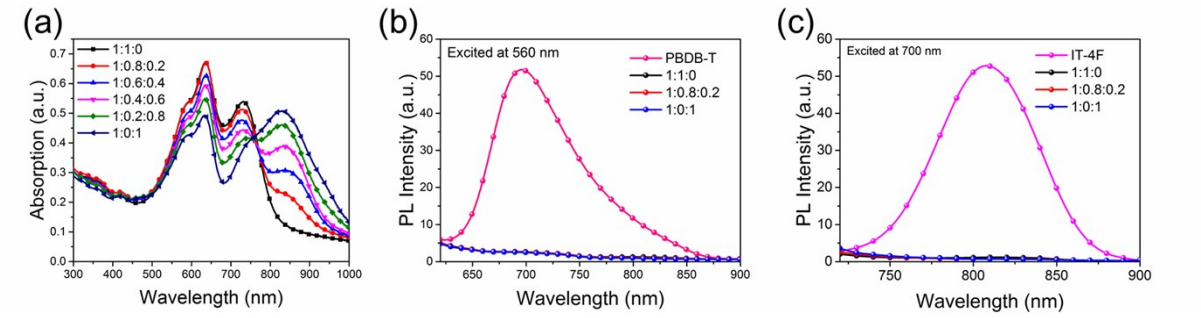

Fig.S2 (a) The absorption spectra of PBDB-T:IT-4F:O6T-4F blend films with various ratios. (b) The PL spectra of pure PBDB-T and blend films excited at 560 nm. (c) The PL spectra of pure IT-4F and blend films excited at 700 nm.

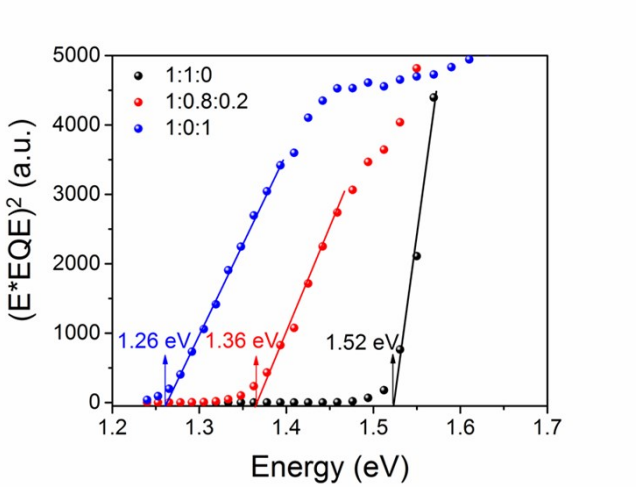

Fig.S3 The calculated bandgaps of PBDB-T:IT-4F:O6T-4F active layers with a relation of ($h\nu$*EQE)^2~($h\nu$-Eg).

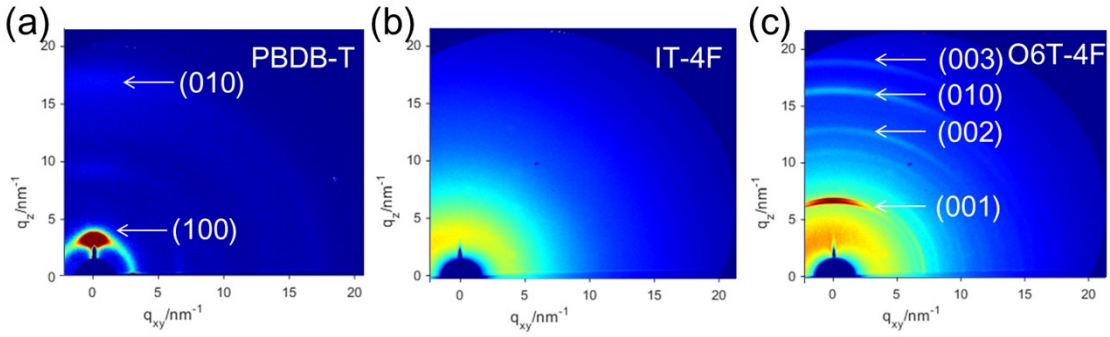

Fig.S4 2D GIWAXS patterns for the neat PBDB-T (a), IT-4F (b) and O6T-4F (c) films, respectively.

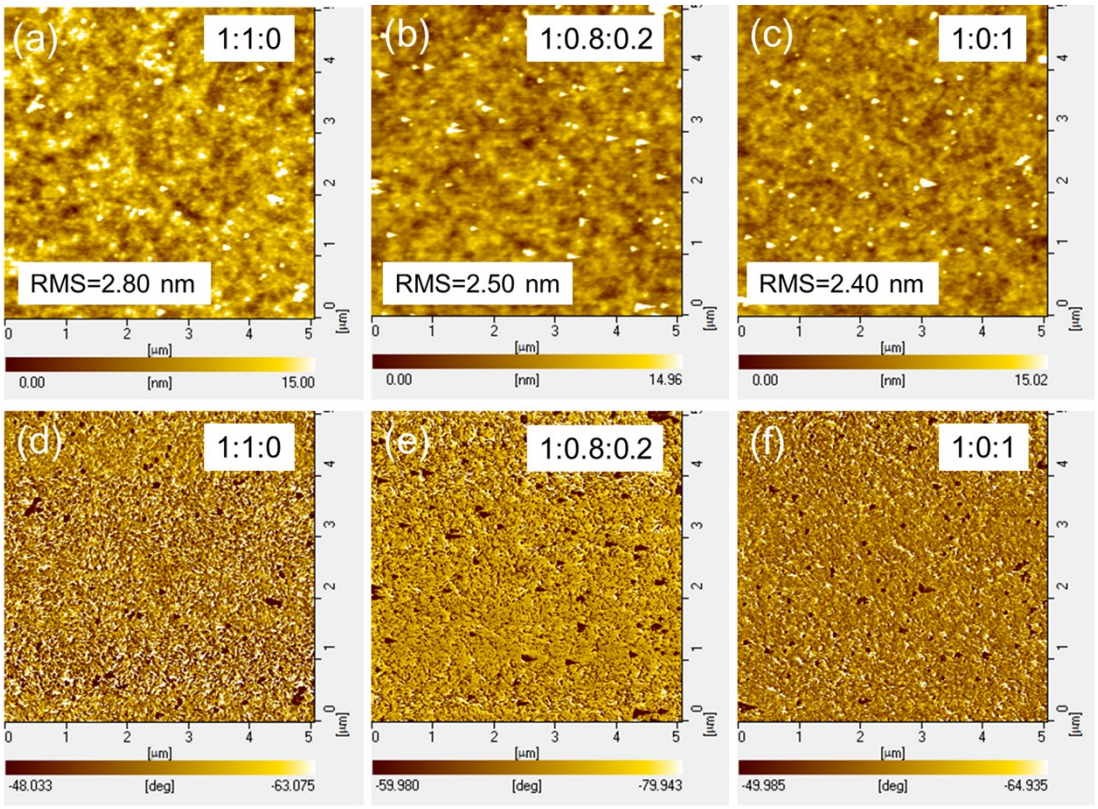

Fig.S5 The AFM height (a-c) and phase (d-f) images for the PBDB-T:IT-4F (1:1), PBDB-T:IT-4F:O6T-4F (1:0.8:0.2) and PBDB-T:O6T-4F (1:1) blend films.

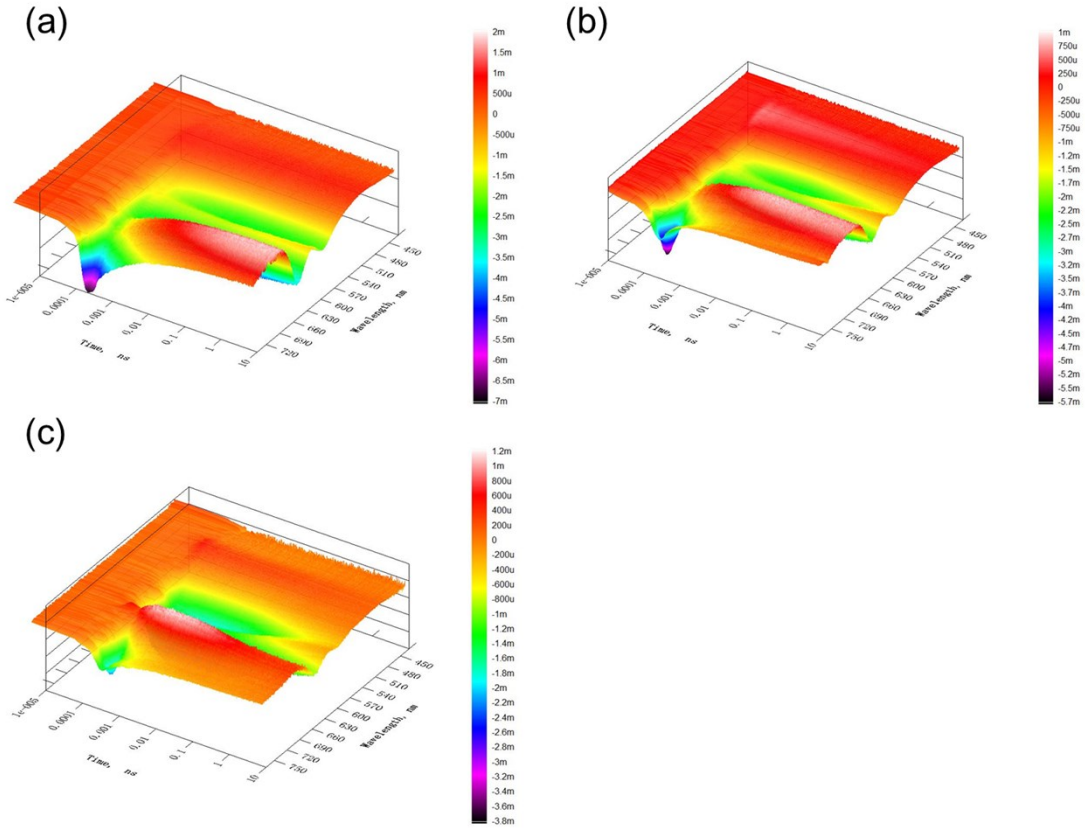

Fig.S6 3D TA spectra of (a) PBDB-T:IT-4F (1:1), (b) PBDB-T:IT-4F:O6T-4F (1:0.8:0.2) and (c) PBDB-T:O6T-4F (1:1) blend films, respectively.