Regulating the morphology of fluorinated non-fullerene acceptor and polymer donor via binary solvent mixture for high efficiency polymer solar cells

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Table S1 Summary of photovoltaic parameters of PBDB-T:INPIC-4F OSCs processed using binary solvent mixtures (CB:CF=1.5:1, v/v) and different treatments.

Treatment	*FF* [%]	J_{sc} [mA cm^{-2}]	V_{oc} [V]	PCE_{max} (PCE_{avg}) [%]
0.5%DIO+100 °C TA	72.7	22.0	0.82	13.1 (12.9±0.3)
0.5%DIO only	70.9	19.9	0.85	12.0 (11.7±0.4)
100 °C TA only	68.4	20.3	0.84	11.7 (11.3±0.4)
—	67.2	18.8	0.85	10.8(10.3±0.6)

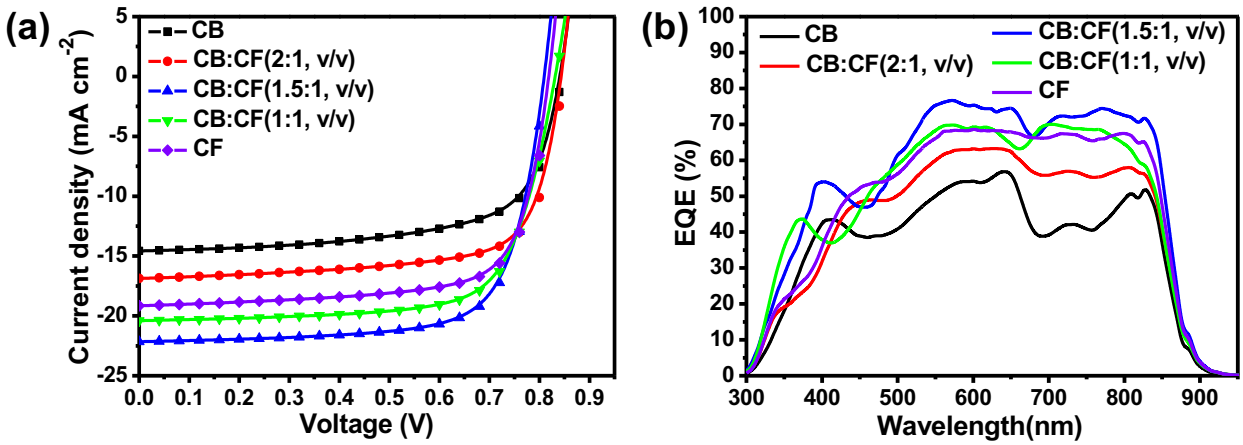

Figure S1 (a) *J-V* characteristics of the PBDB-T: INPIC-4F (1:1, w/w) devices under illumination of AM 1.5G (100mW cm^{-2}). (b) *EQE* of devices fabricated under different processing conditions.

Table S2 Summary of photovoltaic parameters of PBDB-T:INPIC-4F OSCs with different casting solvents measured at an illumination of AM 1.5G at 100 mW cm^{-2}. The statistical data were obtained from over 25 individual devices.

Solvent	*FF* [%]	J_{sc} [mA cm^{-2}]	Calculated J_{sc} [mA cm^{-2}]	V_{oc} [V]	PCE_{max} (PCE_{avg}) [%]
CB	66.5	14.6	14.0	0.84	8.1 (7.4±0.9)
CB:CF(2:1, v/v)	71.5	16.9	16.2	0.84	10.2 (9.7±0.7)
CB:CF(1.5:1, v/v)	72.7	22.0	21.4	0.82	13.1 (12.9±0.3)
CB:CF(1:1, v/v)	71.6	20.4	19.8	0.83	12.1 (11.8±0.4)
CF	72.2	19.1	18.5	0.83	11.4 (11.0±0.5)

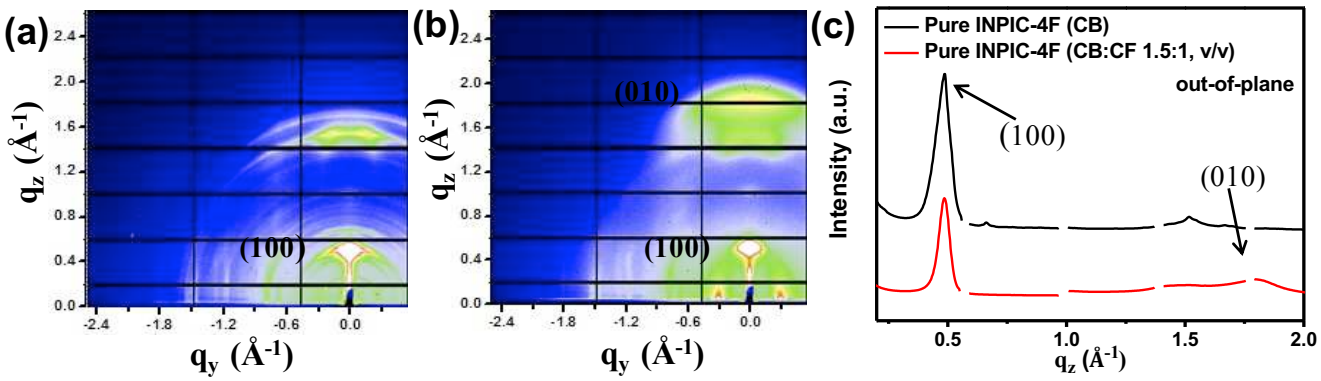

Figure S2 2D GIWAXS patterns of pristine INPIC-4F films prepared from (a) CB, (b) CB:CF (1.5:1, v/v). (c) Out-of-plane 1D profiles of GIWAXS patterns along the q_z axis.

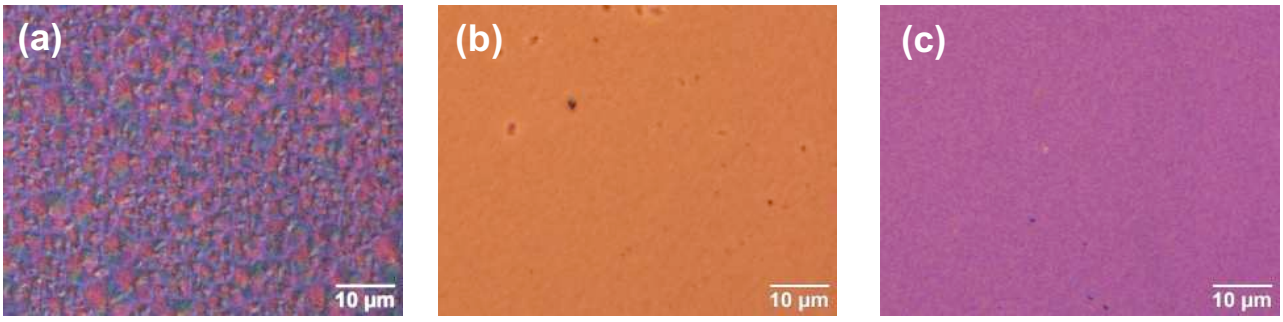

Figure S3 Optical microscope images of PBDB-T: INPIC-4F films prepared from (a) CB, (b) CB: CF (1.5:1, v/v) and (c) CF.

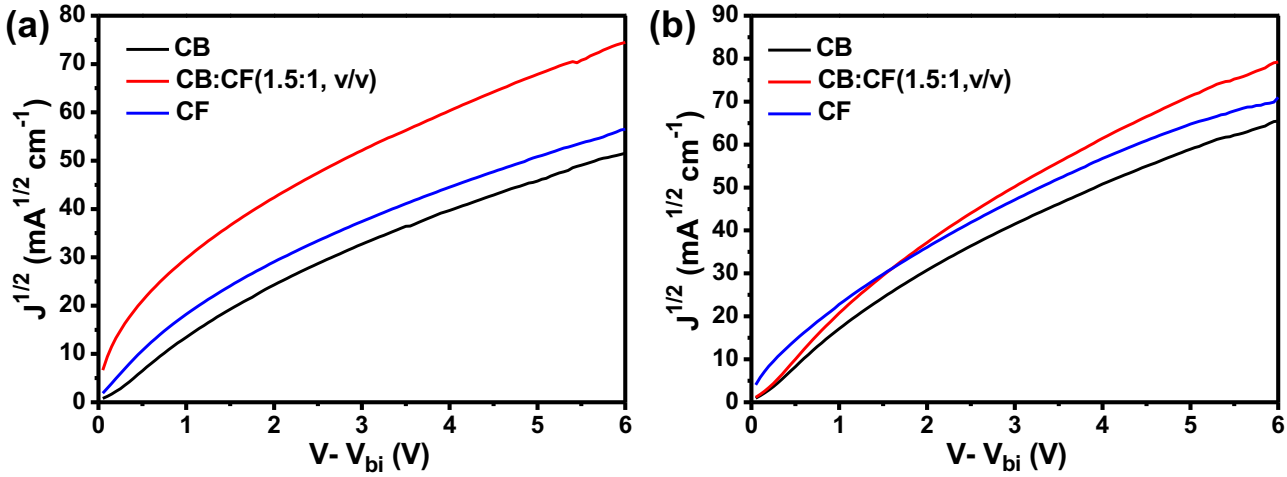

Figure S4 Root square plots of (a) hole densities versus voltage of the ITO/PEDOT:PSS/Active layer/MoO_3/Ag hole-only devices and (b) electron densities versus voltage of the ITO/TiO_2/Active layer/Ca/Ag electron-only devices. The linear fit was applied in the range of 0 to 6 V.

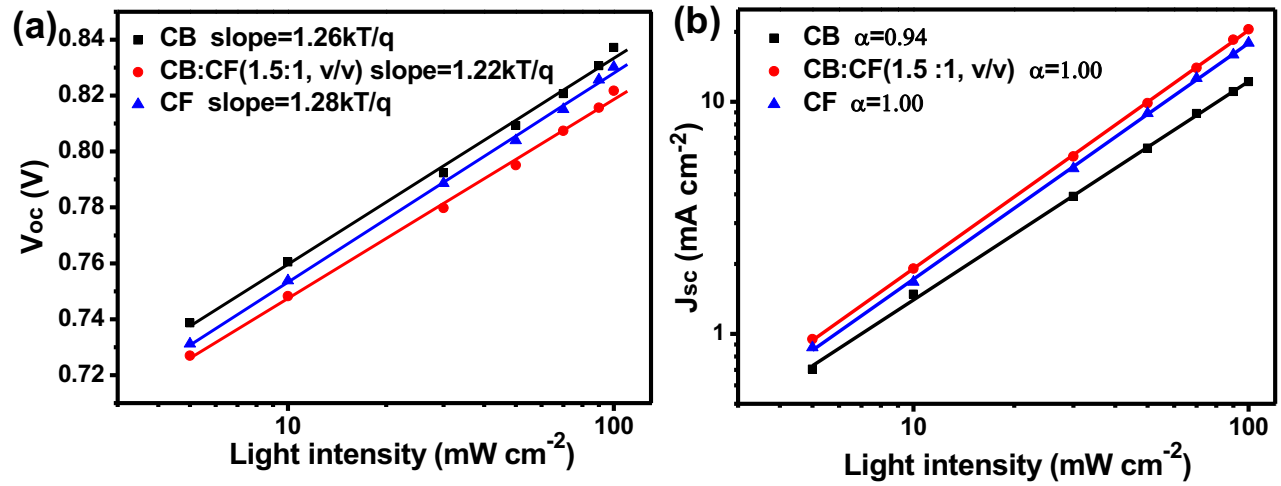

Figure S5 (a) V_{oc} versus light intensity and (b) J_{sc} versus light intensity of PBDB-T:INPIC-4F OSCs cast from various solvents.