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Vacuum-assisted Annealing Method for High Efficiency Printable Large-area Polymer Solar Cell Modules

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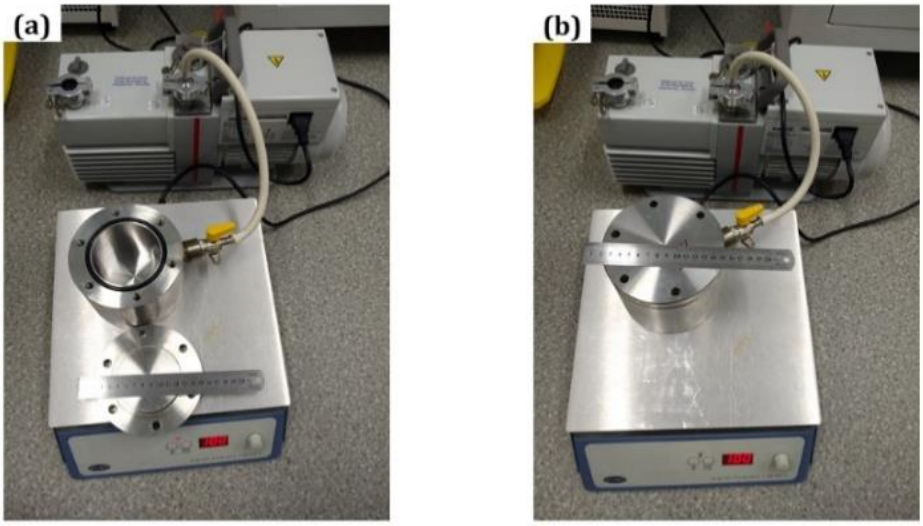

Figure S1. (a) and (b) the photograph of our new custom-built device for annealed blend film with the assistance of vacuum (~10^{-1} Pa).

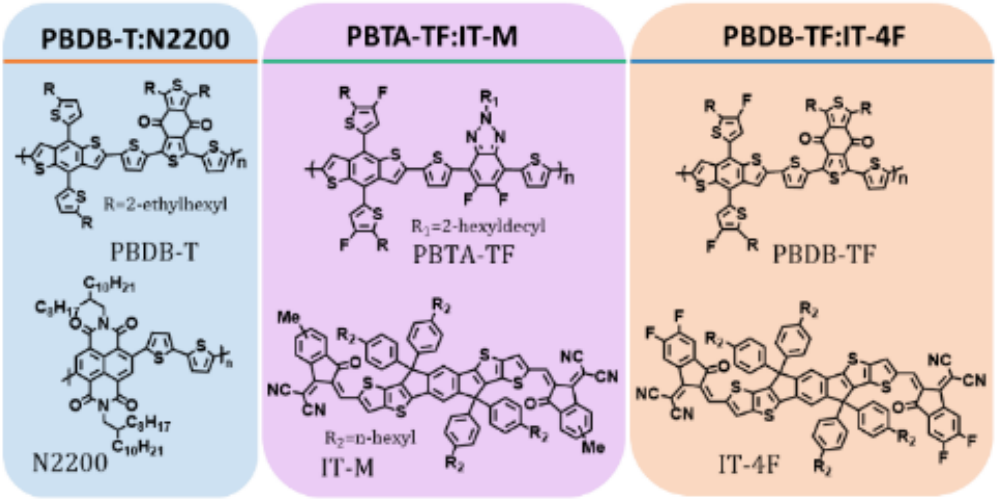

Figure S2. Molecular structures of polymer donors (PBDB-T, PBTA-TF and PBDB-TF) and non-fullerene acceptors (N2200, IT-M and IT-4F).

Table S1. The fabrication details of PSCs.

Active layers	D/A ratio	Coating method	Polymer concentration (mg/ml)	Solvent	Thickness (nm)	Ref.
PBDB-T: N2200	1:1	Spin coating	10	CB/DIO (99.5/0.5)	85	[1]
		Blade coating	7			

PBTA-TF: IT-M	1:1	Spin coating	10	XY/PN (99.5/0.5)	110	[2]
		Blade coating	6			
PTB7-Th: IEICO-4F	1:1	Spin coating	10	CB/CN (96/4)	124	[3]
		Blade coating	7			
PBDB-TF: IT-4F	1:1.5	Spin coating	10	CB/DIO (99.5/0.5)	105	[4]
		Blade coating	6			

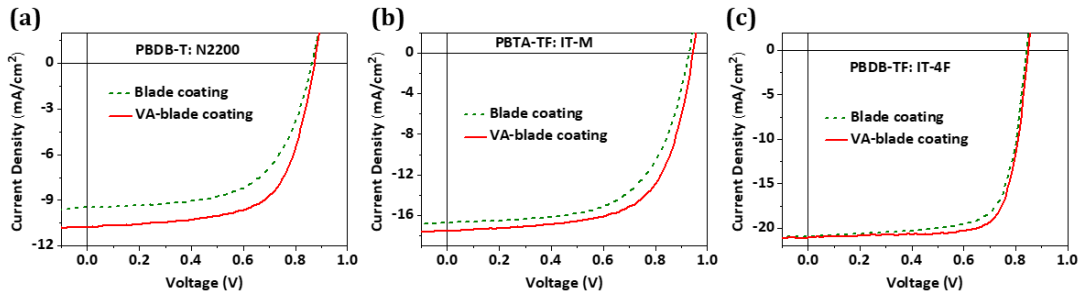

Figure S3. The *J-V* curves of blade-coated PSCs based on (a) PBDB-T: N2200, (b) PBTA-TF:IT-M and (c) PBDB-TF:IT-4F blend film.

Table S2. The photovoltaic properties of PSCs based on PBDB-T: N2200, PBTA-TF: IT-M, and PBDB-TF: IT-4F blend film cast from spin coating method.

Active layer	V_{oc} (V)	J_{sc} (mA/cm^2)	FF	PCE (%)	Ref.
PBDB-T: N2200	0.89	11.05	0.66	6.49	[1]
PBTA-TF: IT-M	0.96	18.71	0.70	12.57	[2]
PBDB-TF: IT-4F	0.84	20.81	0.76	13.29	[4]

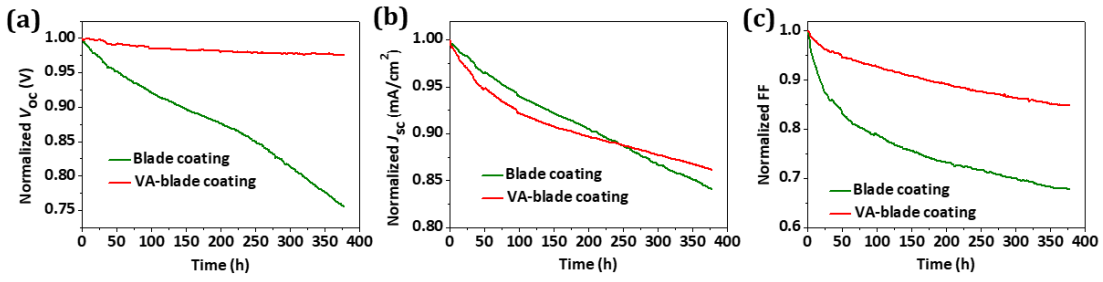

Figure S4. The normalized evolution of V_{oc} (a), J_{sc} (b), and FF (c) measured with

continuous testing under open circuit conditions in the air. The illumination source was white LEDs. The initial PCEs of the blade-coated PSCs based PBDB-TF: IT-4F with blade coating and VA-blade coating method were 12.25% and 13.48%, respectively.

Table S3. Photovoltaic performance of device module with an total area of 21 cm^2 based on PBDB-TF:IT-4F.

Total area (cm^2)	V_{oc} (V)	J_{sc} (mA/cm^2)	FF	PCE (%)
21	2.56	3.74	64.02	6.13

References

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