

Supplementary Information

Controlled thickness and morphology for highly efficient inverted planar heterojunction perovskite solar cells

Jun Xi,^{#a} Zhaoxin Wu,^{#*a} Hua Dong,^a Bin Xia,^a Fang Yuan,^a Bo Jiao,^a Lixin Xiao,^{*b}, Qihang Gong^b and Xun Hou^a

5

^a Dr. J. Xi, Dr. H. Dong, Mr. B. Xia, Dr F. Yuan, Dr. B. Jiao, Prof. X. Hou, Prof. Z. X. Wu
Key Laboratory of Photonics Technology for information,

Key Laboratory for Physical Electronics and Devices of the Ministry of Education,
School of Electronic and Information Engineering, Xi'an Jiaotong University, Xi'an 710049,
10 P. R. China; E-mail: zhaoxinwu@mail.xjtu.edu.cn

Prof. Q. H. Gong, Prof. L. X. Xiao

^b State Key Laboratory for Mesoscopic Physics and Department of Physics,
Peking University, Beijing 100871,
15 P. R. China; E-mail: xiao66@pku.edu.cn

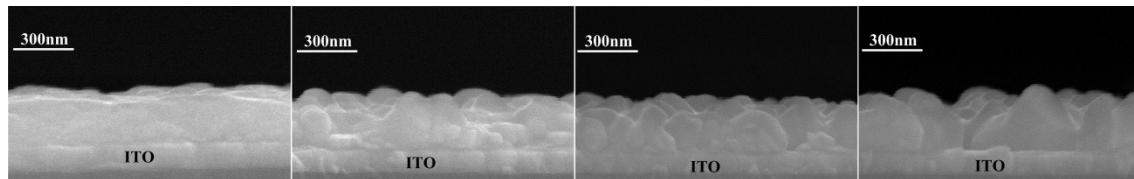
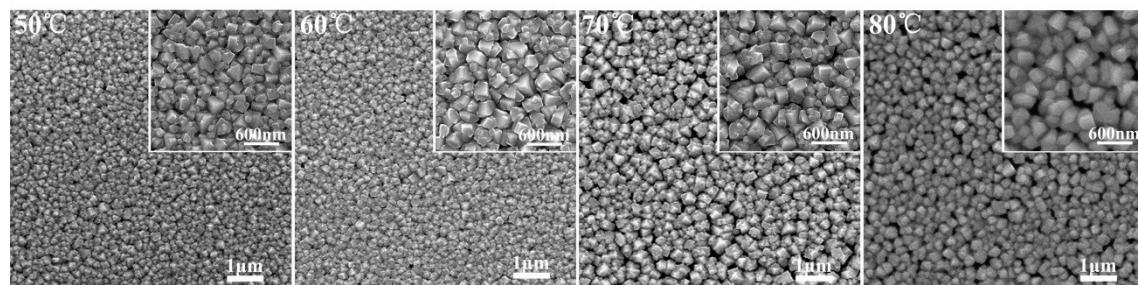


Fig. S1 From left to right, the thickness of SEM images of perovskite films prepared at 50 °C, 60 °C, 70 °C, and 80 °C.

20

Table S1 The intensities of 12.6° and 14.08° diffraction peak in XRD patterns by OD, TD and T'D procedure, respectively.

Process	Diffraction peak (°)	50 °C	60 °C	70 °C	80 °C
		Intensity (a.u.)			
OD	12.6	248	237	196	183
	14.08	286	350	406	426
TD	12.6	143	129	100	58
	14.08	381	437	503	547
T'D	12.6	135	118	86	48
	14.08	355	401	471	508



25 Fig. S2 From left to right, top-view SEM images of the perovskite films upon the PEDOT:PSS layer at different substrate temperatures by T'D procedure.

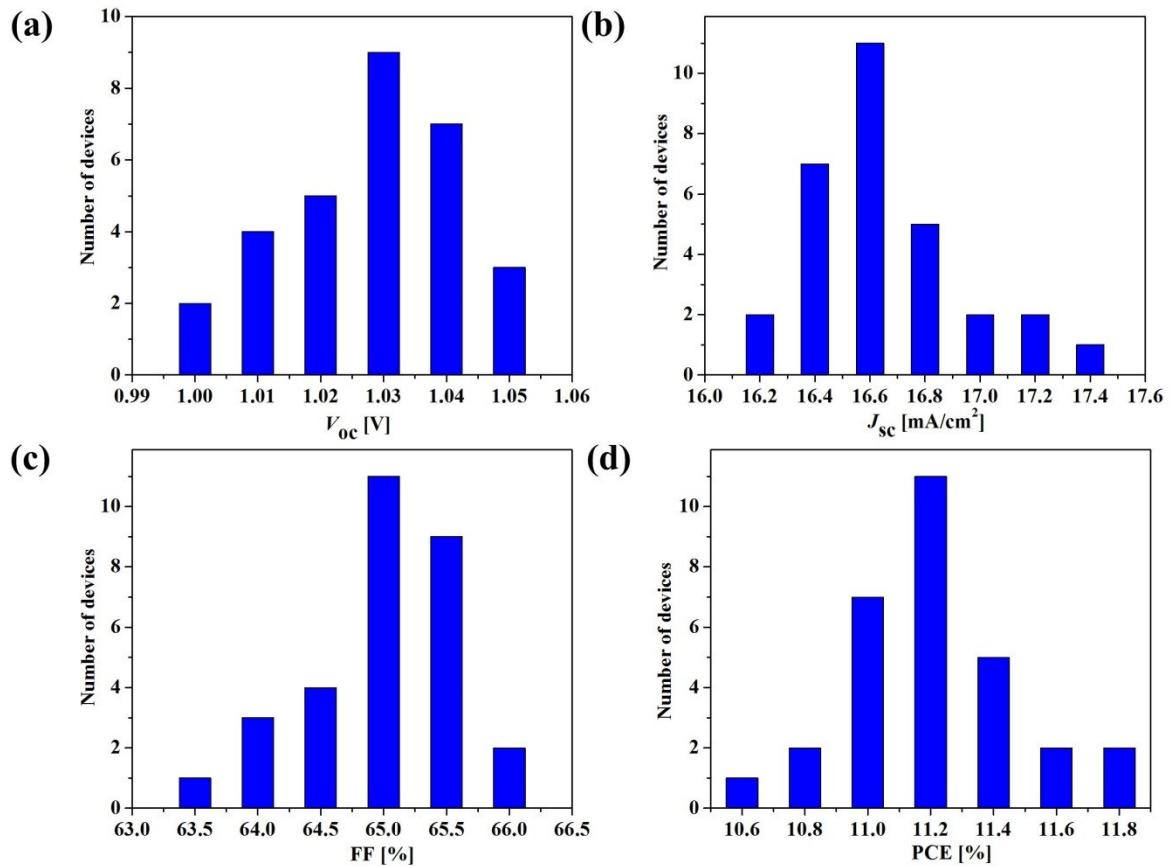


Fig. S3 Histograms of the cell-performance characteristics prepared at 50 °C by TD-VSD technology

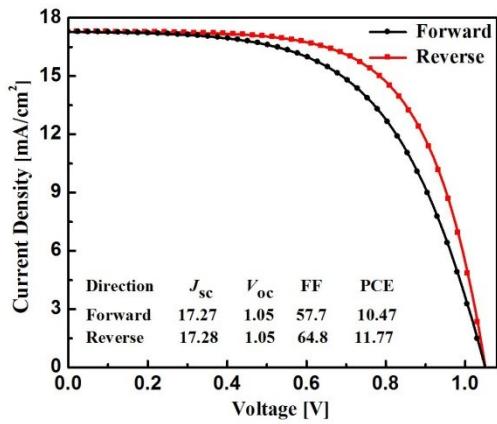


Fig. S4 The Current density-Voltage (J-V) curves in both scan directions under 1 sun illumination. The inset shows the key performance parameters for the champion cell.