Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

[Electronic Supplementary Information]

Fast two-step deposition of perovskite via mediator extraction treatment for large-area, high-performance perovskite solar cells

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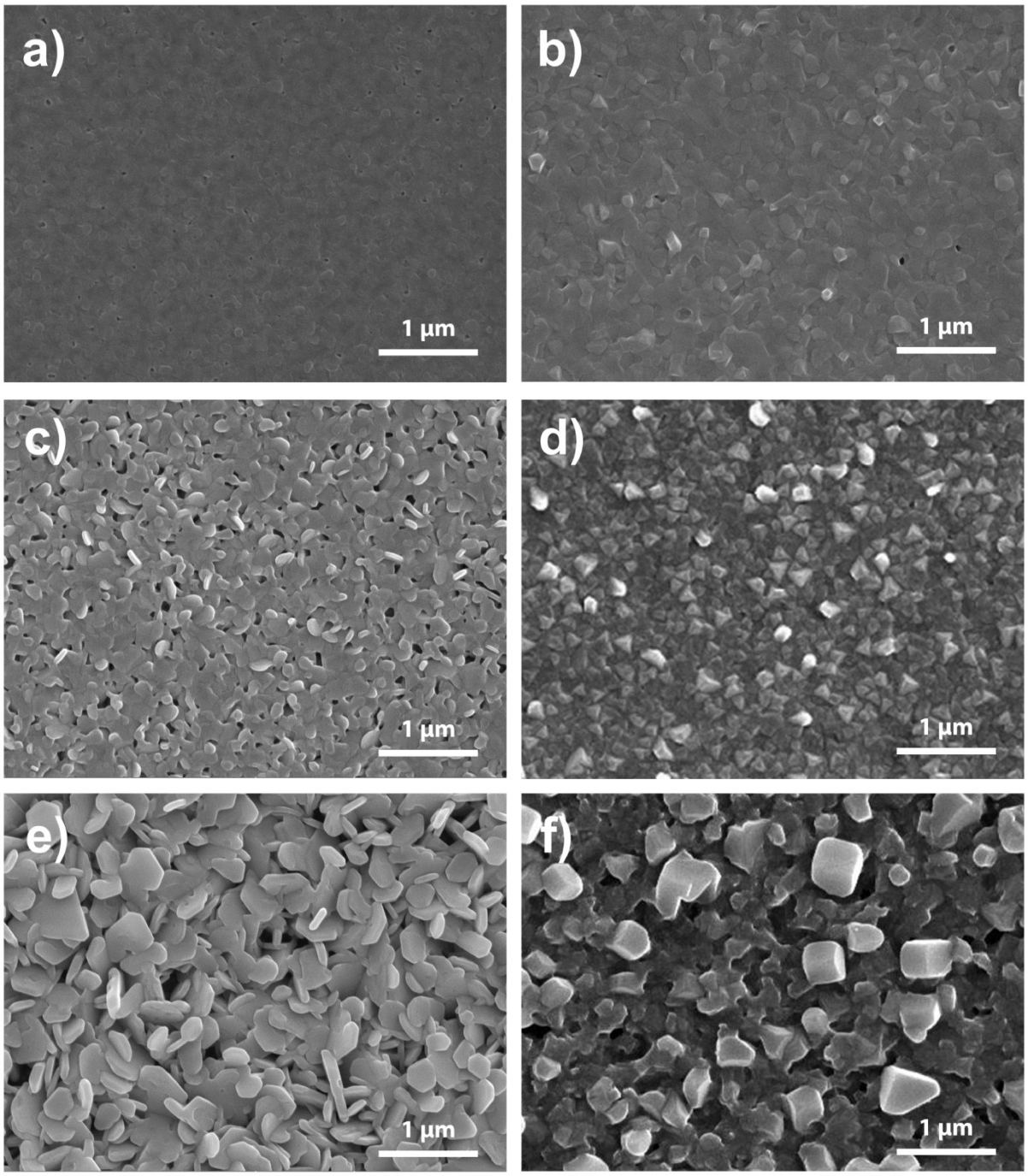


Figure S1. SEM images of PbI_2 films and after washing of DMSO by a) heat treatment, c) chlorobenzene, and e) water. SEM images of $MAPbI_3$ films prepared by subsequent dipping in MAI solution, for PbI_2 films made by b) heat treatment, d) chlorobenzene, and f) water.

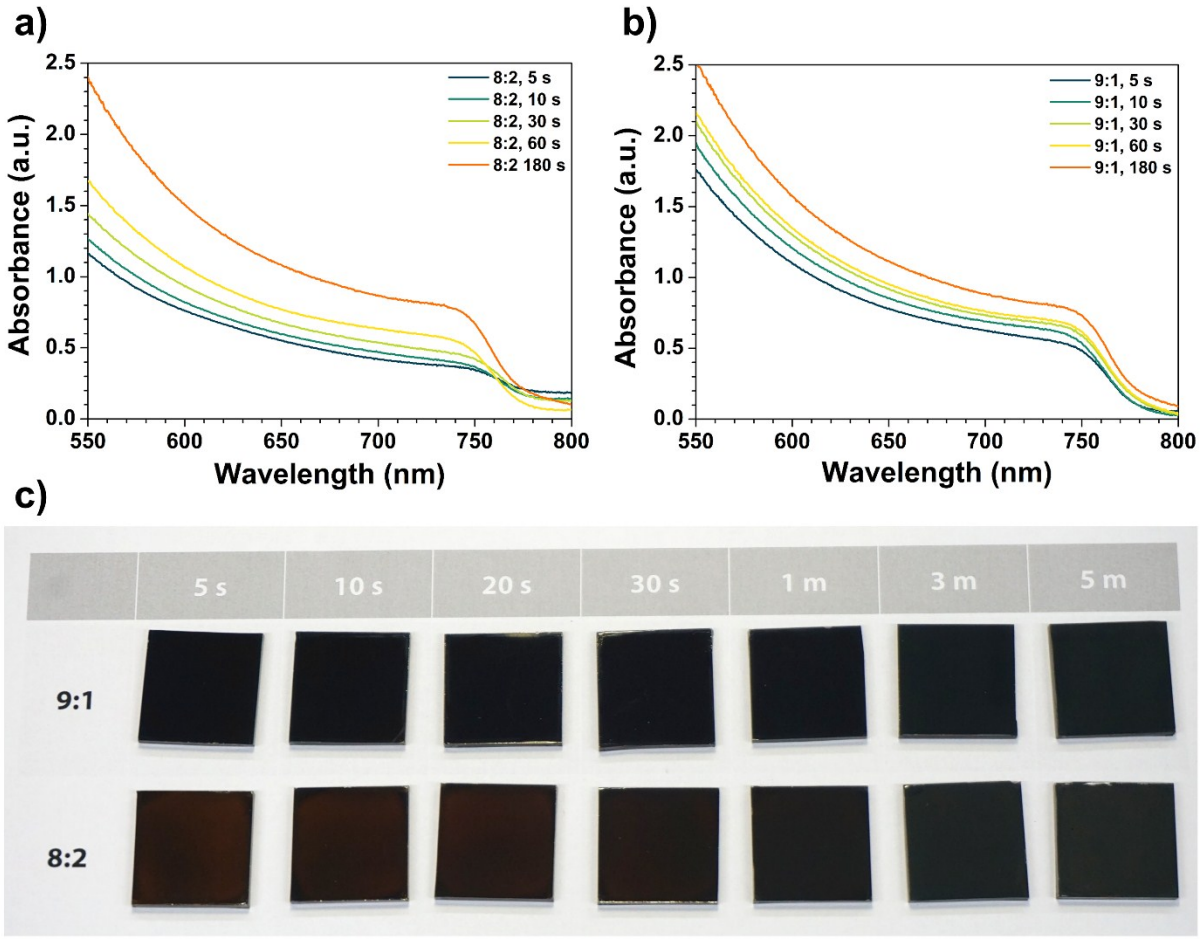


Figure S2. UV-vis spectra of perovskite film with different reaction time, for a) DMF:DMSO = 8:2, and b) 9:1. c) A photograph of perovskite films with different reaction time, showing fast reaction for DMF:DMSO = 9:1 than 8:2.

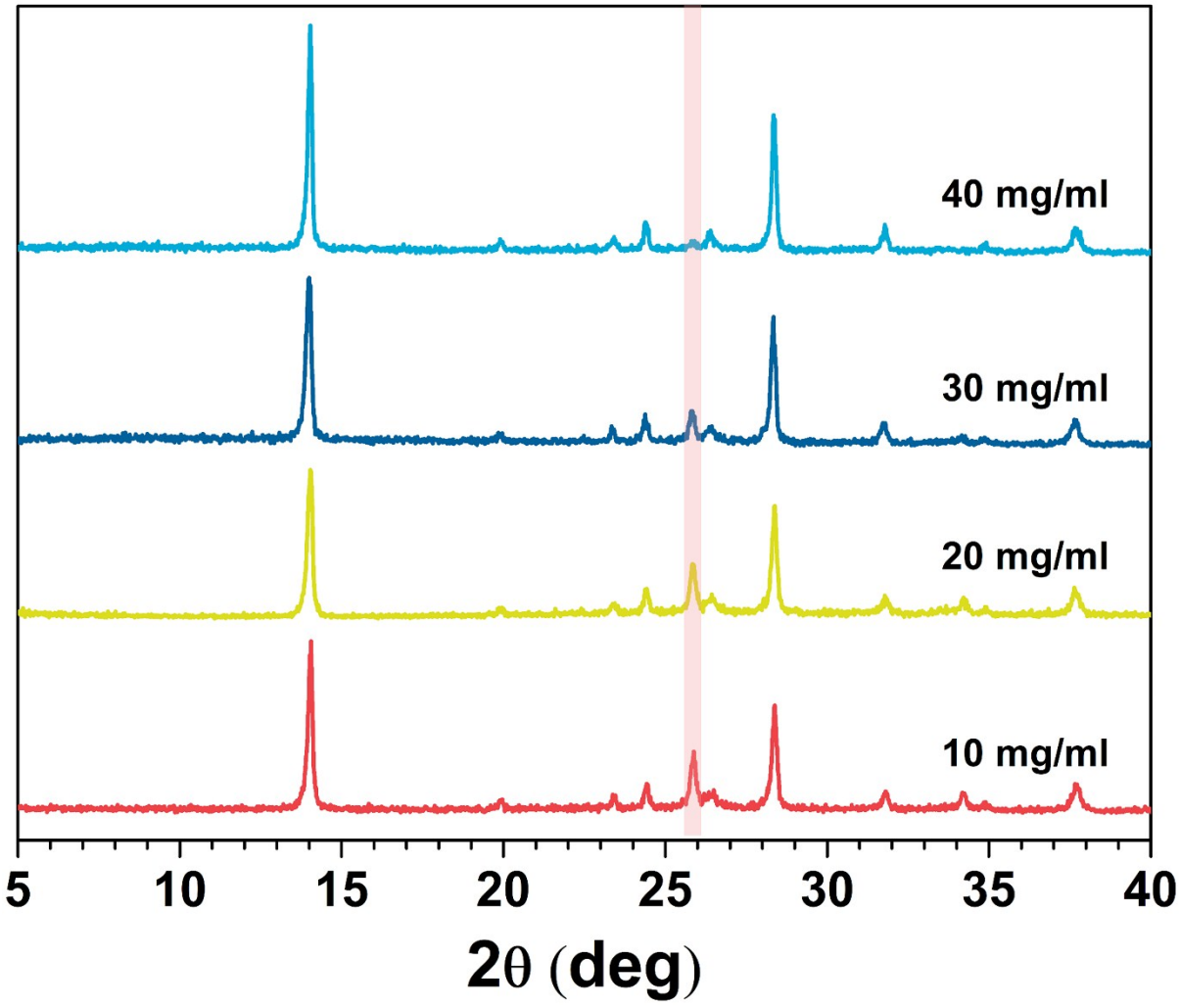


Figure S3. XRD spectra of $MAPbI_3$ films fabricated by dipping in different concentration of MAI solutions.

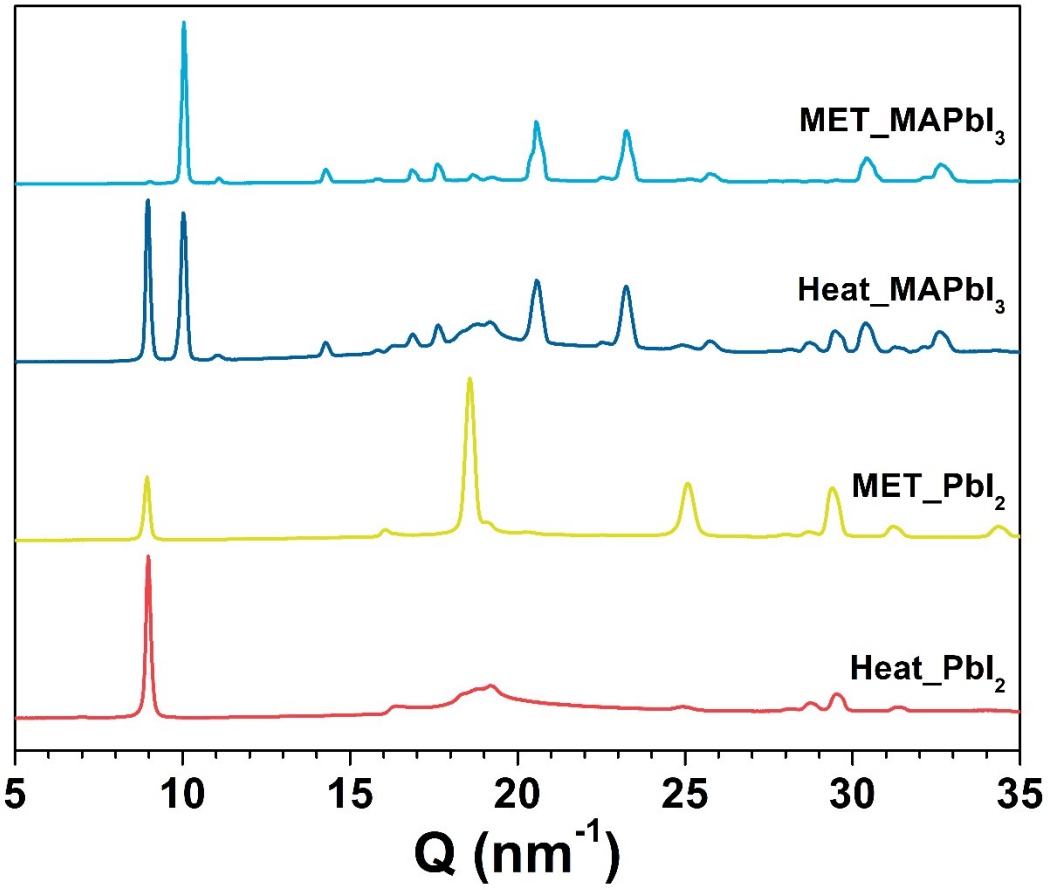


Figure S4. Azimuthally integrated intensity plots calculated from GI-WAXS spectra.

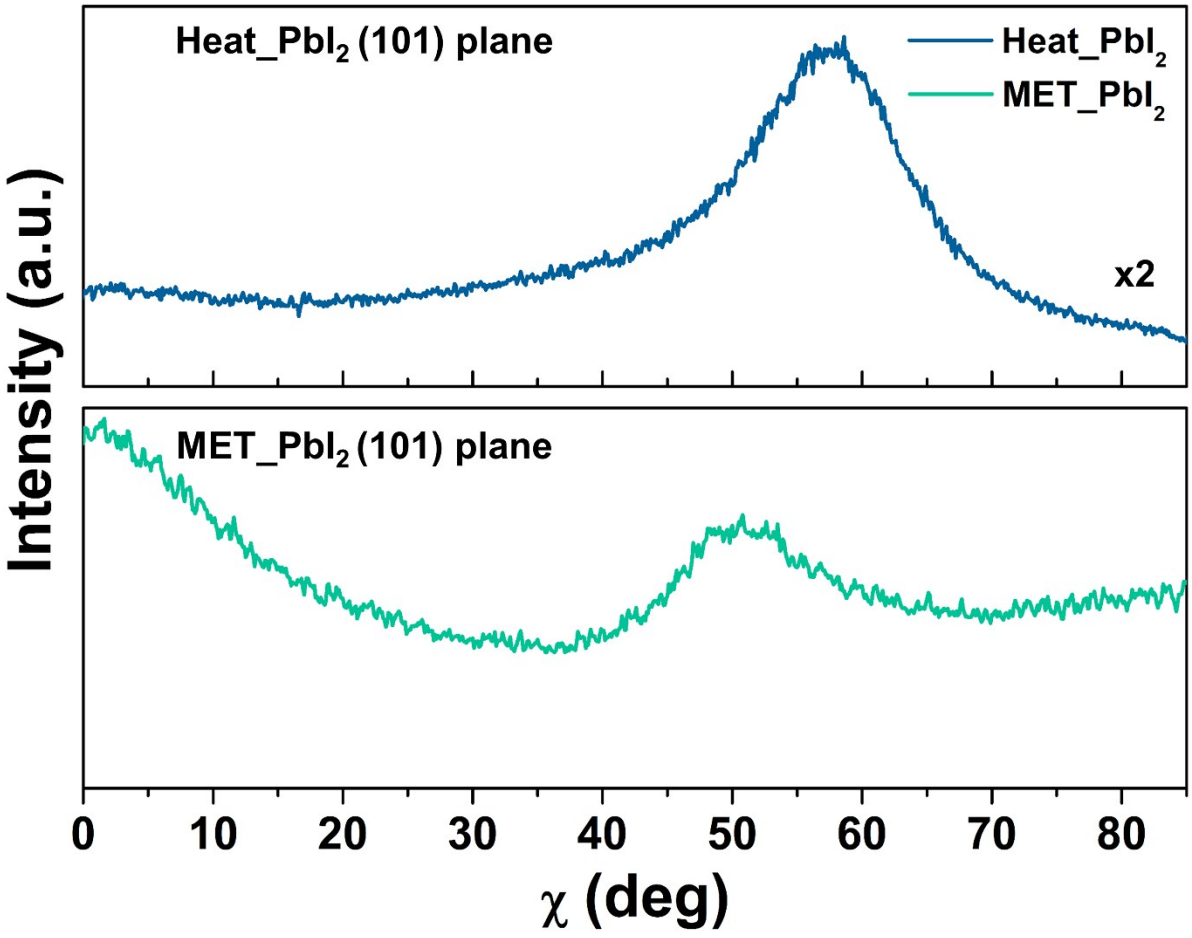


Figure S5. Radially integrated intensities of PbI_2 films along the (101) plane.

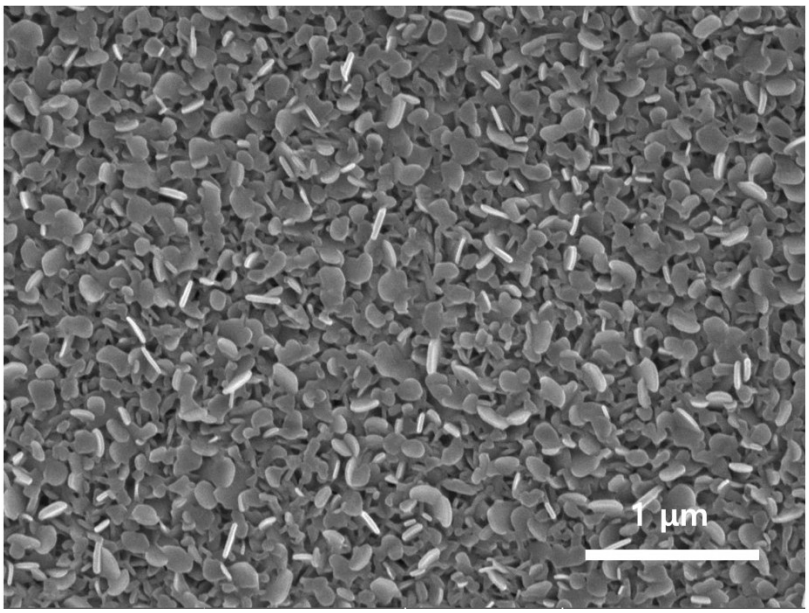


Figure S6. SEM image of PbI_2 film made by washing of DMSO by IPA for 2 min.

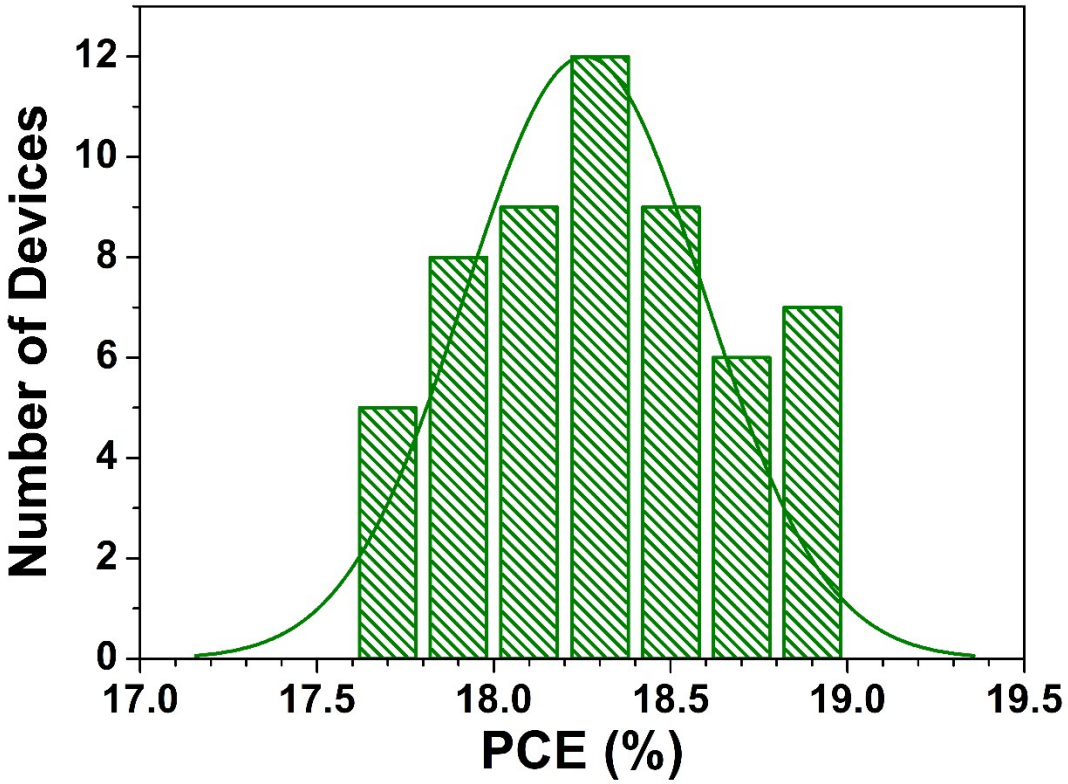


Figure S7. Histogram of PCEs for optimized solar cells made by MET.

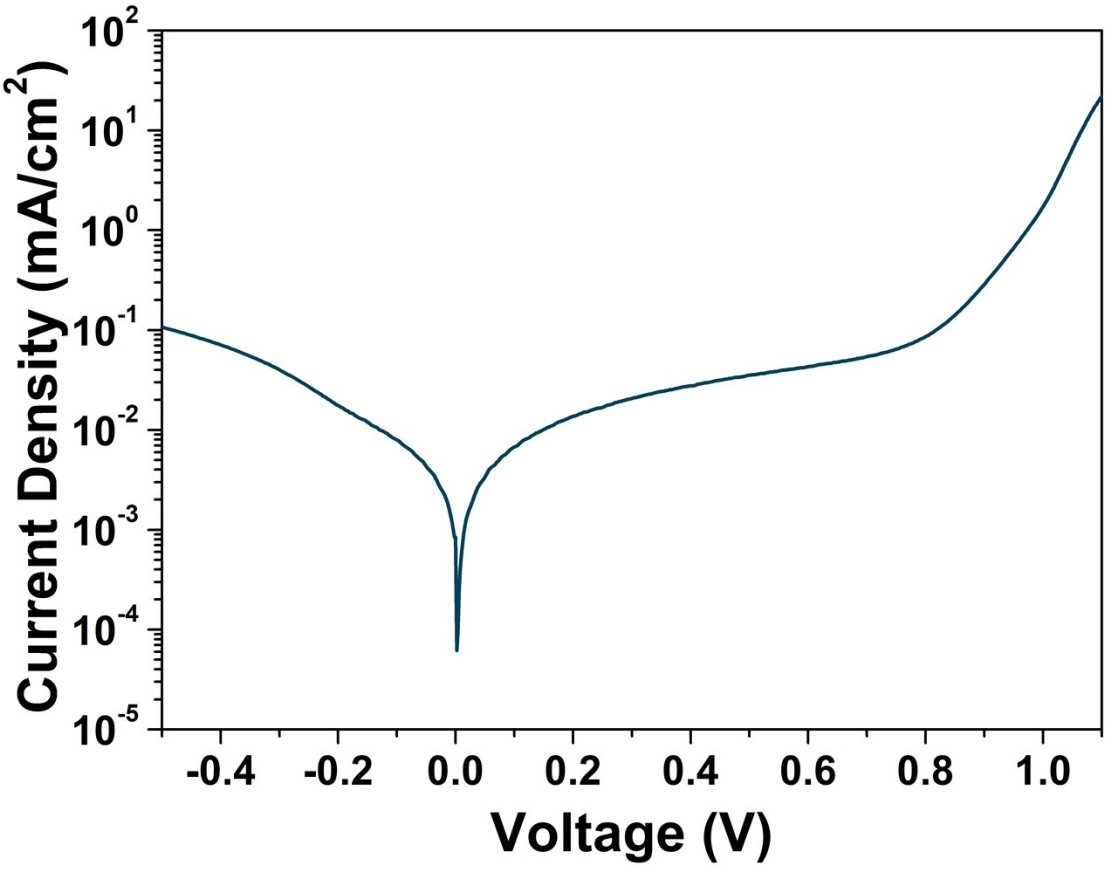


Figure S8. The dark J-V curve.

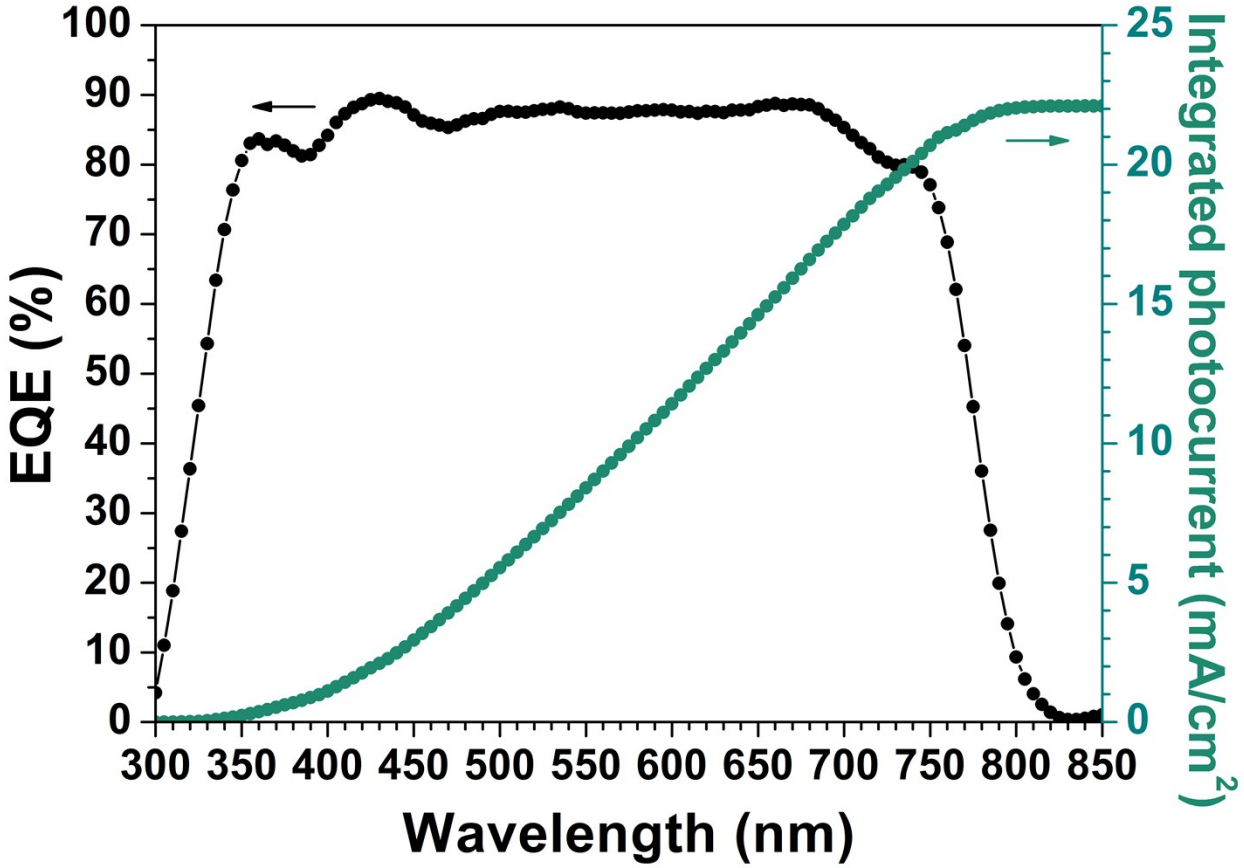
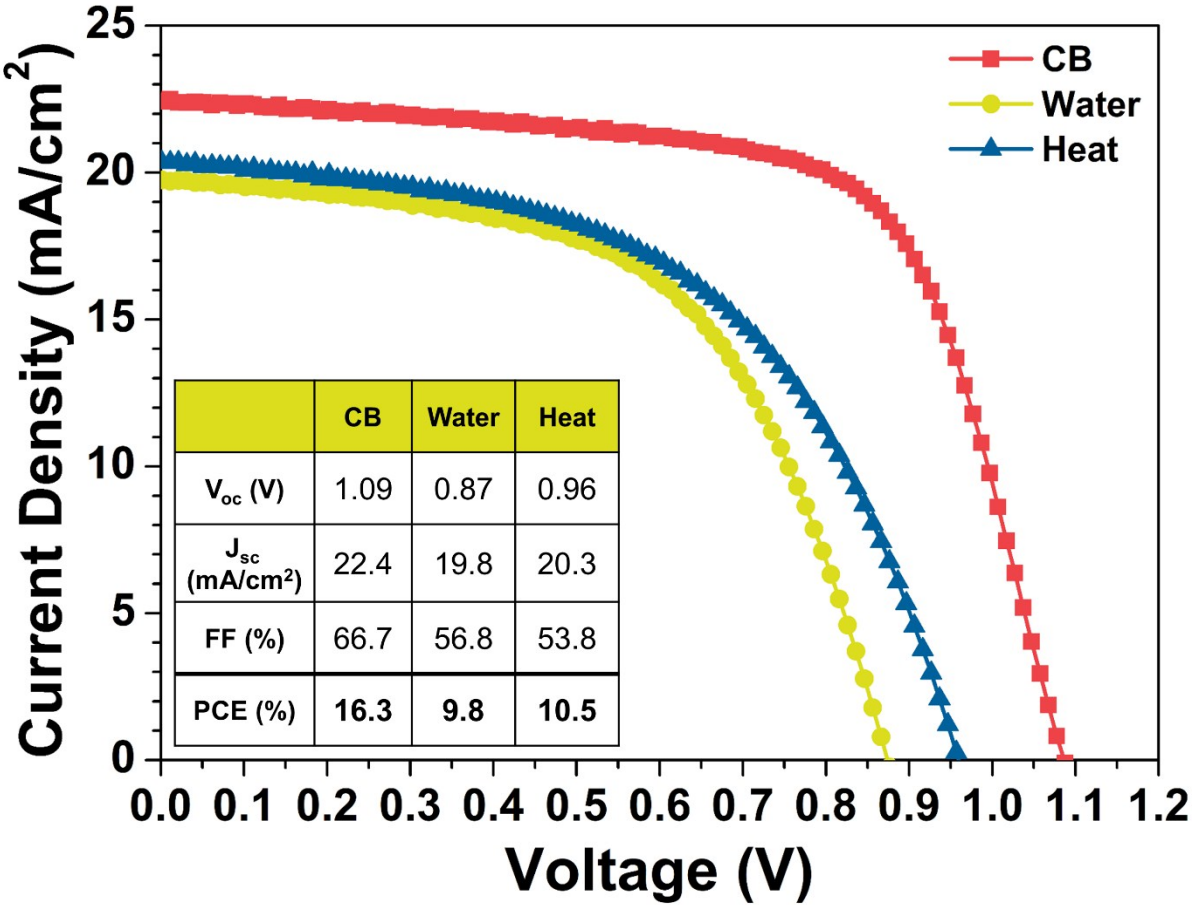


Figure S9. EQE spectrum and corresponding integrated photocurrent for the champion device.



	CB	Water	Heat
V_{oc} (V)	1.09	0.87	0.96
J_{sc} (mA/cm^2)	22.4	19.8	20.3
FF (%)	66.7	56.8	53.8
PCE (%)	**16.3**	**9.8**	**10.5**

Figure S10. J-V curves of solar cells fabricated by different extraction solvent and treatment.

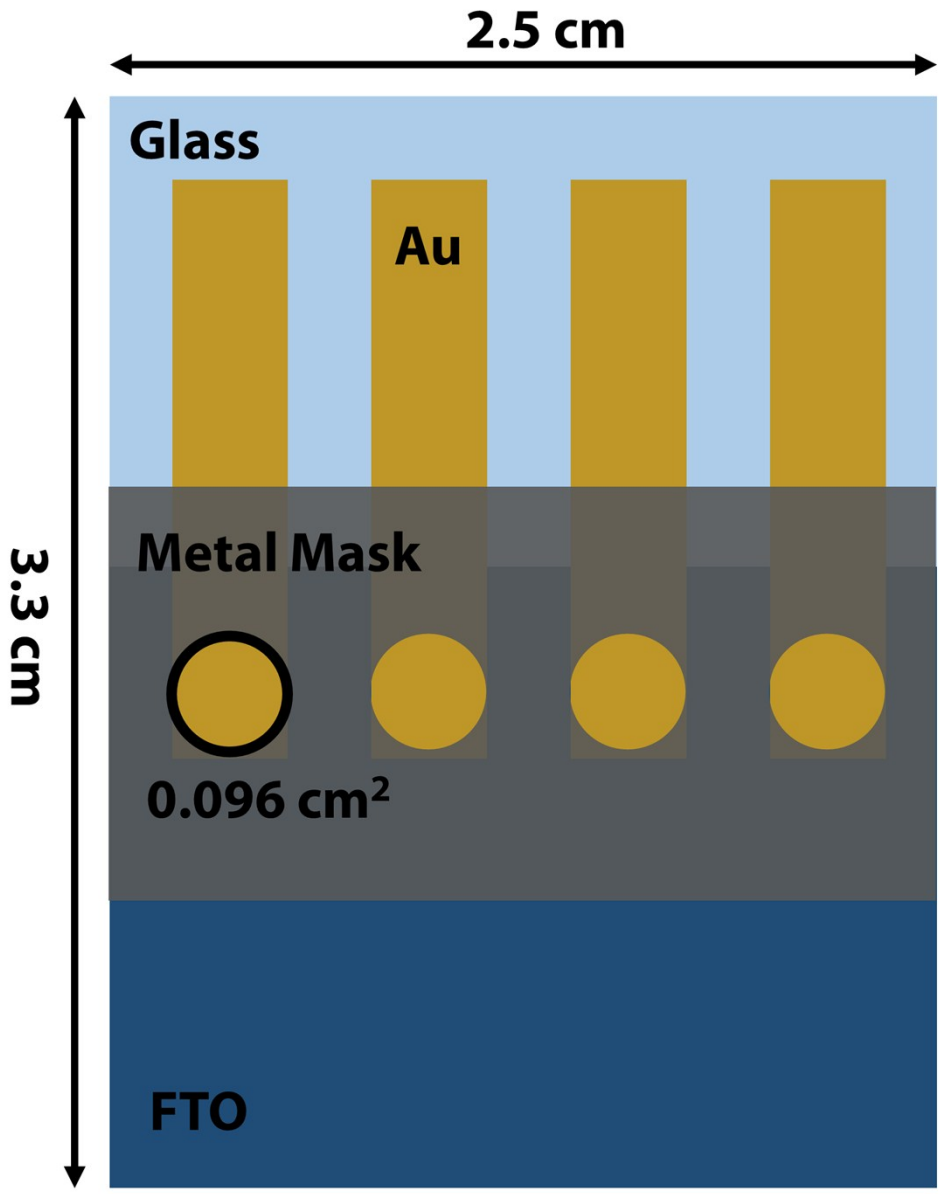


Figure S11. Schematic diagram of the structure of solar cells made by using slot-die coating.