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 PbI₂ 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.
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.