Electronic Supplementary Material (ESI) for Dalton Transactions.

Supporting information—Methanol as anti-solvent to improve the low open-circuit voltage of $CsPbBr_3$ perovskite solar cells prepared with water

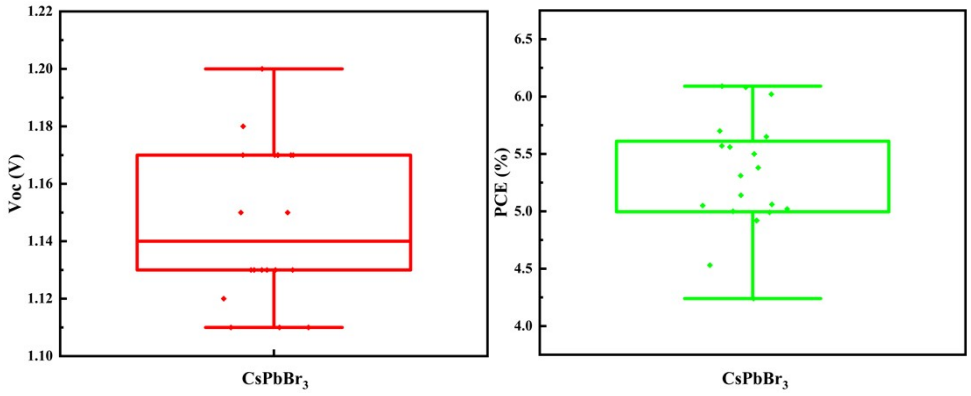


Figure S1. The Voc and PCE box chart of $CsPbBr_3$ device obtained by $CsBr/H_2O$ solution.

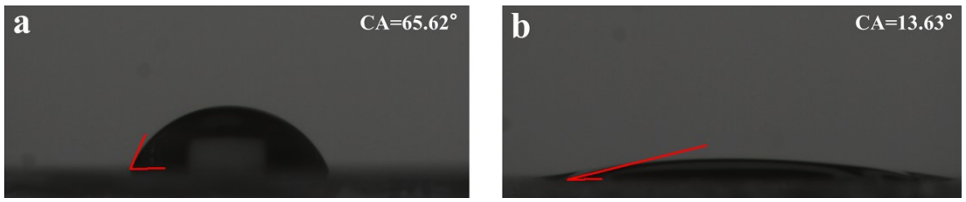


Figure S2. The contact angle image of (a) $PbBr_2$ layer to $CsBr/H_2O$ solution and (b) $PbBr_2$ layer added with 2-Hydroxyethylurea to $CsBr/H_2O$ solution.

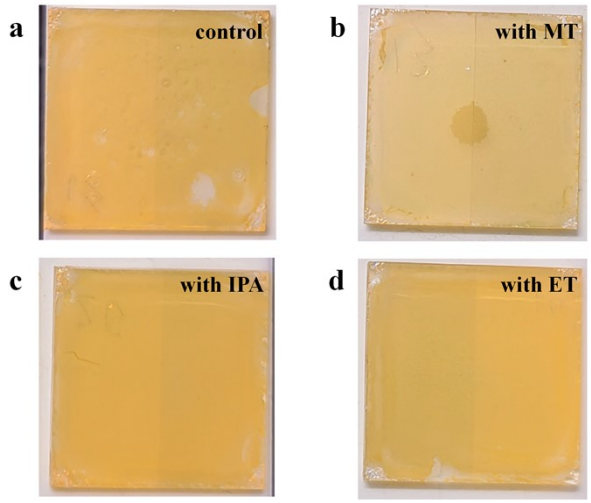
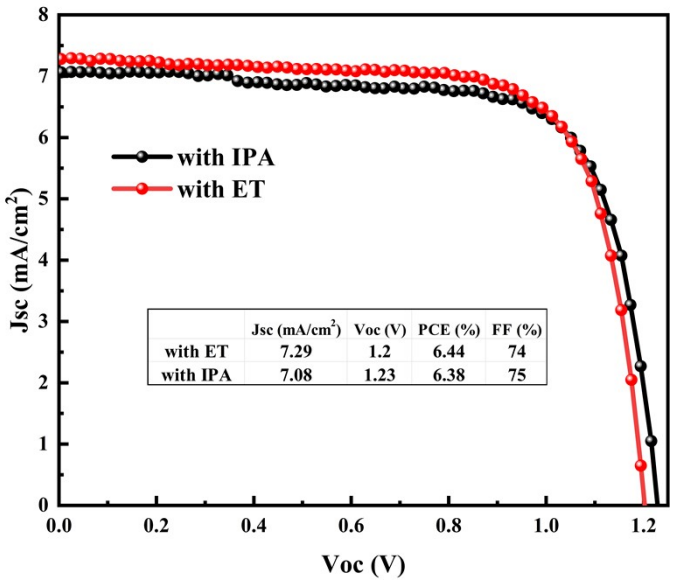


Figure S3. The $CsPbBr_3$ film prepared with $CsBr/H_2O$ solution treated (a) without and with (b) MT, (c) IPA, and (d) ET.



	Jsc (mA/cm^2)	Voc (V)	PCE (%)	FF (%)
with ET	7.29	1.2	6.44	74
with IPA	7.08	1.23	6.38	75

Figure S4. The J-V curve of $CsPbBr_3$ PSCs treated with IPA and ET.

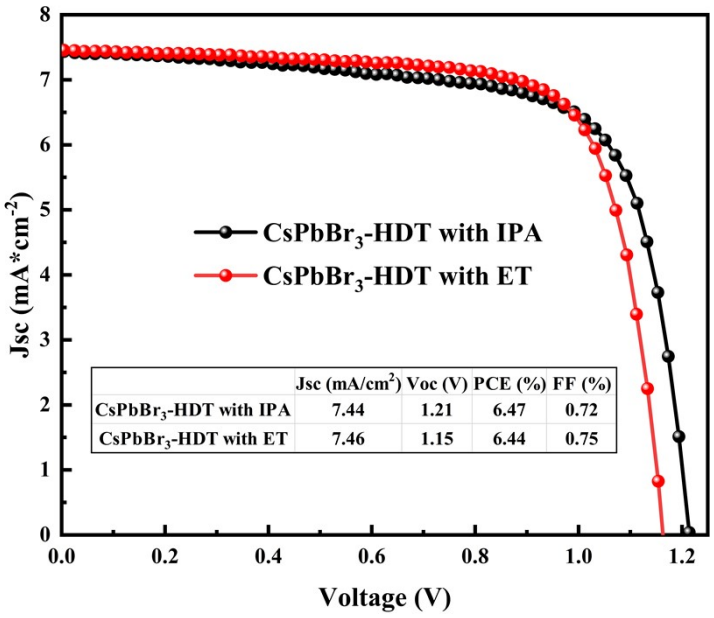


Figure S5. The J-V curve of $CsPbBr_3$ PSCs contained 2-Hydroxyethylurea treated with IPA and ET.

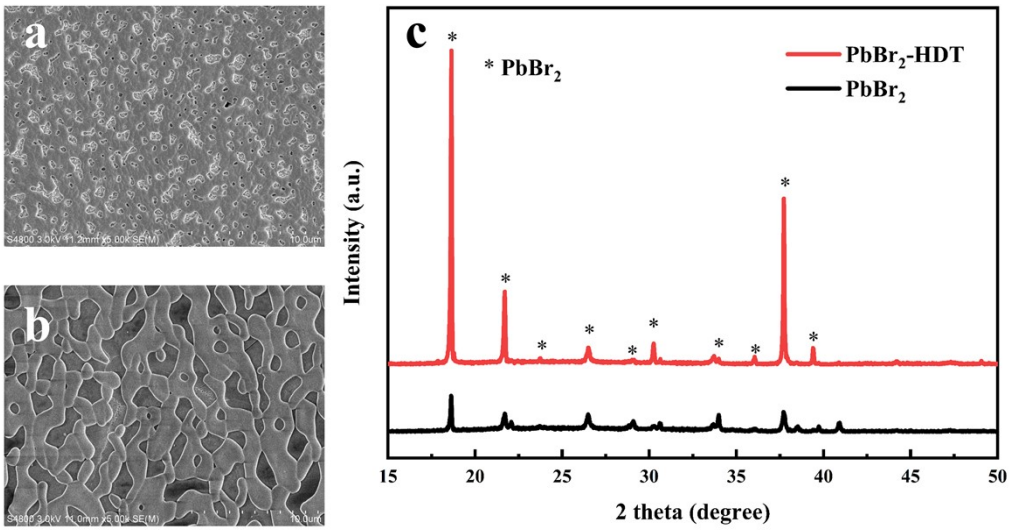


Figure S6. SEM spectra of (a) $PbBr_2$ layer and (b) $PbBr_2$ layer contained 2-Hydroxyethylurea; (c) XRD image of $PbBr_2$ layer and $PbBr_2$ layer contained 2-Hydroxyethylurea.

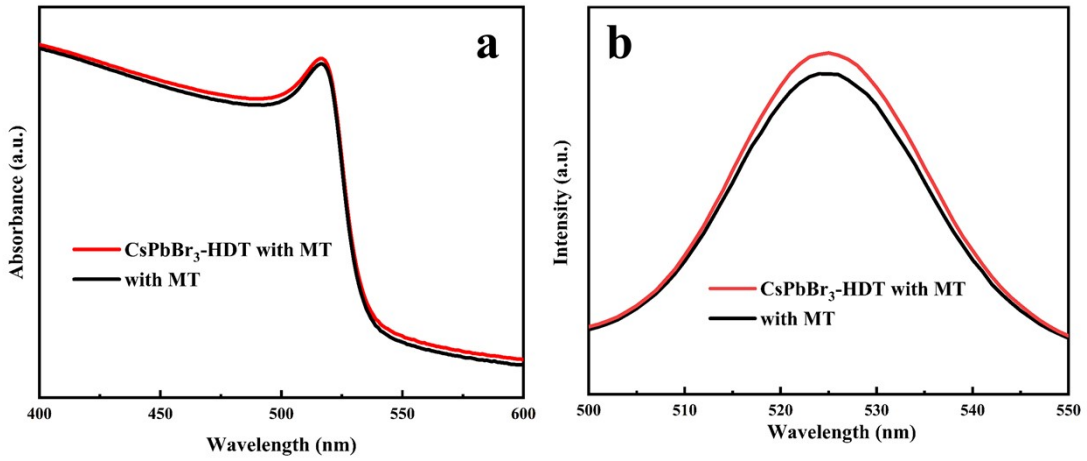


Figure S7. (a) UV-vis, (b) PL spectra of methanol anti-solvent treated $CsPbBr_3$ films obtained from the $PbBr_2$ layers with and without 2-Hydroxyethylurea.

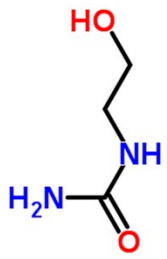


Figure S8. The structural formula of 2-Hydroxyethylurea.

Table S1. The coefficient of TRPL double exponential function fitting curve.

perovskite film	A_1 (%)	A_2 (%)	τ_1 (ns)	τ_2 (ns)
Control	89.47	10.53	0.66856	7.3879
With MT	67.17	32.83	0.59518	8.64355