

High-Performance, Highly Durable Perovskite Photovoltaics Featuring Solution-Processable TiO_2 as Interfacial Electron Transporting Layers

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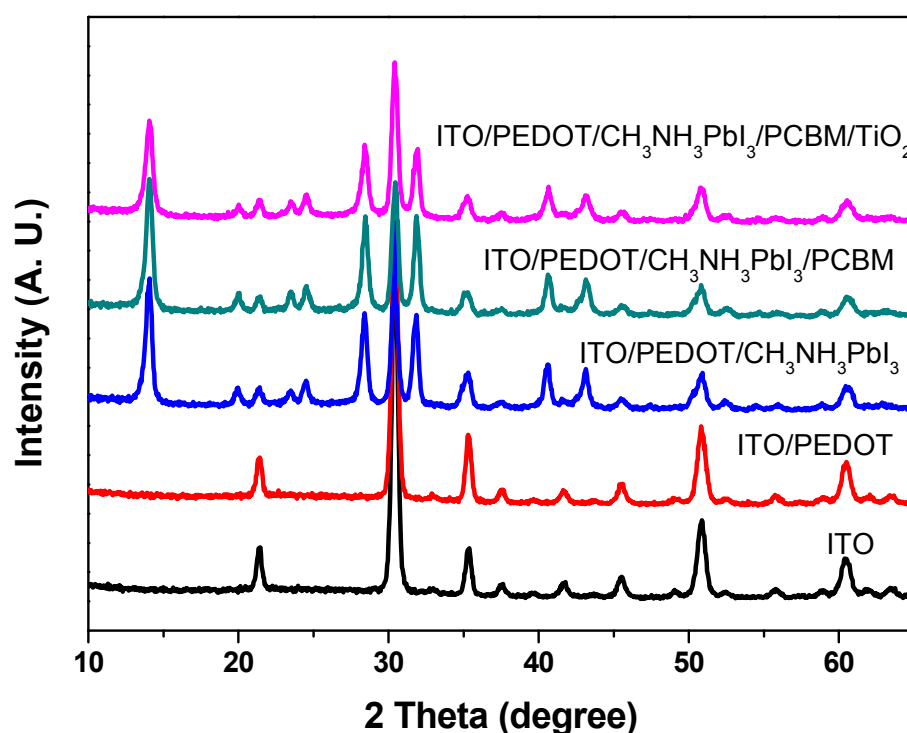


Figure S1. WAXS profiles of ITO, ITO/PEDOT, ITO/PEDOT/ $\text{CH}_3\text{NH}_3\text{PbI}_3$, ITO/PEDOT/ $\text{CH}_3\text{NH}_3\text{PbI}_3$ /PCBM, and ITO/PEDOT/ $\text{CH}_3\text{NH}_3\text{PbI}_3$ /PCBM/ TiO_2 .

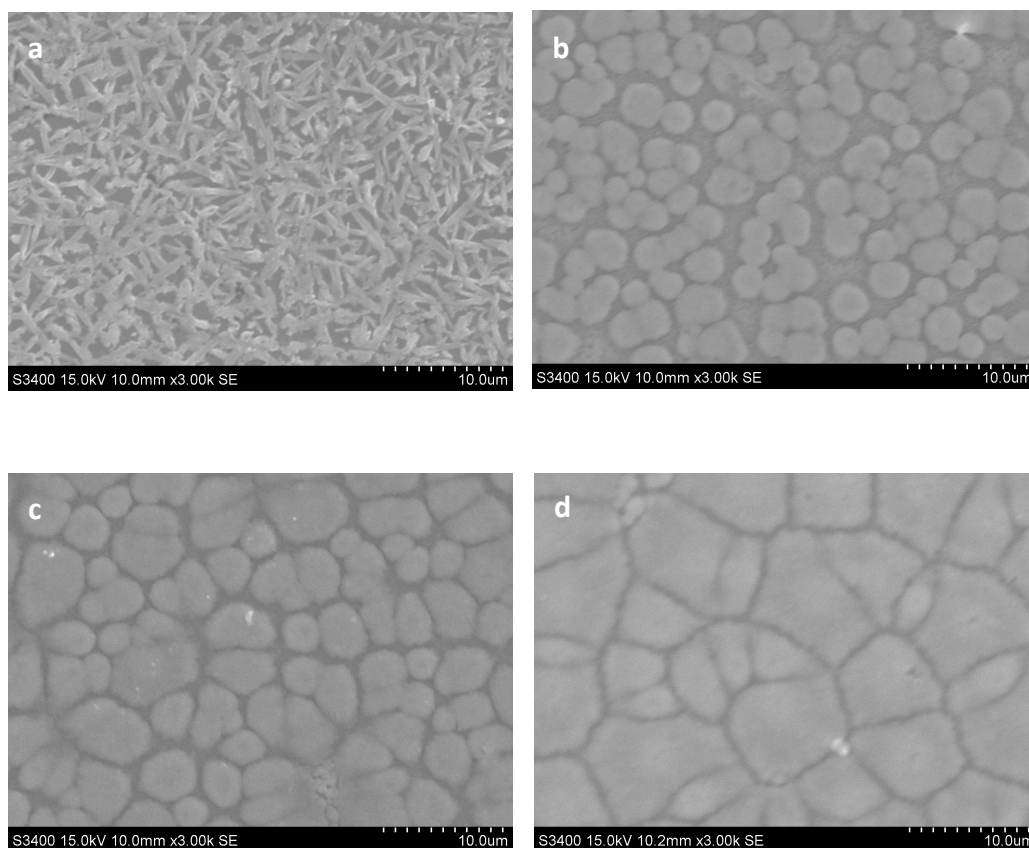
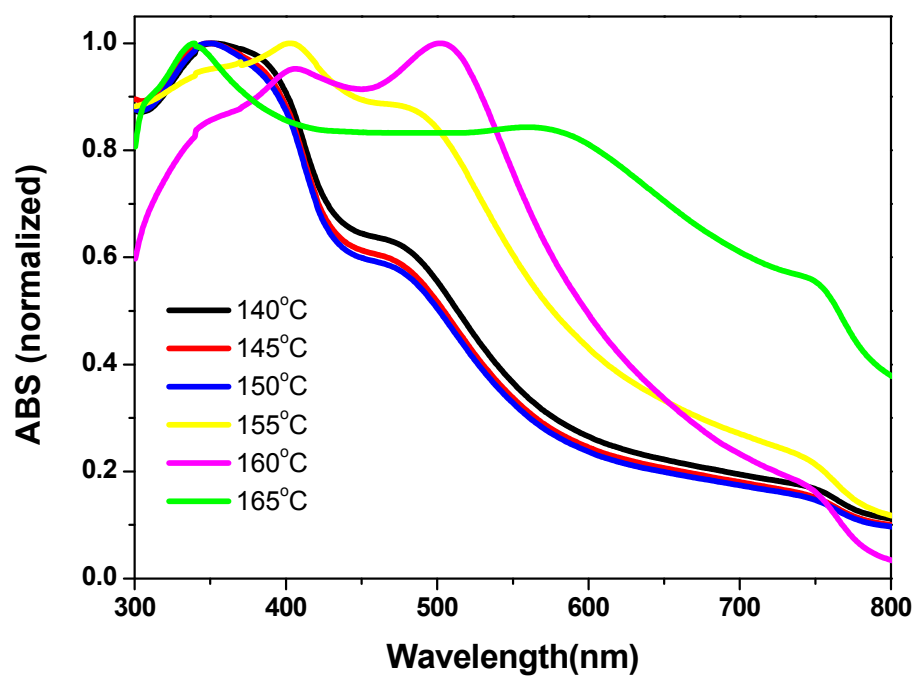


Figure S2. Top-view SEM images of as-spun perovskite films prepared with preheating at a) 145, b) 150, c) 155, and d) 165°C.

a)



b)

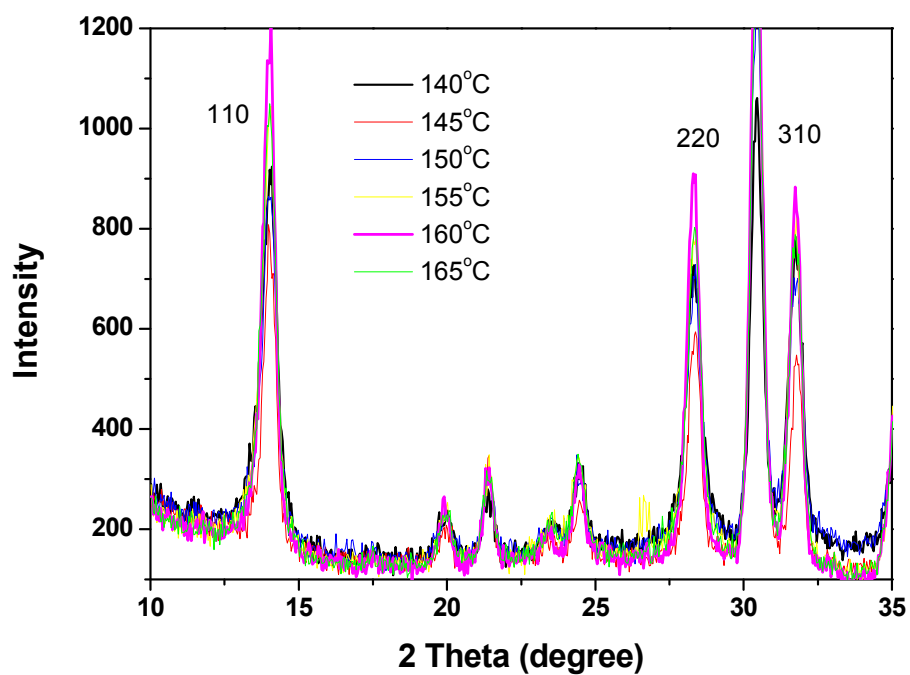


Figure S3. a) UV-Vis spectra and b) GAXRD profiles of $\text{CH}_3\text{NH}_3\text{PbI}_3$ perovskite films prepared using various fabrication conditions.

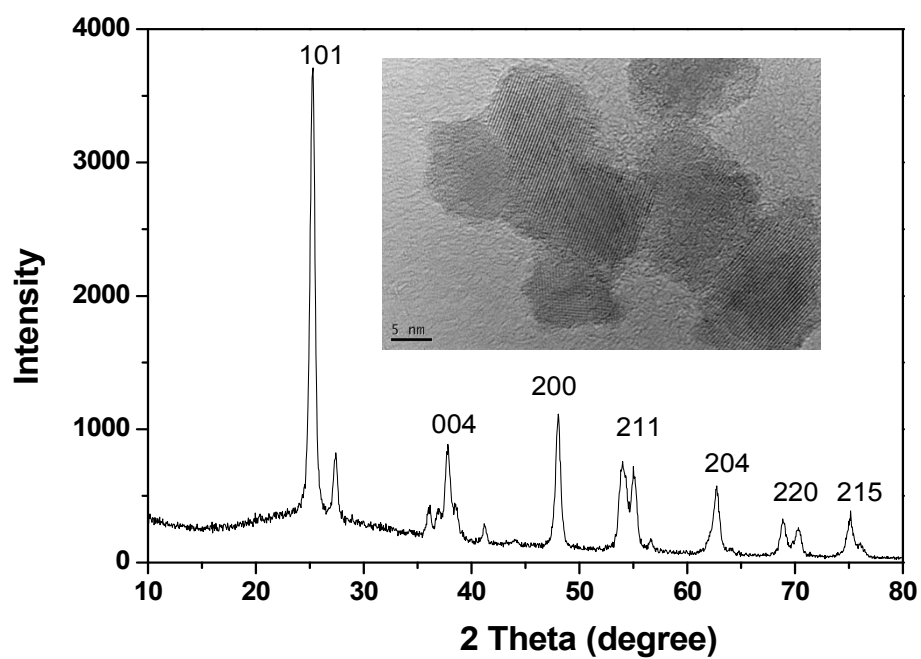


Figure S4. WAXS profiles of TiO₂ film prepared through mechanical grinding of the TiO₂ solution; inset: TEM image of the TiO₂ particles.

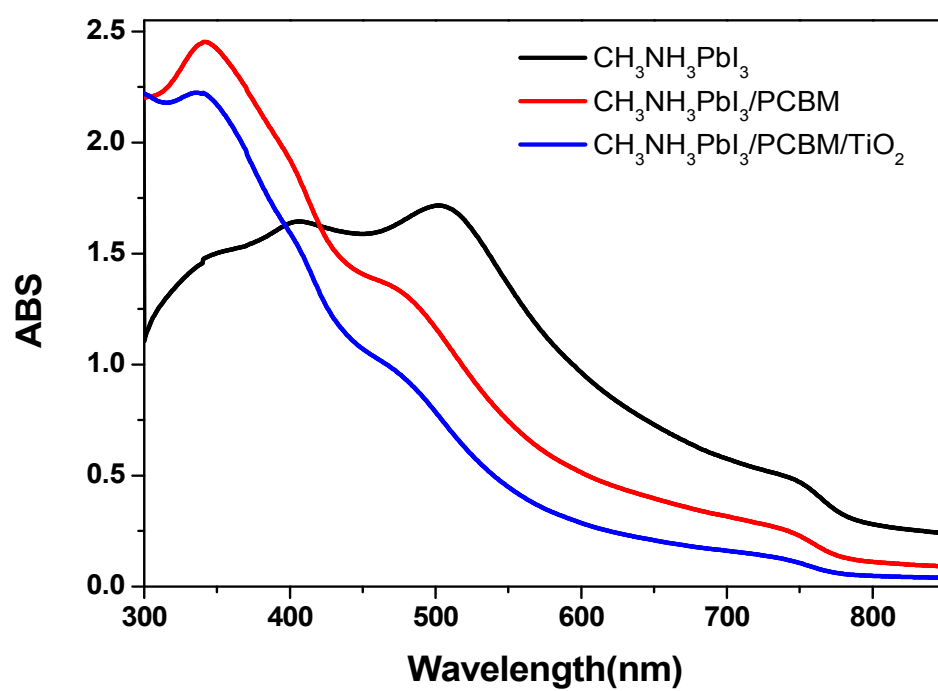
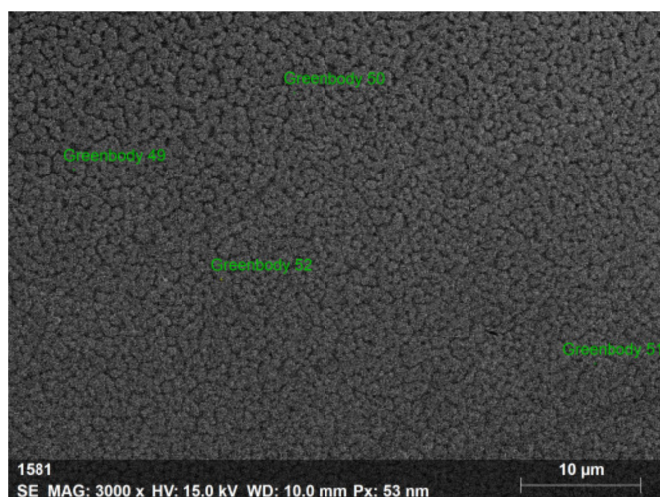


Figure S5. UV-Vis spectra of $\text{CH}_3\text{NH}_3\text{PbI}_3$, $\text{CH}_3\text{NH}_3\text{PbI}_3/\text{PCBM}$, and $\text{CH}_3\text{NH}_3\text{PbI}_3/\text{PCBM}/\text{TiO}_2$.



Atomic percent (%)

Spectrum	O	Ti	I	Pb
Greenbody 49	59.67	10.55	23.84	5.94
Greenbody 50	63.57	8.99	21.02	6.42
Greenbody 51	73.25	9.35	13.59	3.81
Greenbody 52	61.75	5.74	25.07	7.45

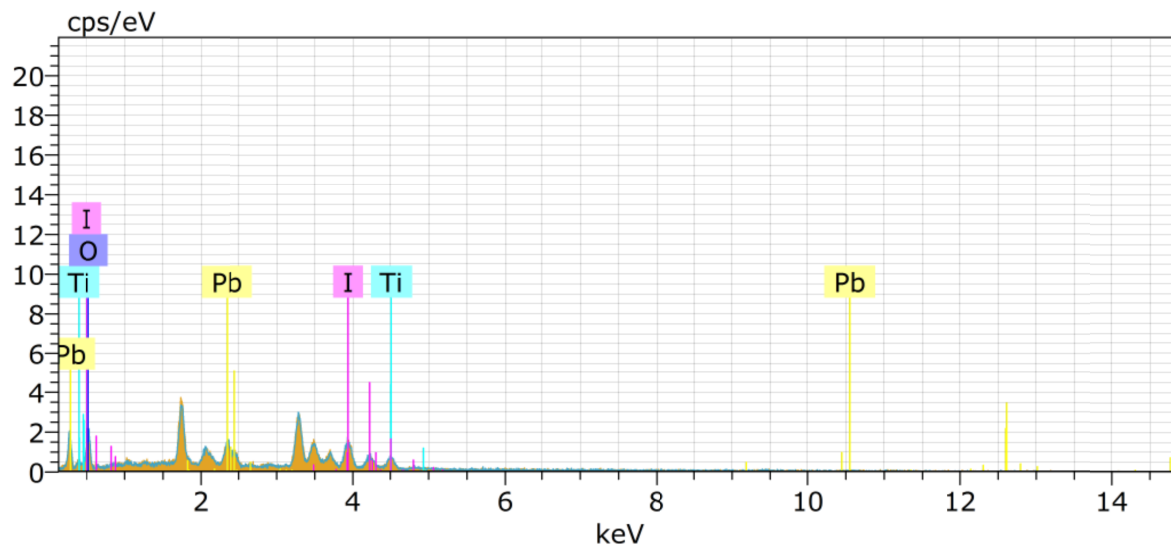
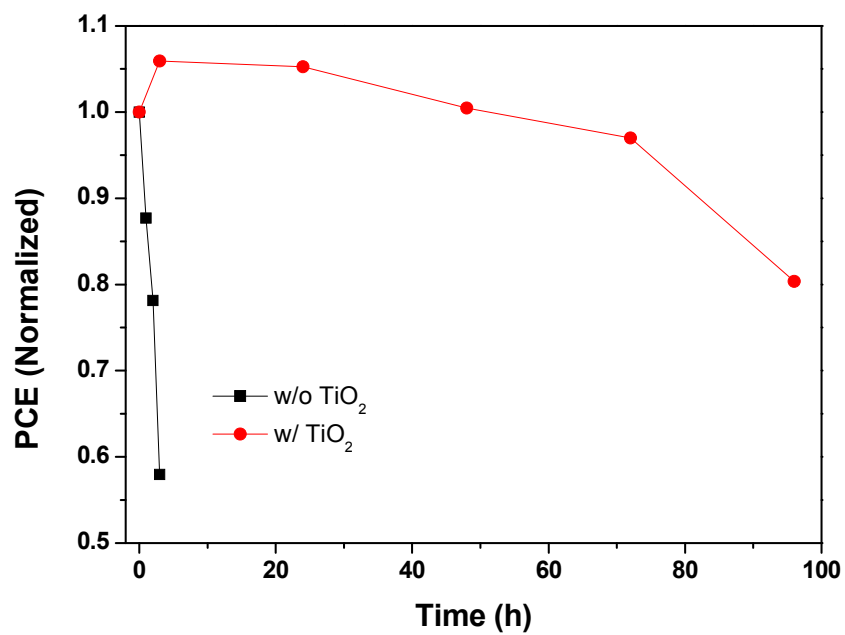


Figure S6. EDS images of the surface of an ITO/PEDOT/CH₃NH₃PbI₃/PCBM/TiO₂ film

a)



b)

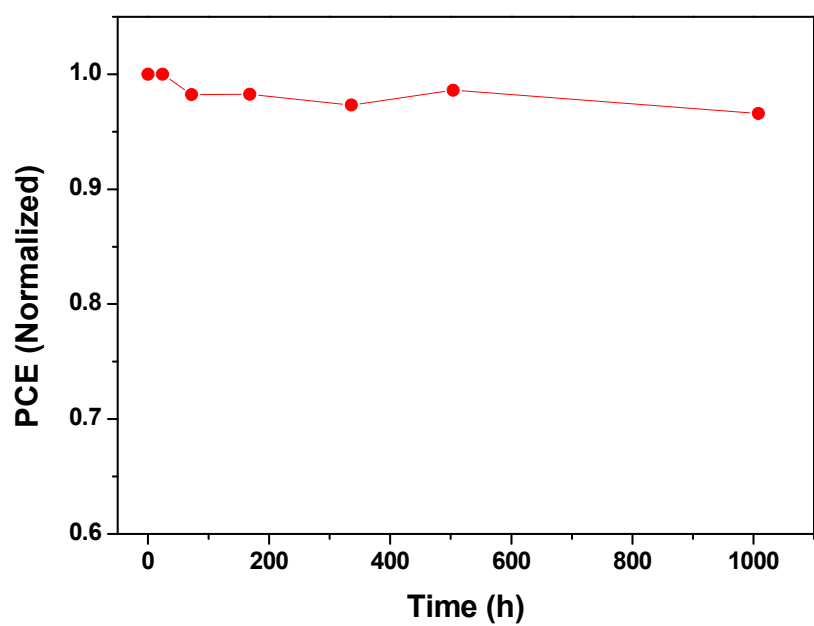


Figure S7. Long-term photovoltaic performance of perovskite cells under a) ISOS-D-1 condition and b) in the dark under N₂.