

Supplementary Information

High-Efficiency Perovskite Solar Cells with Humidity-Stability beyond 60 Days Achieved via Atomic Layer Deposition

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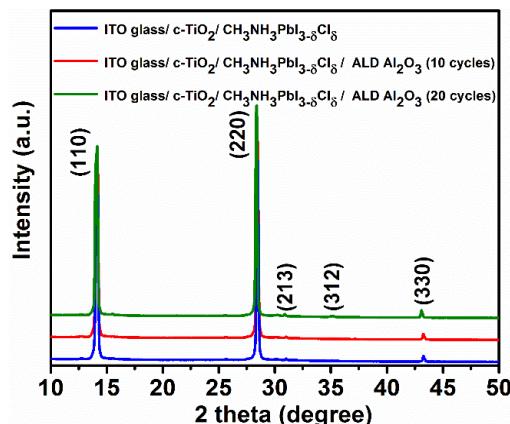


Figure S1. XRD spectra of the parent perovskite film before and after the successive depositions of ALD Al_2O_3 on top.

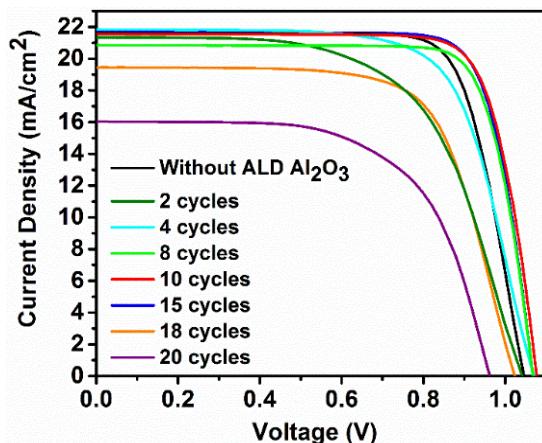


Figure S3. J-V curves of the best perovskite devices employing different numbers of ALD Al_2O_3 cycles.

Configuration	V_{oc} (V)	J_{sc} (mA/cm^2)	FF	PCE (%)
Pristine	1.03	21.3	0.69	15.1
Al_2O_3 , 2 cycles	1.04	21.3	0.61	13.5
Al_2O_3 , 4 cycles	1.06	21.9	0.69	16.0
Al_2O_3 , 8 cycles	1.07	20.8	0.78	17.4
Al_2O_3 , 10 cycles	1.08	21.7	0.77	18.0
Al_2O_3 , 15 cycles	1.07	21.7	0.77	17.9
Al_2O_3 , 18 cycles	1.02	19.5	0.69	13.7
Al_2O_3 , 20 cycles	0.96	16.0	0.63	9.7

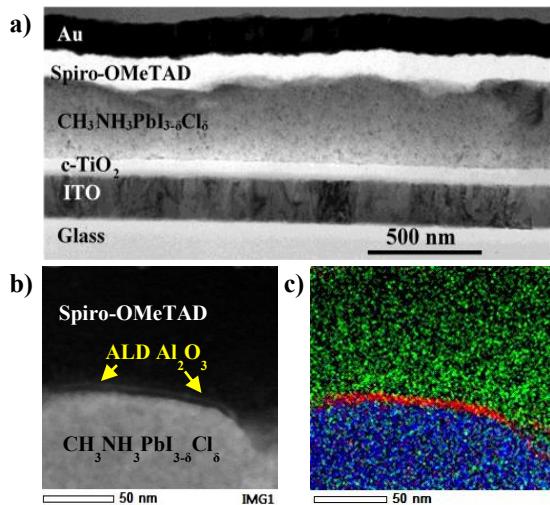


Figure S2. (a) Bright field TEM cross-sectional image of the complete planar perovskite device. (b) High angle annular dark field (HAADF) scanning TEM image of the enlarged perovskite/ALD Al_2O_3 /Spiro-OMeTAD interface. (c) Corresponding overlapped elemental mapping image.

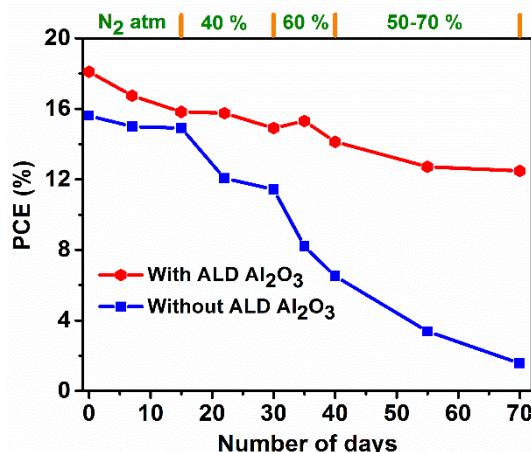


Figure S4. PCE of the champion perovskite devices with and without ALD Al_2O_3 as a function of storage time under varied humidity conditions ranging from 40% to 70%.