Supporting Information for

Progress in Air-Processed Perovskite Solar Cells: From Crystallization to Photovoltaic Performance

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Table S1 The details device structure, fabrication conditions, device area, and photovoltaic parameters of OHP solar cells listed in Figure 9.

Lab-scale OHP solar cells								
Device Structure	**Method for perovskite**	**Processing Environment**	**Device Area (cm^2)**	**Jsc (mA/cm^2)**	**Voc (V)**	**FF (%)**	**PCE (%)**	**Ref**
FTO/TiO_2/$CH_3NH_3PbI_3$ (Dye-sensitized solar cell)	Spin-coating	/	0.24	11.0	0.61	0.57	3.81	[3]
FTO/TiO_2/$CH_3NH_3PbI_3$ (Dye-sensitized solar cell)	Spin-coating	/	0.309	15.82	0.706	0.59	6.54	[97]
FTO/TiO_2/$CH_3NH_3PbI_3$/Spiro-MeOTAD/Au	Spin-coating & dip coating	Glovebox	0.209	21.3	1.00	0.66	14.1	[10]
FTO/TiO_2/$CH_3NH_3PbI_3$/PTAA /Au	Spin-coating	Glovebox	0.16	21.3	1.04	0.73	16.2	[98]
FTO/TiO_2/$(FAPbI_3)_{1-x}(MAPbBr_3)_x$/PTAA/Au	Spin-coating	Glovebox	0.16	24.6	1.06	0.77	20.1	[99]
FTO/TiO_2/$FAPbI_3$/PTAA/Au	Spin-coating	Glovebox	0.0946	25.0	1.1	0.80	22.1	[10]
ITO/SnO_2/$FA_{1-x}MA_xPbI_3$/PEAI/Spiro-OMeTAD/Au	Spin-coating	Glovebox	0.108	25.2	1.18	0.78	23.3	[100]
/	/	/	/	/	/	/	24.2*	[10]
FTO/TiO_2/$CH_3NH_3PbI_{3-x}Cl_x$/P3HT/Ag	Spin-coating	In air with RH 50%	0.09	18.85	0.64	0.41	5.67	[90]
FTO/TiO_2/$CH_3NH_3PbI_3$/Carbon/PANI	Spin-coating	In air	/	13.6	0.65	0.45	4.00	[92]
FTO/TiO_2/$CH_3NH_3PbI_3$/ Spiro-OMeTAD/Ag	Low-pressure chemical vapor deposition	In air with RH 60%	0.12	21.7	0.91	0.65	12.73	[91]
FTO/TiO_2/$CH_3NH_3PbI_{3-x}(SCN)_x$/ Spiro-OMeTAD/Au	Spin-coating	In air with RH 70%	/	21.1	0.96	0.75	15.12	[54]
FTO/TiO_2/$CH_3NH_3PbI_3$/ Spiro-OMeTAD/Au	Spin-coating	In air with RH 35%	0.1256	19.01	1.04	0.73	14.55	[51]
FTO/TiO_2/$CH_3NH_3PbI_3$/ Spiro-OMeTAD/Au	Multi-flow air knife	In air with RH 40%	0.1	23.50	1.09	0.69	17.71	[93]
ITO/PolyTPD/ $CH_3NH_3PbI_3$/C_{60}/BCP/Ag	Spin-coating	In air with RH 70%	0.1	23.03	1.05	0.75	18.1	[33]
ITO/m-PEDOT:PSS/$CH_3NH_3PbI_3$/PCBM/Ca/Al	Blowing assisted drop-casting	In air	0.1	22.64	1.11	0.77	19.48	[59]
ITO/ZnO/$CH_3NH_3PbI_3$/ Spiro-OMeTAD/Ag	Spin-coating	In air with RH 55-65%	0.04	22.17	1.07	0.77	18.34	[52]
ITO/PolyTPD/ $CH_3NH_3PbI_3$/C_{60}/BCP/Ag	Spin-coating	In air with RH 70%	0.1	23.36	1.00	0.67	15.56	[50]
FTO/TiO_2/meso-TiO_2/ $Cs_{0.05}(FA_{0.83}MA_{0.17})_{0.95}Pb(I_{0.83}Br_{0.17})_3$/Spiro-OMeTAD/Au	Spin-coating	In air with RH 20-35%	0.25	23.6	1.14	0.77	20.8	[44]
ITO/SnO_2/$MAPbI_3$/Spiro-OMeTAD/Au	Air blading	In air	0.09	23.46	1.09	0.79	20.08	[94]
ITO/SnO_2/$MAPbI_3$/Spiro-OMeTAD/Au	Air blading	In air with RH 60%	0.1	22.97	1.06	0.80	19.39	[95]
ITO/SnO_2/ $Cs_{0.21}FA_{0.56}MA_{0.23}(I_{0.98}Br_{0.02})_3$	Spin-coating	In air with RH 40%	/	23.37	1.11	0.71	18.38	[96]

/Spiro-OMeTAD/Ag								
Air processed large-scale OHP solar cells								
ITO/PEDOT:PSS/ $CH_3NH_3PbI_{3-x}Cl_x$/PCBM/Ca/Al	Spray coating	In air	/	16.8	0.92	0.72	11.1	[63]
FTO/TiO_2/ $CH_3NH_3PbI_{3-x}Cl_x$/ Spiro-OMeTAD/Ag	Spray coating	In air	0.065	20.6	1.03	0.62	13	[58]
FTO/TiO_2/ $CH_3NH_3PbI_3$/ Spiro-OMeTAD/Au	Spray coating	In air	1	18.59	1.03	0.68	13.09	[66]
FTO/TiO_2/ZrO_2/ (5-AVA)$_x$(MA)$_{1-x}$$PbI_3$/Carbon	Printing	In air	0.5	22.8	0.86	0.66	12.8	[101]
FTO/TiO_2/ZrO_2/Carbon/$MAPbI_3$ (module)	Printing	In air	70	1.77	9.63	0.63	10.74	[103]
FTO/compact-TiO_2/ (meso-TiO_2/meso-ZrO_2/meso-carbon)/ (5-AVA)$_x$(MA)$_{1-x}$$PbI_3$ (module)	Printing	In air	49	2.0	9.3	0.56	10.4	[56]
FTO/TiO_2/$Cs_{0.1}(FA_{0.83}MA_{0.17})_{0.9}Pb(I_{0.83}Br_{0.17})_3$/Spiro-OMeTAD/Au	Printing	In air with RH 45%	0.09	21.5	1.06	0.67	15.3	[104]
ITO/ZnO/$MAPbI_3$/P3HT/Ag	Slot-die	In air with RH 30-40%	0.1	20.38	0.98	0.60	11.96	[71]
ITO/ZnO/$MAPbI_3$/ Bifluo-OMeTAD/MoO_x/Ag	Slot-die	In air with RH 30-40%	0.1	19.7	1.1	0.68	14.7	[105]
ITO/ZnO/$MAPbI_3$/P3HT/MoO_x/Ag	Slot-die	In air	0.1	17.21	1.1	0.67	12.7	[106]
FTO/TiO_2/ $CH_3NH_3PbI_3$/ Spiro-OMeTAD/Au	Doctor blading	In air	10.1	4.3	4.11	0.58	10.3	[107]
FTO/Graphene-TiO_2/ $CH_3NH_3PbI_3$/ Spiro-OMeTAD/Au (module)	Doctor blading	In air	50.6	2.26	8.57	0.65	12.6	[108]
FTO/TiO_2-PCBM/ $CH_3NH_3PbI_3$/ Spiro-OMeTAD/Au	Doctor blading	In air with RH 10-20%	1.2	21.38	1.11	0.73	17.33	[109]
ITO/NiO_x/$MAPbI_3$/$PC_{61}BM$/Ag	Doctor blading	In air with RH 40%	0.09	17.6	1.02	0.61	10.92	[110]
ITO/PEDOT:PSS/$CH_3NH_3PbI_{3-x}Cl_x$ /PCBM/ZnO/Ag	R2R	In air	0.5	13.7	0.98	0.33	5.1	[111]
PET/TCO/ZnO/$FA_{0.4}MA_{0.6}PbI_3$/PEDOT/MoO_3/Ag	R2R	In air with RH 30-40%	0.1	19.6	1.04	0.54	11.0	[112]
ITO/m-PEDOT:PSS/$CH_3NH_3PbI_3$/PCBM/Ca/Al	R2R	In air with RH 45%	0.1	17.39	0.99	0.65	11.16	[59]

*The certified PCE obtained from NREL Efficiency chart, https://www.nrel.gov/pv/cell-efficiency.html, Access on April 17, 2019

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