

Supplementary Materials for

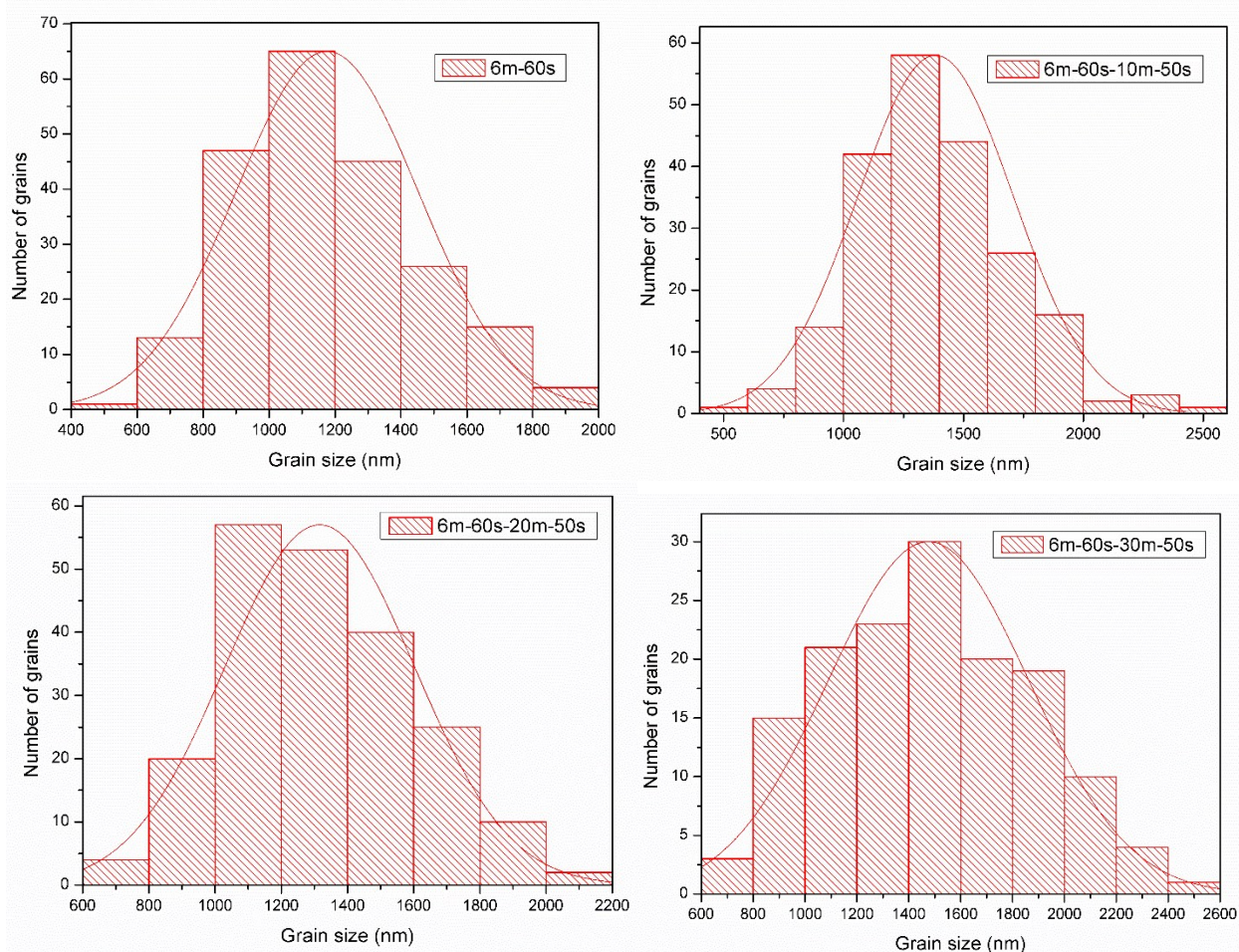
Concentration gradient controlled growth of large-grain $\text{CH}_3\text{NH}_3\text{PbI}_3$ films and enhanced photovoltaic performance of solar cells in ambient conditions

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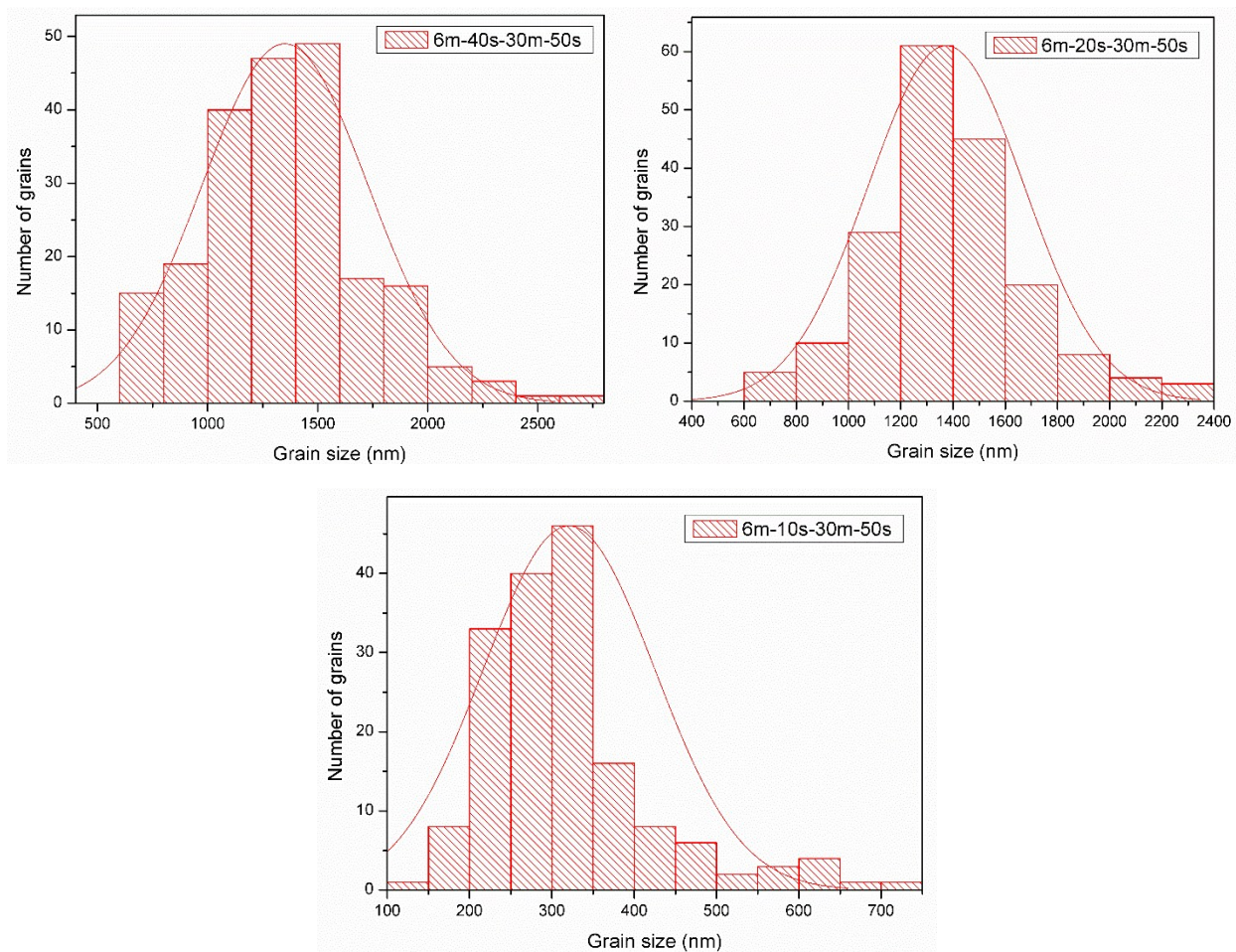
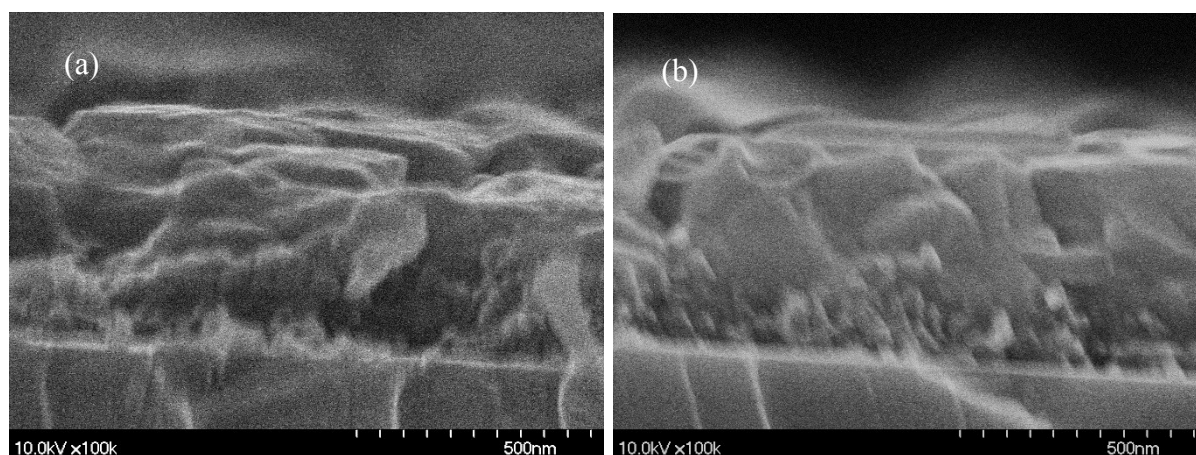


Fig. S1. Histogram of the grain sizes of the perovskite films



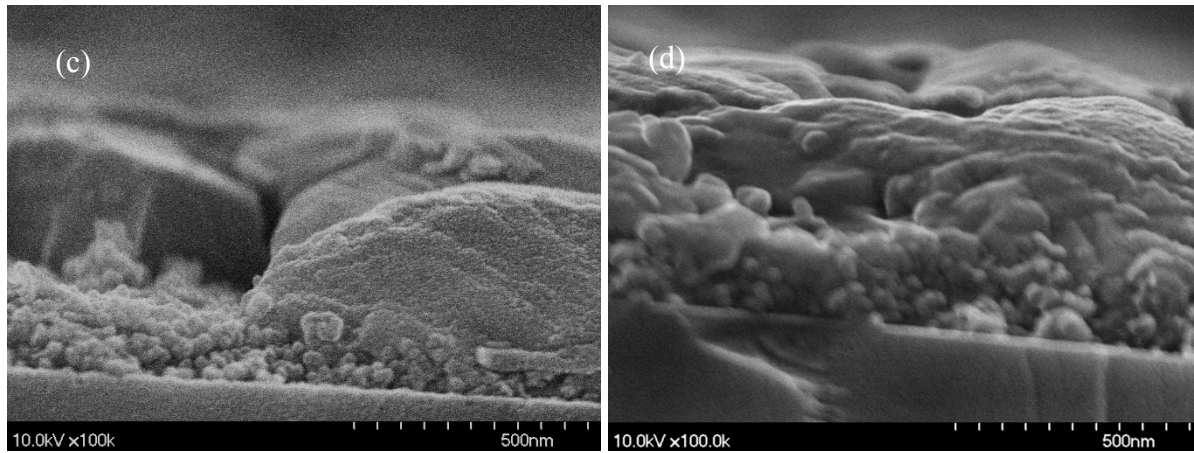


Fig. S2. Cross-section SEM images of the sample. a) 6m-60s, b) 6m-10s-30m-50s, c) 6m-60s-10m-50s, d) 6m-60s-30m-50s.

Tab. S1. Statistic analysis on the grain size distribution of the perovskite films.

	Max./nm	Min./nm	Mean/nm
6m-60s	1980.21	585.44	1171.23
6m-60s-10m-50s	2438.82	594.53	1377.54
6m-60s-20m-50s	2057.82	617.07	1315.23
6m-60s-30m-50s	2461.41	713.67	1467.93
6m-10s-30m-50s	728.63	137.89	313.72
6m-20s-30m-50s	2359.29	617.39	1367.48
6m-40s-30m-50s	2607.01	607.13	1339.04

Tab. S2. List of I - V information of the solar devices (MAI concentration effect)

	J_{sc} (mA/cm ²)	V_{oc} (V)	FF	PCE (%)
6m-60s				
	9.90	0.87	0.61	5.25
	10.63	0.80	0.46	3.96
6m-60s-10m-50s				
	12.52	0.91	0.58	6.59
	13.93	0.89	0.53	6.50

6m-60s-20m-50s	13.85	0.89	0.61	7.52
	15.88	0.91	0.59	8.56
	16.79	0.91	0.62	9.57
	17.60	0.91	0.62	9.92
6m-60s-30m-50s	18.09	0.98	0.65	11.48
	17.89	0.98	0.62	10.92
	17.48	0.97	0.64	10.81

Tab. S3. List of I - V information of the solar devices (MAI loading time effect)

	J_{sc} (mA/cm ²)	V_{oc} (V)	FF	PCE (%)
6m-60s	9.90	0.87	0.61	5.25
	10.63	0.80	0.46	3.96
6m-10s-30m-50s	13.10	0.90	0.60	7.02
	11.81	1.00	0.67	7.93
	15.49	0.92	0.55	7.91
	14.87	0.94	0.68	9.53
6m-20s-30m-50s	11.07	0.97	0.62	6.61
	15.87	0.93	0.49	7.29
	13.18	0.94	0.70	8.60
	14.53	0.89	0.53	6.81
6m-40s-30m-50s	15.07	0.92	0.63	8.77
	17.87	0.93	0.63	10.47
	17.54	0.93	0.63	10.30

6m-60s-30m-50s

18.09	0.98	0.65	11.48
17.89	0.98	0.62	10.92
17.48	0.97	0.64	10.81
