

Crystallization dynamics in wide-bandgap perovskite films

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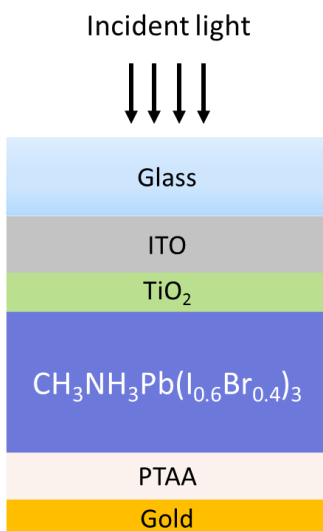


Figure S1 Schematic layer stack of the *n-i-p* perovskite solar cell.

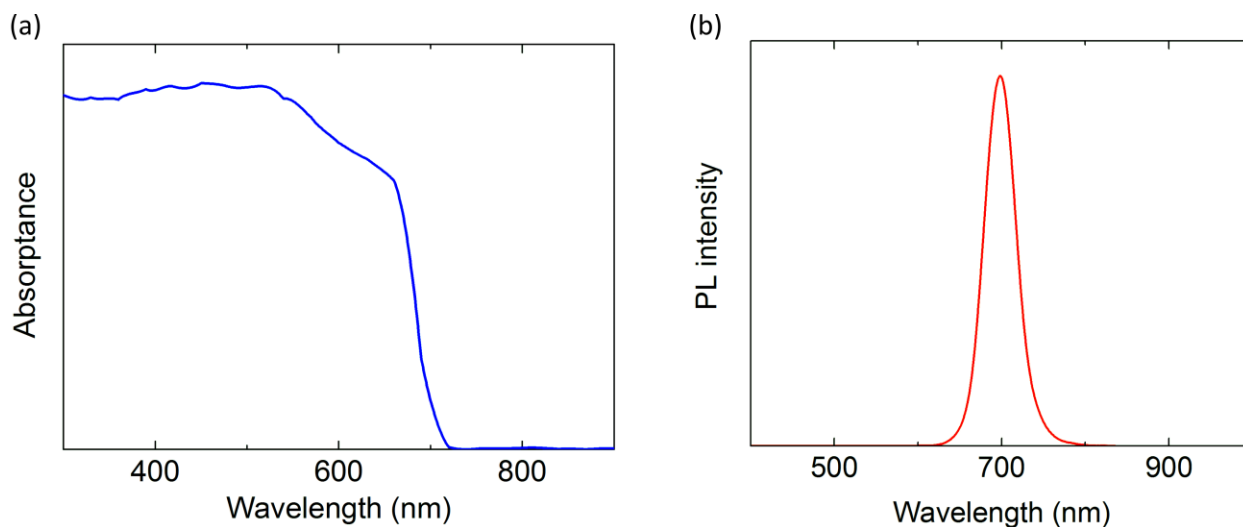


Figure S2 (a) Normalised absorbance and (b) PL spectra of CH₃NH₃Pb(I_{0.6}Br_{0.4})₃ film annealed at 110 °C for 90 minutes

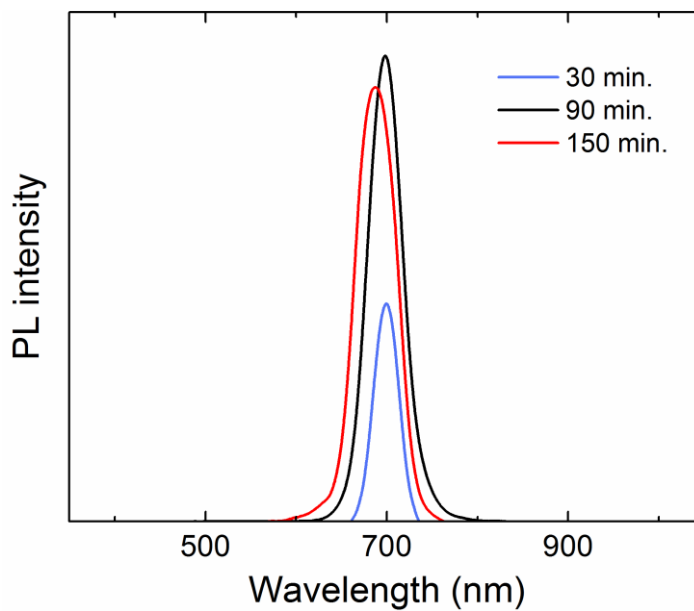


Figure S3 PL spectra of $\text{CH}_3\text{NH}_3\text{Pb}(\text{I}_{0.6}\text{Br}_{0.4})_3$ films annealed at 110 °C for different durations.

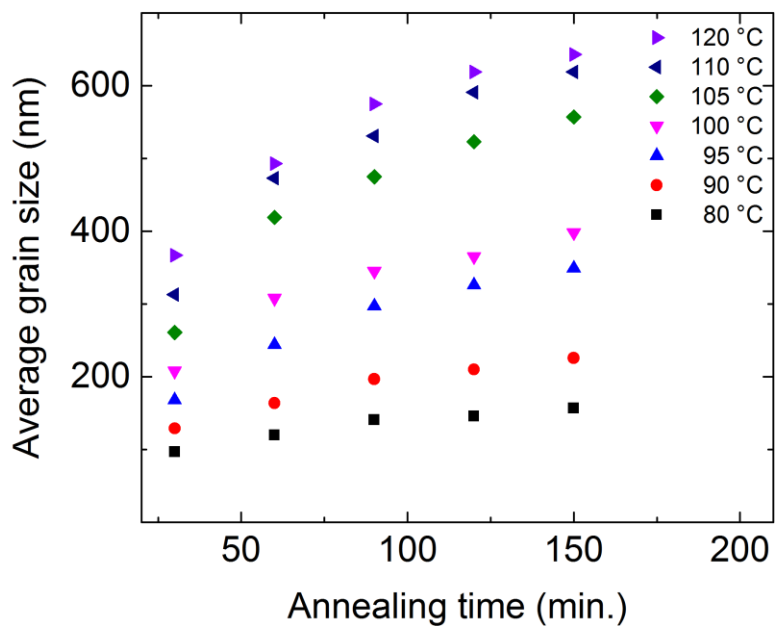


Figure S4 Average grain sizes in $\text{CH}_3\text{NH}_3\text{Pb}(\text{I}_{0.6}\text{Br}_{0.4})_3$ films annealed at different conditions.

Table S1 Photovoltaic parameters of solar cells employing $\text{CH}_3\text{NH}_3\text{Pb}(\text{I}_{0.6}\text{Br}_{0.4})_3$ films annealed at different annealing conditions.

Annealing temperature (°C)	Annealing time (min.)	J_{sc} (mA cm ⁻²)	V_{oc} (V)	Fill Factor	PCE (%)
80	30	1.09	0.85	0.52	0.48
80	60	1.71	0.86	0.54	0.79
80	90	2.38	0.86	0.55	1.13
80	120	3.08	0.87	0.55	1.47
80	150	3.21	0.87	0.56	1.56
90	30	1.58	0.89	0.49	0.69
90	60	6.68	0.90	0.58	3.49
90	90	10.21	0.91	0.66	6.13
90	120	10.59	0.95	0.70	7.04
90	150	10.52	0.94	0.69	6.82
95	30	3.39	0.81	0.43	1.18
95	60	9.91	0.90	0.59	5.26
95	90	11.92	0.97	0.67	7.75
95	120	11.69	0.97	0.63	7.14
95	150	11.43	0.99	0.61	6.90
100	30	6.91	0.92	0.58	3.69
100	60	11.88	1.01	0.68	8.16
100	90	12.09	1.05	0.71	9.01
100	120	12.07	1.04	0.71	8.91
100	150	12.06	1.01	0.70	8.53
105	30	11.59	0.95	0.65	7.16
105	60	12.11	1.04	0.70	8.82
105	90	12.38	1.06	0.71	9.32
105	120	12.21	1.04	0.70	8.89
105	150	12.2	1.03	0.69	8.67
110	30	12.19	1.08	0.66	8.69
110	60	12.28	1.09	0.70	9.37
110	90	13.28	1.11	0.72	10.61
110	120	12.13	1.10	0.70	9.34
110	150	12.27	1.09	0.69	9.23
120	30	12.11	0.93	0.63	7.10
120	60	11.37	0.91	0.59	6.10
120	90	9.09	0.90	0.55	4.50
120	120	8.93	0.89	0.54	4.29
120	150	8.81	0.87	0.51	3.91