Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Boosting the Optimization Process of Perovskite Solar Cells by Partial Sampling and Kriging Method

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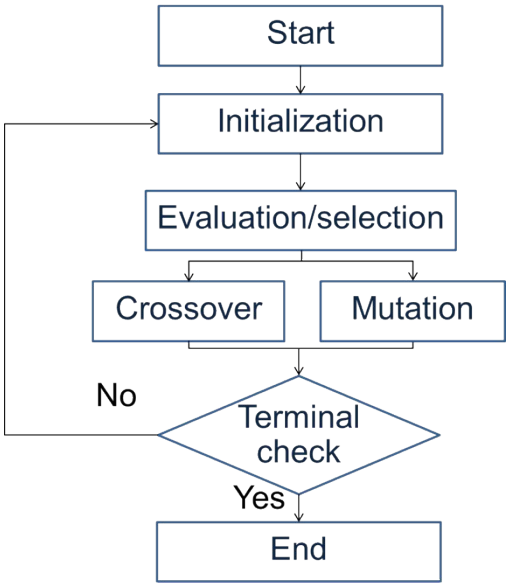

Figure S1 The algorithms of simple GA

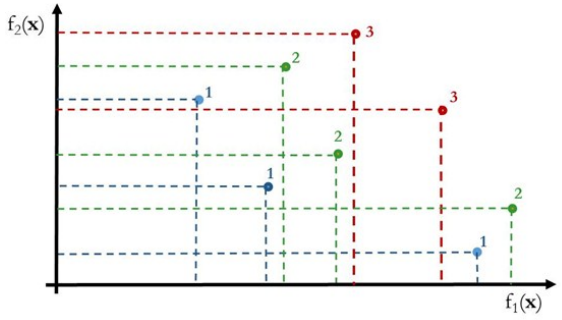

Figure S2 Ranking by NSGA-II (Minimization of f_1 and f_2).

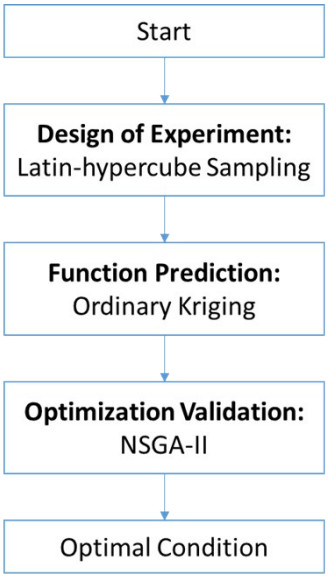

Figure S3 Flowcharts showing the modelling and optimization process using in this report.

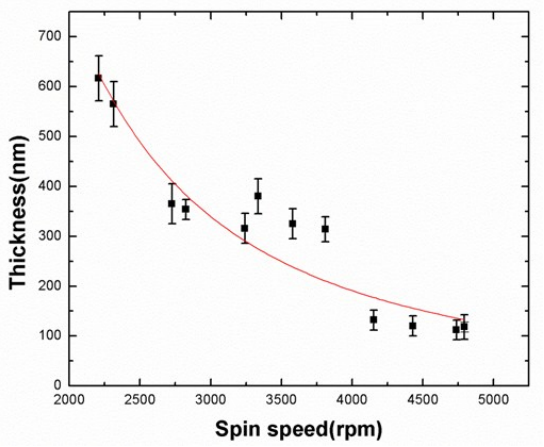

Figure S4 The relation between spin-coating speed and thickness of perovskite layer.

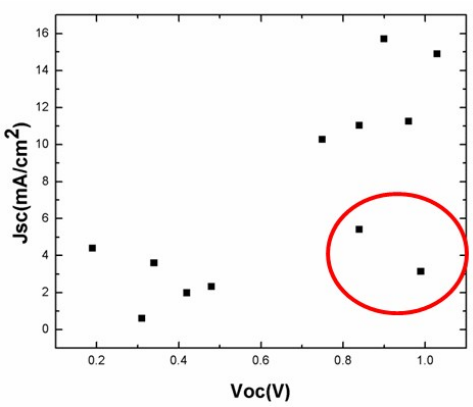

Figure S5 Relationship between J_{sc} and V_{oc} from the original experimental data.

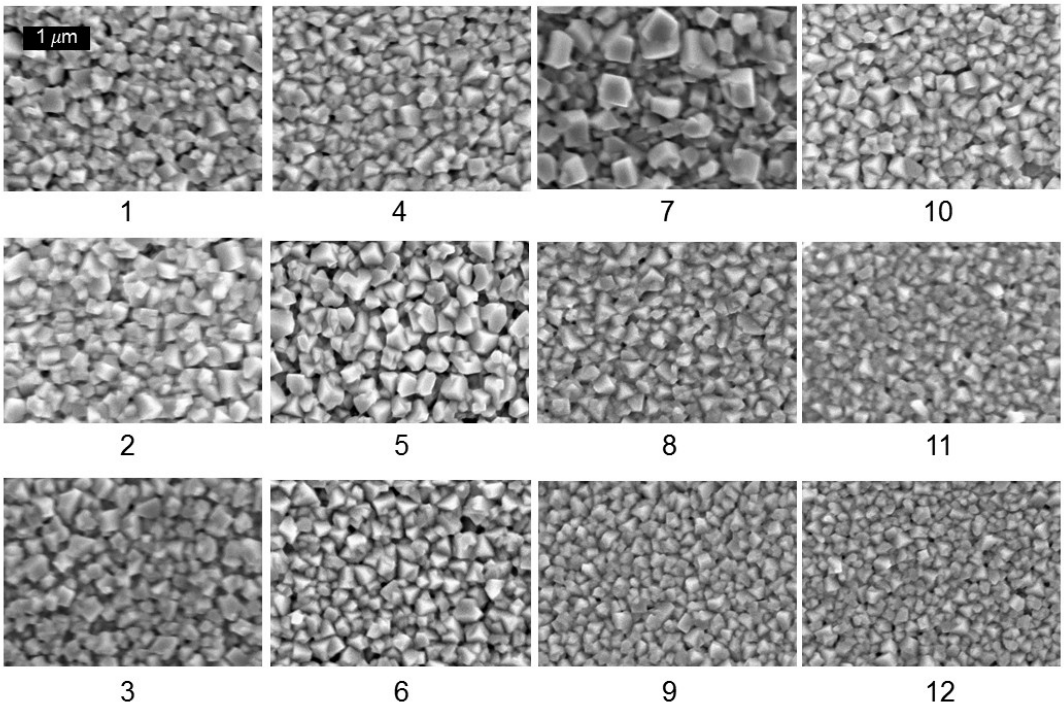

Figure S6 SEM images of perovskite layer under conditions in Table 1

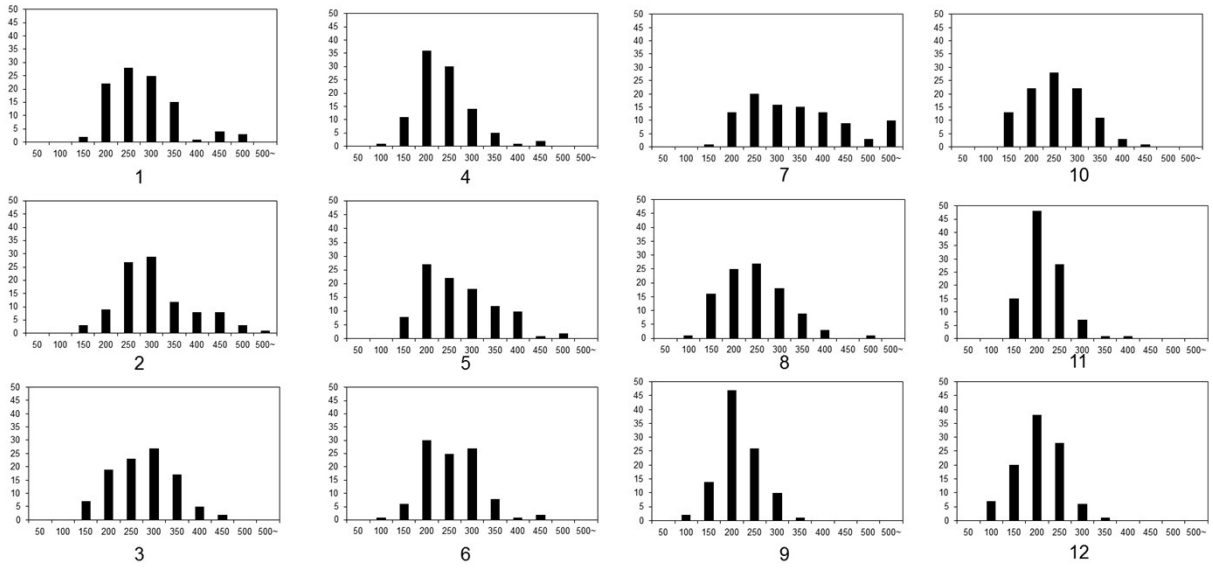

Figure S7 The grain size distribution of perovskite thin film surface

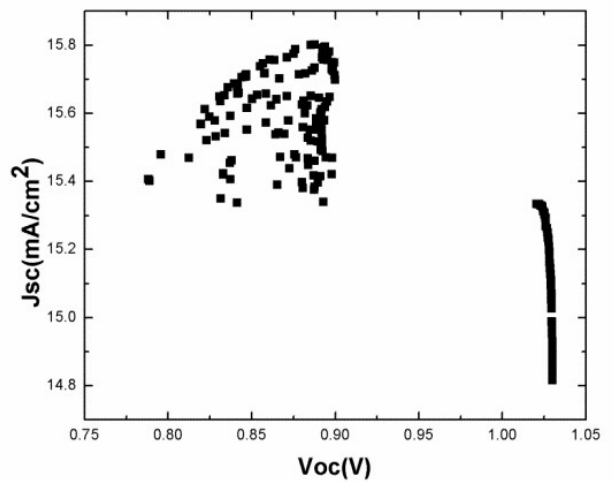

Figure S8 Non-dominated solution of output parameters; V_{oc}, J_{sc}

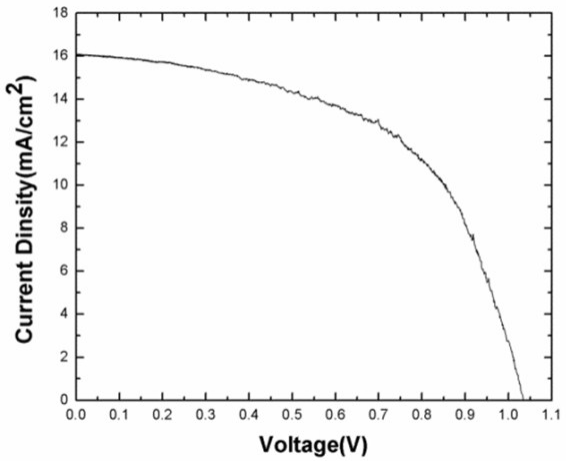

Figure S9 The current-voltage characteristics of the highest performance devices fabricated with optimal condition.

Table S1 show the conversion ratio of PbI_2 to $MAPbI_3$, grain size average and S.D value of perovskite grain when fabricated with difference condition

condition	C_{MAPbI3}	Ave. (μm)	STDEV.
1	0.87	0.25	0.07
2	0.71	0.28	0.08
3	0.65	0.17	0.18
4	0.58	0.21	0.06
5	0.78	0.24	0.08
6	0.62	0.23	0.06
7	0.81	0.32	0.12
8	0.83	0.22	0.07
9	0.68	0.19	0.04
10	0.55	0.23	0.06
11	0.84	0.19	0.04
12	0.83	0.18	0.05

Table S2 the current density-voltage parameters of perovskite solar cell when fabricated with optimal condition

Sample number	V_{oc} (V)	FF	J_{sc} (mA/cm^2)	Eff (%)
1	1.03	0.52	16.56	8.87
2	1.02	0.49	15.99	7.99
3	1.02	0.51	15.05	7.83
4	1.02	0.49	15.58	7.79
5	1.03	0.52	15.35	8.22
6	1.02	0.50	15.14	7.72