Supporting Information for

Management of interfacial energy band alignment in wide-bandgap perovskite solar cells for performance improvement

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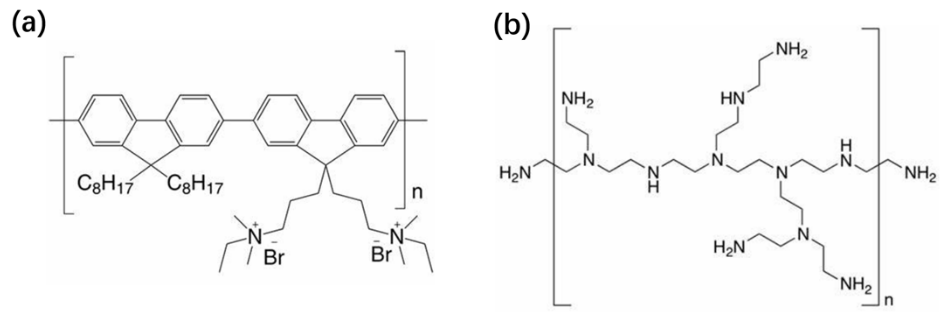

Figure S1. Chemical structures of PFN-Br (a) and PEI (b).

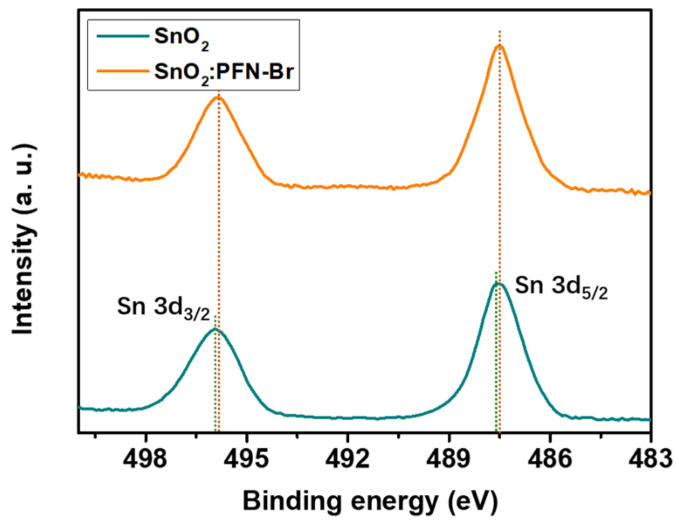

Figure S2. XPS spectra of Sn 3d for pristine SnO_2 and PFN-Br incorporated SnO_2 films.

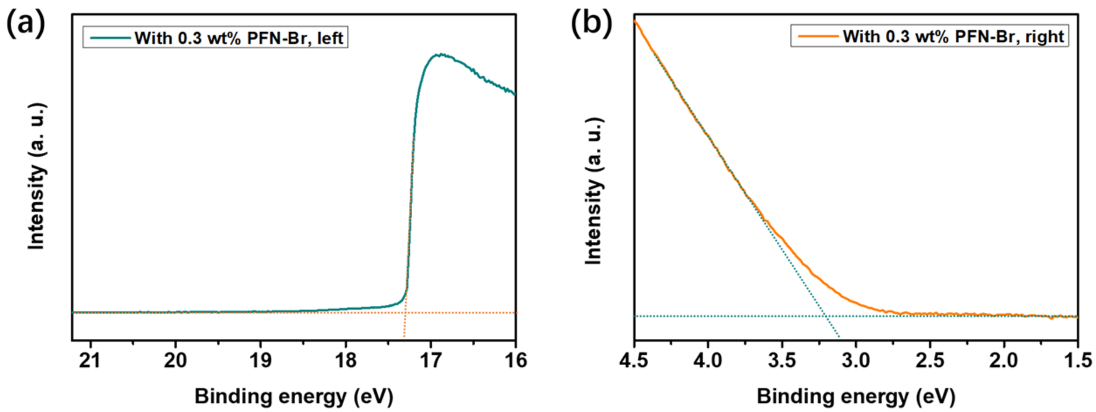

Figure S3. Left (d) and right (e) regions of the UPS spectra for the SnO_2 film with 0.3 wt% PFN-Br.

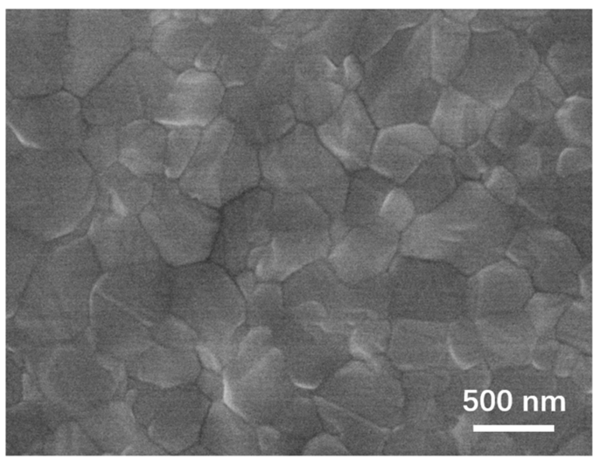

Figure S4. SEM image of the prepared $Cs_{0.15}FA_{0.79}MA_{0.06}Pb(I_{0.7}Br_{0.3})_3$ perovskite film.

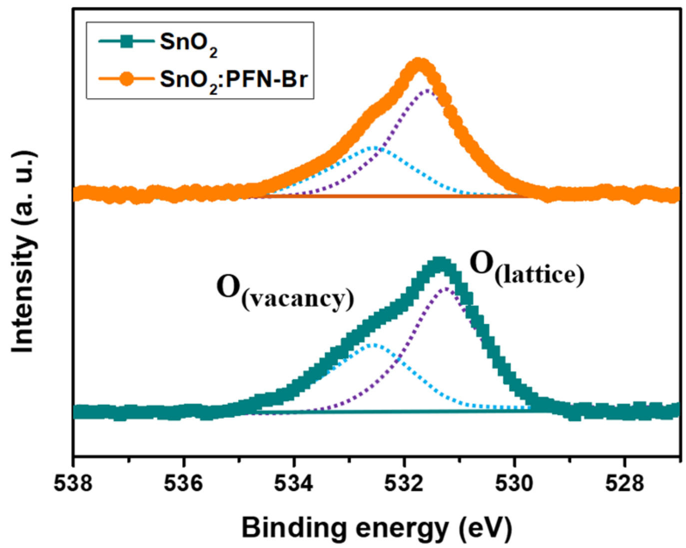

Figure S5. XPS spectra of O 1s orbital for pristine SnO_2 and PFN-Br incorporated SnO_2 films.

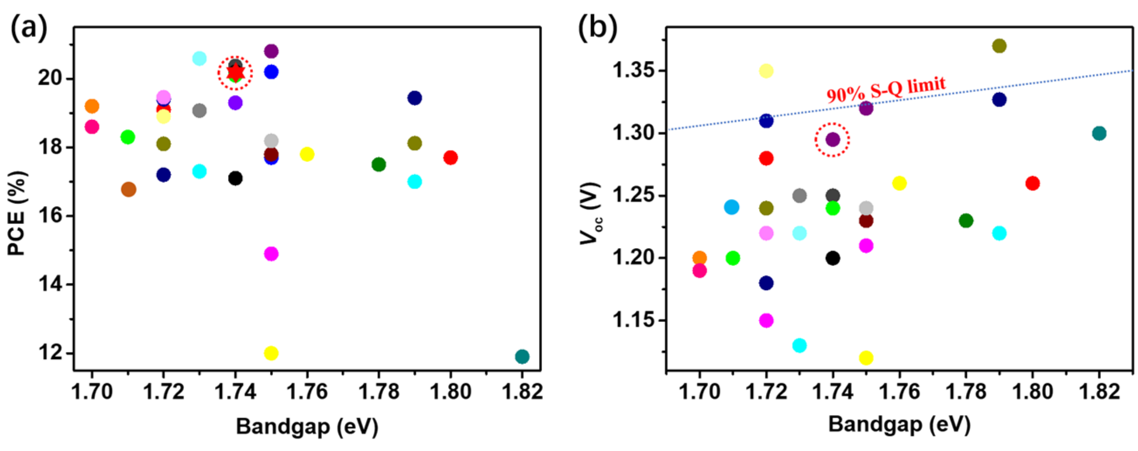

Figure S6. Relationships of (a) PCE and perovskite bandgap; (b) V_{oc} and perovskite bandgap.

Table S1. Device parameters for recently reported wide-bandgap PSCs.

No.	V_{oc} (V)	PCE (%)	Bandgap (eV)	Reference
1	1.20	17.1	1.74	[1]
2	1.28	19.1	1.72	[2]
3	1.20	18.3	1.71	[3]
4	1.23	17.7	1.75	[4]
5	1.13	17.3	1.73	[5]
6	1.15	17.2	1.72	[6]
7	1.12	12.0	1.75	[7]
8	1.24	18.1	1.72	[8]
9	1.18	17.2	1.72	[9]
10	1.28	20.2	1.74	This work
11	1.23	17.8	1.75	[10]
12	1.23	17.5	1.78	[11]
13	1.30	11.9	1.82	[12]
14	1.31	19.4	1.72	[13]
15	1.20	19.2	1.70	[14]
16	1.25	19.3	1.74	[15]
17	1.19	18.6	1.70	[16]
18	1.24	16.74	1.71	[17]
19	1.24	18.19	1.75	[18]
20	1.25	19.07	1.73	[19]
21	1.35	18.9	1.72	[20]
22	1.22	20.59	1.73	[21]
23	1.22	19.46	1.72	[22]
24	1.25	20.37	1.74	[23]
25	1.25	20.2	1.74	[24]
26	1.26	17.7	1.80	[25]
27	1.24	20.1	1.74	[26]
28	1.21	20.2	1.75	[27]
29	1.22	17.0	1.79	[28]
30	1.21	14.9	1.75	[29]
31	1.26	17.8	1.76	[30]
32	1.37	18.12	1.79	[31]
33	1.32	20.8	1.75	[32]
34	1.327	19.44	1.79	[33]

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