

Supporting Information

Improved performance of perovskite solar cells via combining Pb-Sn alloying with passivation effect of SnI₂

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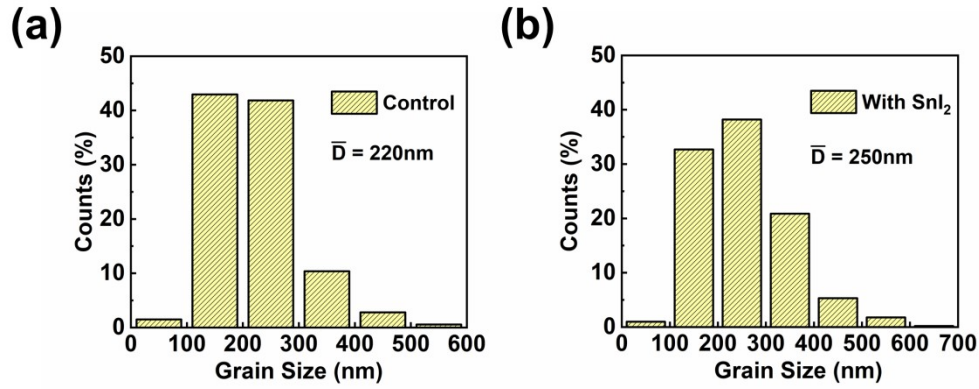


Fig. S1 Statistical graph of perovskite grain size of CsFAMA(Pb) and CsFAMA(Pb-Sn) thin films using ITO/SnO₂ as substrate.

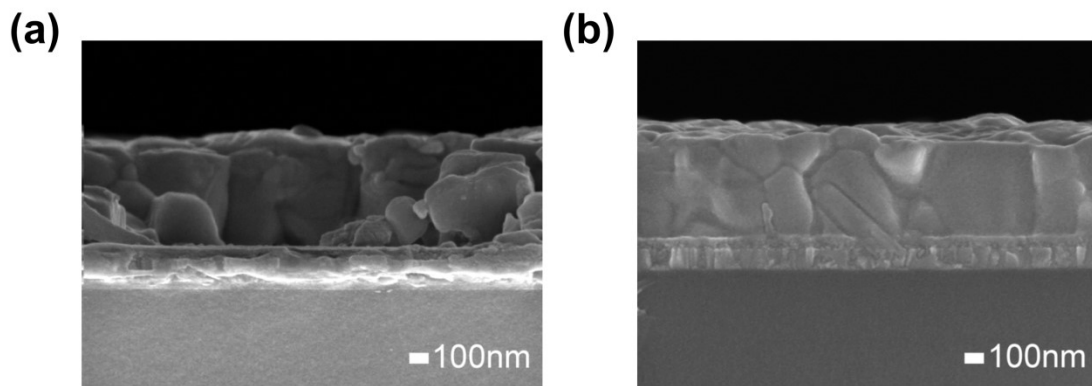


Fig. S2 SEM cross-sectional images of CsFAMA(Pb) and CsFAMA(Pb-Sn) thin films on ITO/SnO₂ substrates.

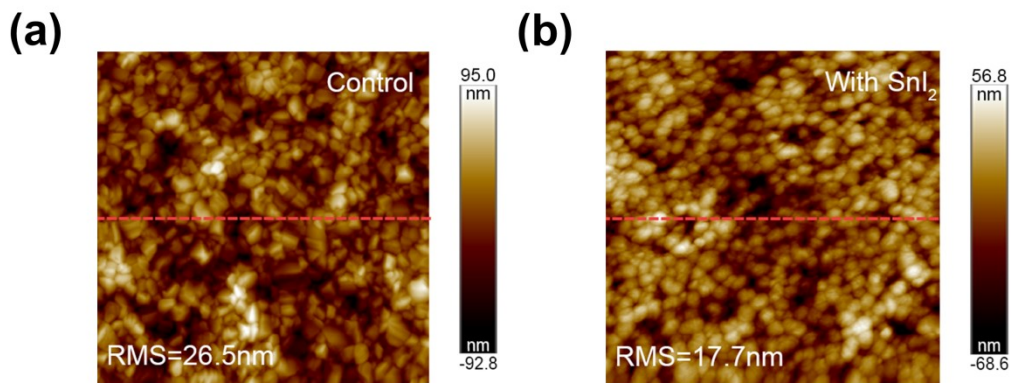


Fig. S3 2D AFM images of (a) pure CsFAMA(Pb) and (b) CsFAMA(Pb-Sn) thin films on ITO/SnO₂ substrates.

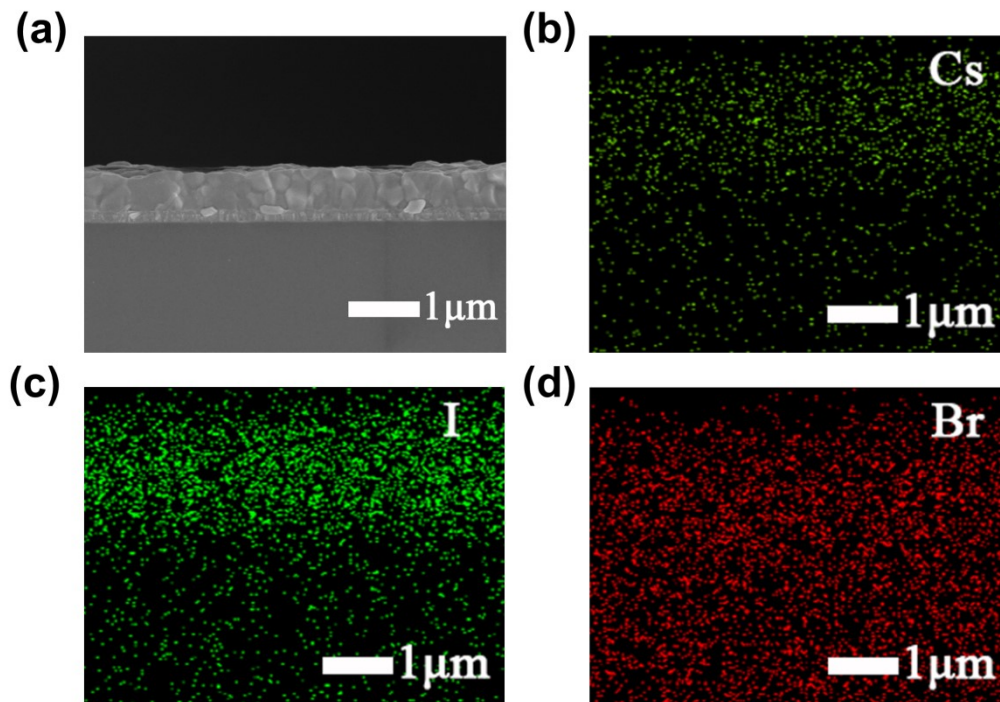


Fig. S4 Cross-sectional SEM image of ITO/SnO₂/CsFAMA(Pb-Sn) film and EDS mapping of (b) Cs, (c) I, (d) Br.

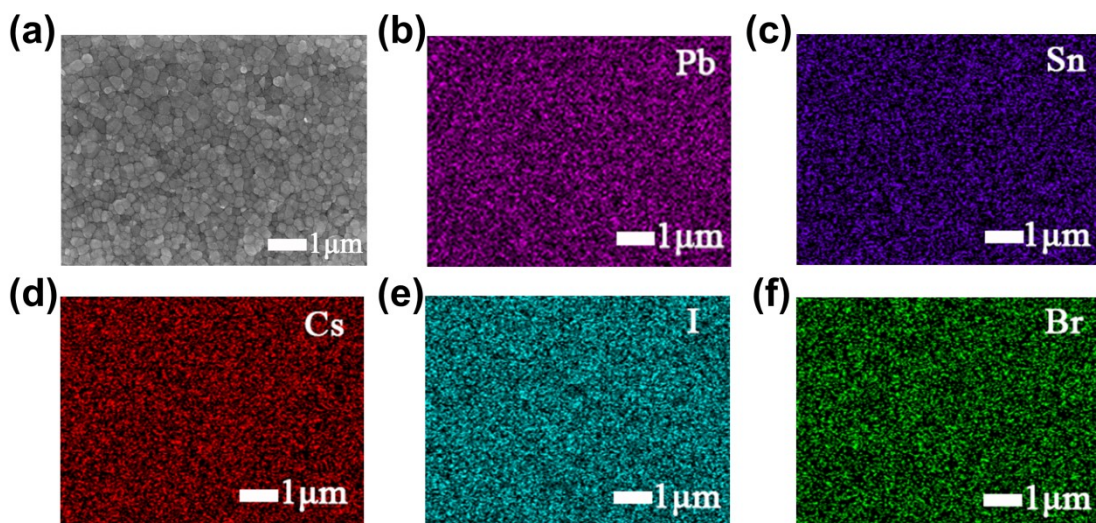


Fig. S5 (a) top-view SEM image of ITO/SnO₂/CsFAMA(Pb-Sn) films for EDS mapping, and EDS mapping of (b) Pb, (c) Sn, (d) Cs, (e) I, and (f) Br.

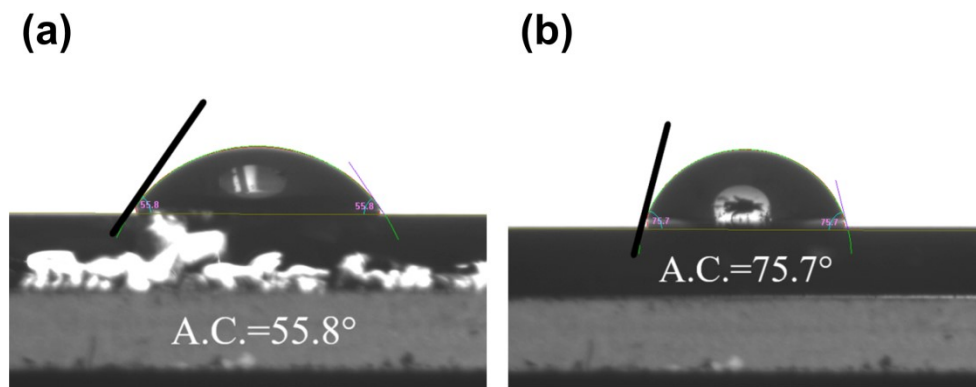


Fig. S6 The water contact angle: (a) ITO/ SnO₂/CsFAMA(Pb) and (b) ITO/SnO₂/CsFAMA(Pb-Sn).

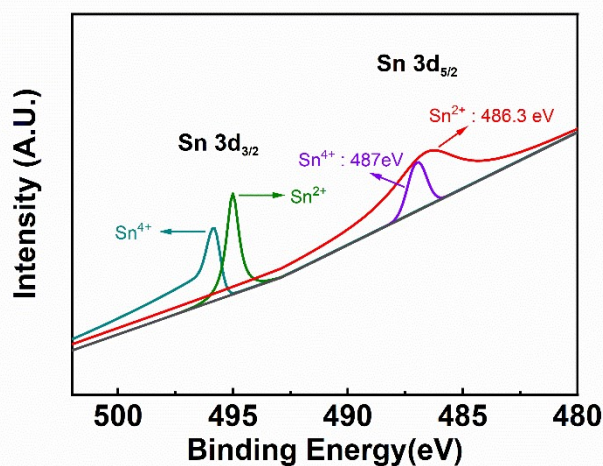


Fig. S7 The X-ray photoelectron spectroscopy (XPS) measurements for the Pb-based perovskite films with treating SnI₂.

Table S1 The change of the main diffraction peaks and the lattice constants for perovskite films with/without SnI₂.

Crystal Face	Peak Position						Lattice parameters		
	(100)	(110)	(111)	(200)	(210)	(211)	a/Å	b/Å	c/Å
Control	14.209	20.109	24.670	28.497	31.935	35.104	6.241	6.241	6.343
With SnI ₂	14.179	20.079	24.614	28.467	31.904	35.048	6.251	6.251	6.345