

## Electronic Supplementary Information

### Fabrication of Single Phase CsPbBr<sub>3</sub> Films via In-situ Metal Reaction

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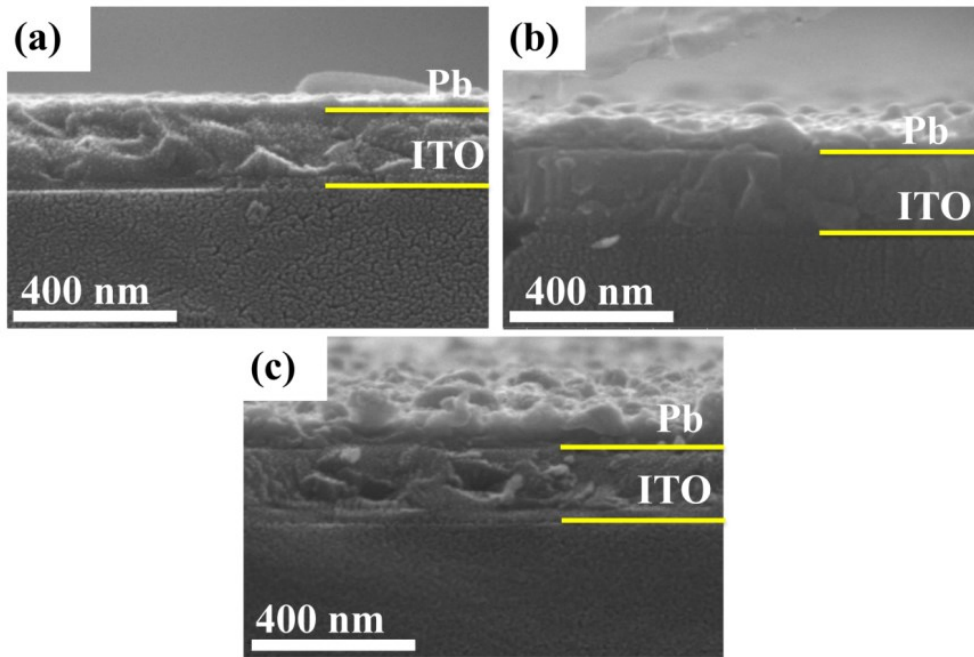


Fig. S1.(a), (b) and (c) indicate the sputtering of 20 nm Pb, 40 nm Pb and 60 nm Pb layers on ITO respectively (the true thickness is about  $\sim 21.05$  nm,  $\sim 44.48$  nm,  $\sim 64.10$  nm respectively).

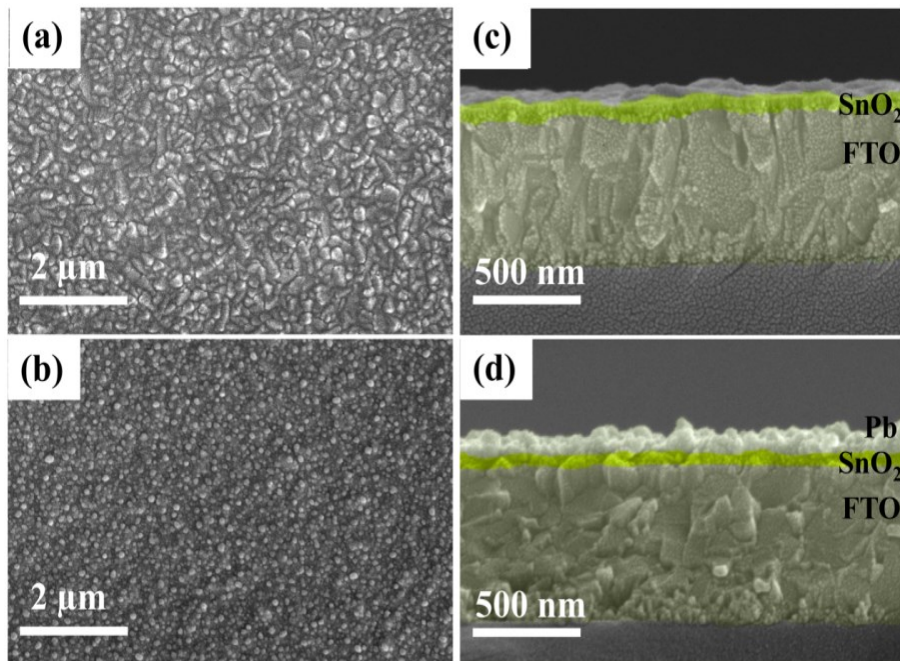


Fig.S2.,Surface SEM images (a) (b) and cross section SEM images (c) (d) of FTO / SnO<sub>2</sub> and FTO / SnO<sub>2</sub> / Pb substrate, respectively.

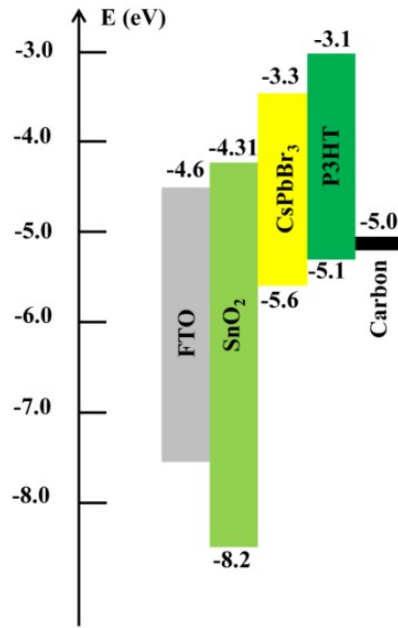


Fig. S3 The energy level diagram of FTO / SnO<sub>2</sub> /CsPbBr<sub>3</sub> / P3HT / Carbon PSCs. The results show that the energy levels of each structure match.

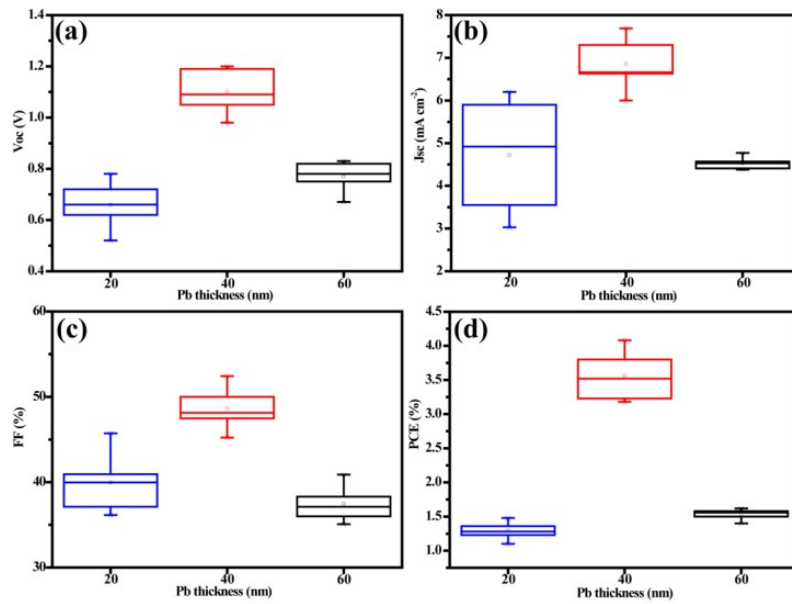


Fig. S4 The reproducibility of V<sub>oc</sub>, J<sub>sc</sub>, FF and PCE parameter values of diverse Pb thickness. The error bar represents the standard deviation from at least 15 experimental trials.