

## Supplementary Materials

# Fabrication of Porous Lead Bromide Films by Introducing Indium Tribromide for Efficient Inorganic CsPbBr<sub>3</sub> Perovskite Solar Cells

Xianwei Meng <sup>1</sup>, Kailin Chi <sup>2,\*</sup>, Qian Li <sup>3</sup>, Bingtao Feng <sup>1</sup>, Haodi Wang <sup>4</sup>, Tianjiao Gao <sup>4</sup>, Pengyu Zhou <sup>2</sup>, Haibin Yang <sup>1</sup> and Wuyou Fu <sup>1,\*</sup>

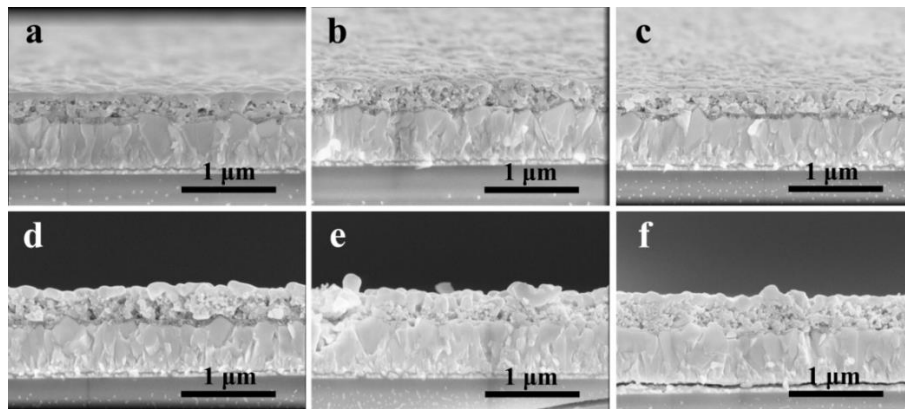
<sup>1</sup> State Key Laboratory of Superhard Materials, College of Physics, Jilin University, Changchun 130012, China; xwmeng17@mails.jlu.edu.cn (X.M.); fengbt20@mails.jlu.edu.cn (B.F.); yanghb@jlu.edu.cn (H.Y.)

<sup>2</sup> School of Science, Northeast Electric Power University, Jilin 132012, China; 20162715@neepu.edu.cn

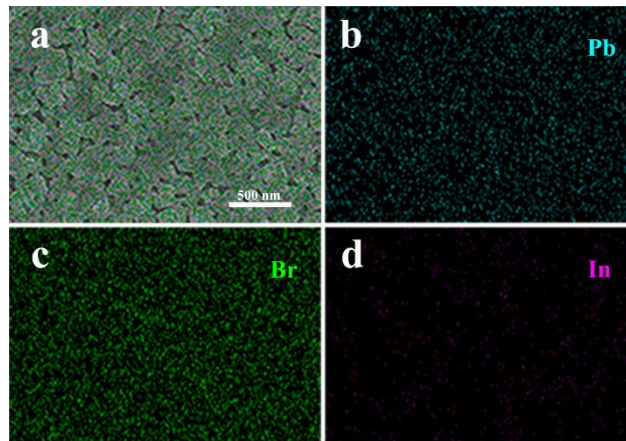
<sup>3</sup> Beijing Key Lab of Cryo-Biomedical Engineering and Key Lab of Cryogenics, Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, Beijing 100190, China; liqian@mail.ipc.ac.cn

<sup>4</sup> College of Physics, Jilin University, Changchun 130012, China; hdwang20@mails.jlu.edu.cn (H.W.); gaotj19@mails.jlu.edu.cn (T.G.)

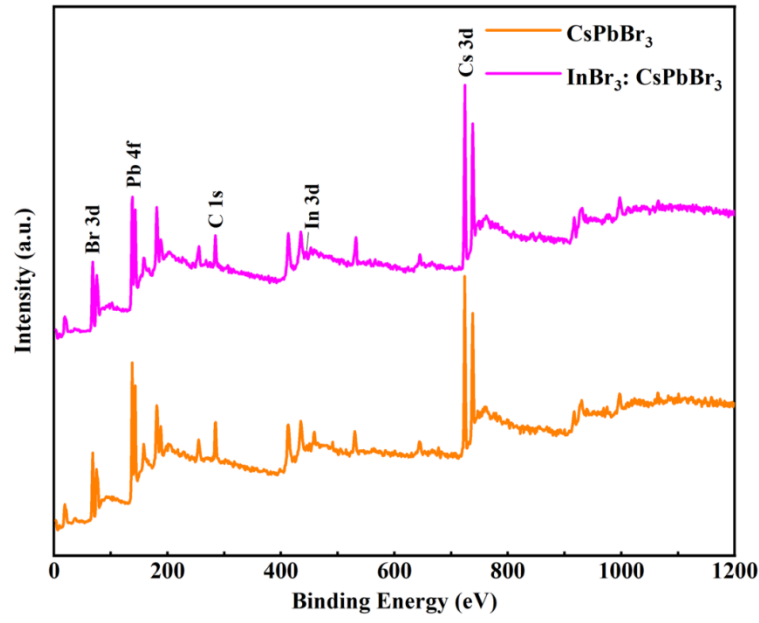
\* Corresponding; kailinchi@neepu.edu.cn (K.C.); fuwy@jlu.edu.cn (W.F.); Tel./Fax: +86-0432-64806674 (K.C.); +86-431-8516-8763-801 (W.F.)



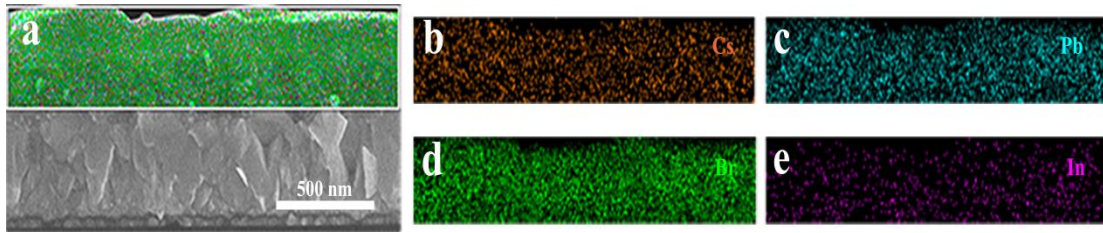
**Figure S1.** Cross-sectional SEM images of PbBr<sub>2</sub> films by introducing different concentrations of InBr<sub>3</sub>: (a) 0.00 M; (b) 0.03 M; (c) 0.09 M; (d) 0.15 M; (e) 0.21 M; (f) 0.27 M.



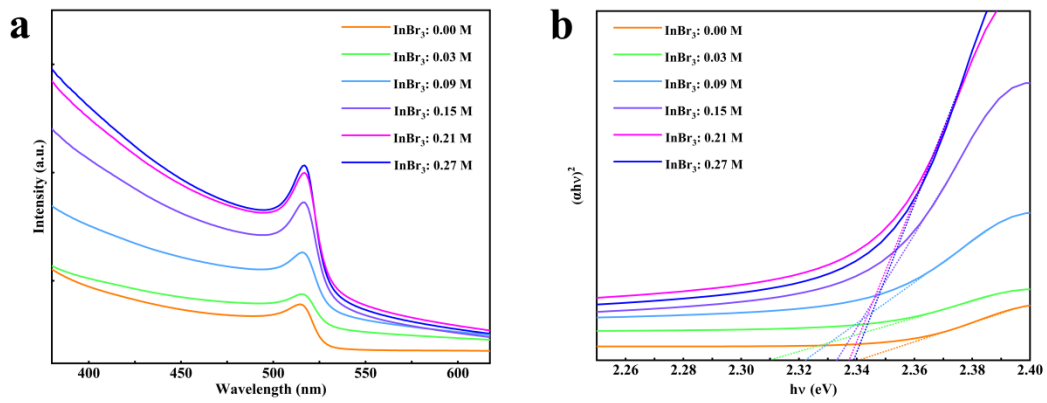
**Figure S2.** The SEM image of InBr<sub>3</sub>:PbBr<sub>2</sub> film (a) and the corresponding EDS mapping of Pb (b), Br (c) and In (d).



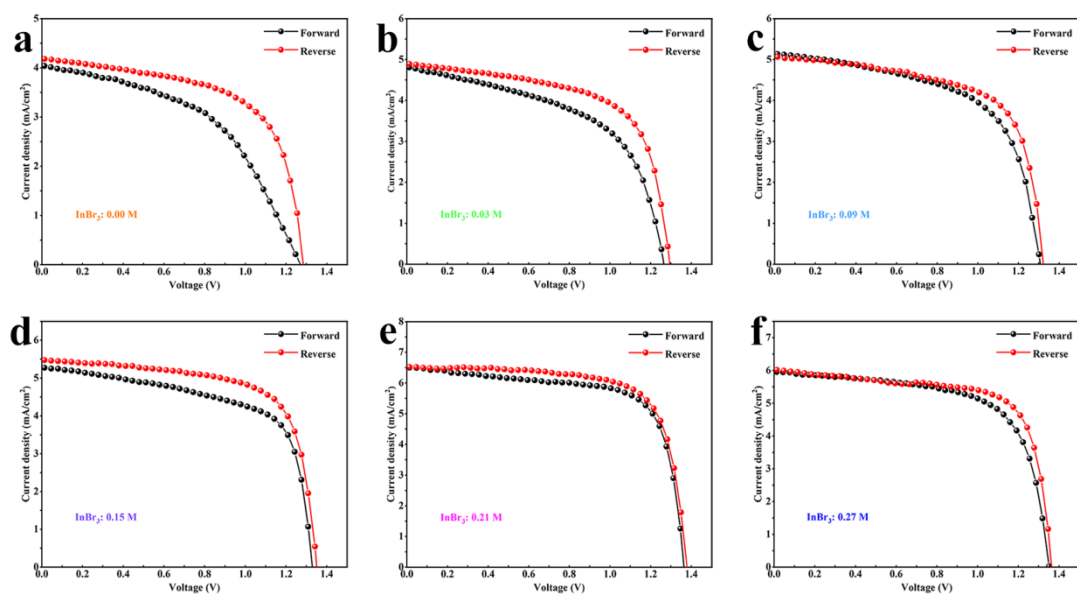
**Figure S3.** XPS spectra of InBr<sub>3</sub>:CsPbBr<sub>3</sub> film.



**Figure S4.** The cross-sectional SEM image of InBr<sub>3</sub>:CsPbBr<sub>3</sub> film (a) and the corresponding EDS mapping of Cs (b), Pb (c), Br (d) and In (e).



**Figure S5.** UV-vis absorption spectra (a) and  $(\alpha h\nu)^2$  vs.  $h\nu$  plots (b) of the modules by introducing different concentrations of InBr<sub>3</sub>.



**Figure S6.**  $J$ - $V$  curves with forward and reverse voltage scanning for the  $\text{InBr}_3\text{:CsPbBr}_3$  devices: (a) 0.00 M; (b) 0.03 M; (c) 0.09 M; (d) 0.15 M; (e) 0.21 M; (f) 0.27 M.

**Table S1.** Electrochemical Impedance Spectroscopy parameters of the pristine and  $\text{InBr}_3$  (0.21 M): $\text{CsPbBr}_3$  modules.

Samples	$R_s$ ( $\Omega$ )	$R_{\text{rec}}$ ( $\Omega$ )	CPE-T (F)	CPE-P (F)
$\text{CsPbBr}_3$	22.72	765.20	$8.95 \times 10^{-9}$	0.96
$\text{InBr}_3$ (0.21 M): $\text{CsPbBr}_3$	20.26	1152.30	$6.80 \times 10^{-9}$	0.98