

Controlled Growth of Porous InBr_3 : PbBr_2 Film for Preparation of CsPbBr_3 in Carbon-Based Planar Perovskite Solar Cells

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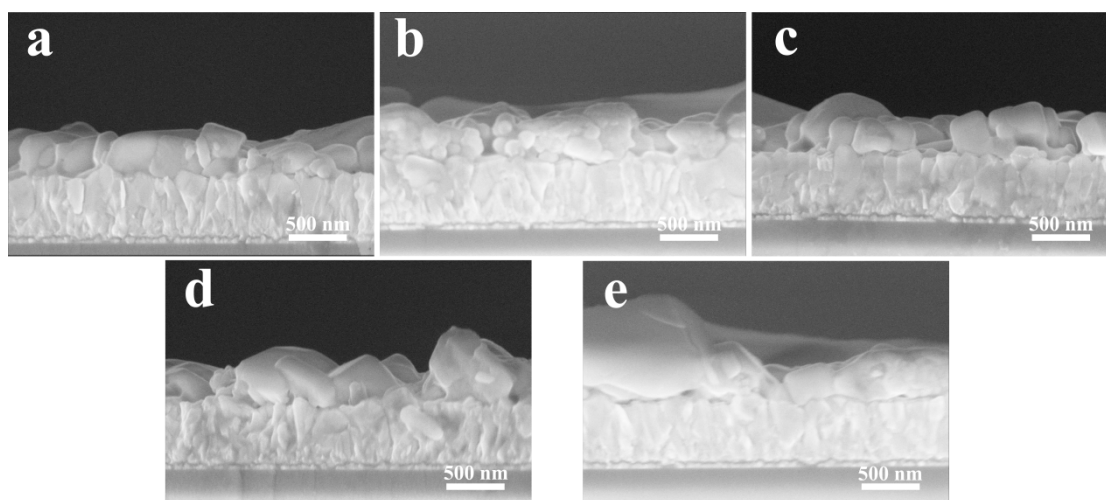


Figure S1. Cross-sectional SEM images of PbBr_2 films synthesized with different PbBr_2 concentration: (a) 1.0 M w/ InBr_3 ; (b) 1.1 M w/ InBr_3 ; (c) 1.2 M w/ InBr_3 ; (d) 1.3 M w/ InBr_3 ; (e) 1.4 M w/ InBr_3 .

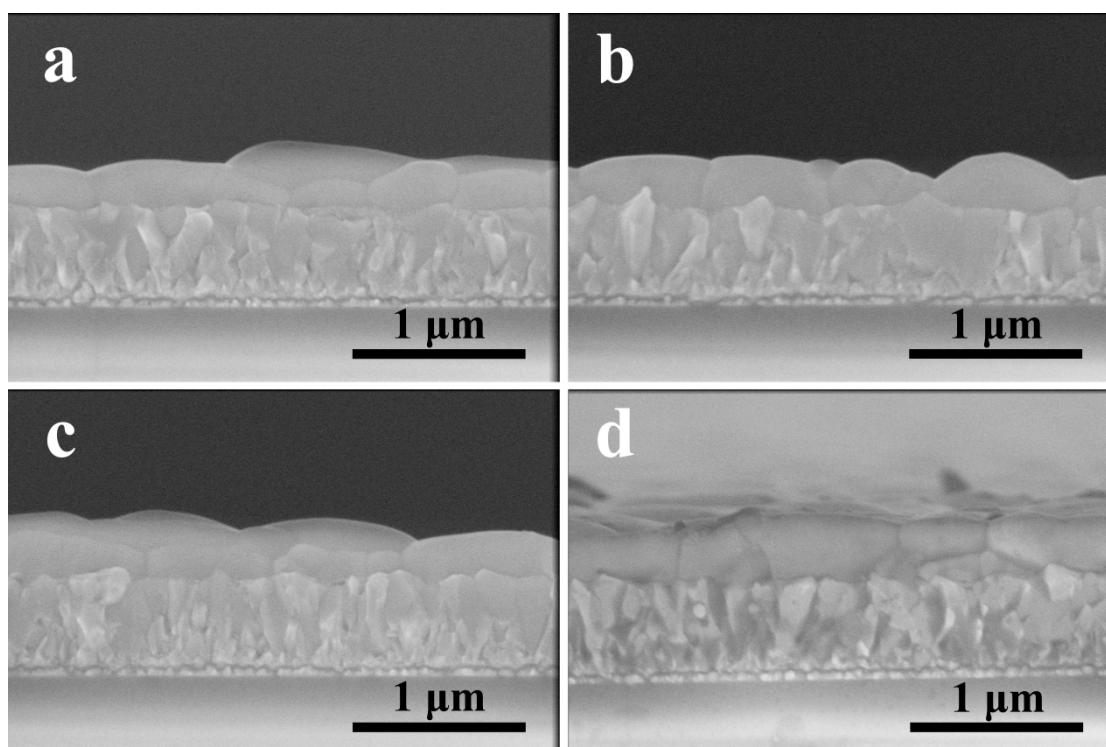


Figure S2. Cross-sectional SEM images of CsPbBr_3 films synthesized with different PbBr_2 concentration: (a) 1.1 M w/o InBr_3 ; (b) 1.2 M w/o InBr_3 ; (c) 1.3 M w/o InBr_3 ; (d) 1.4 M w/o InBr_3 .

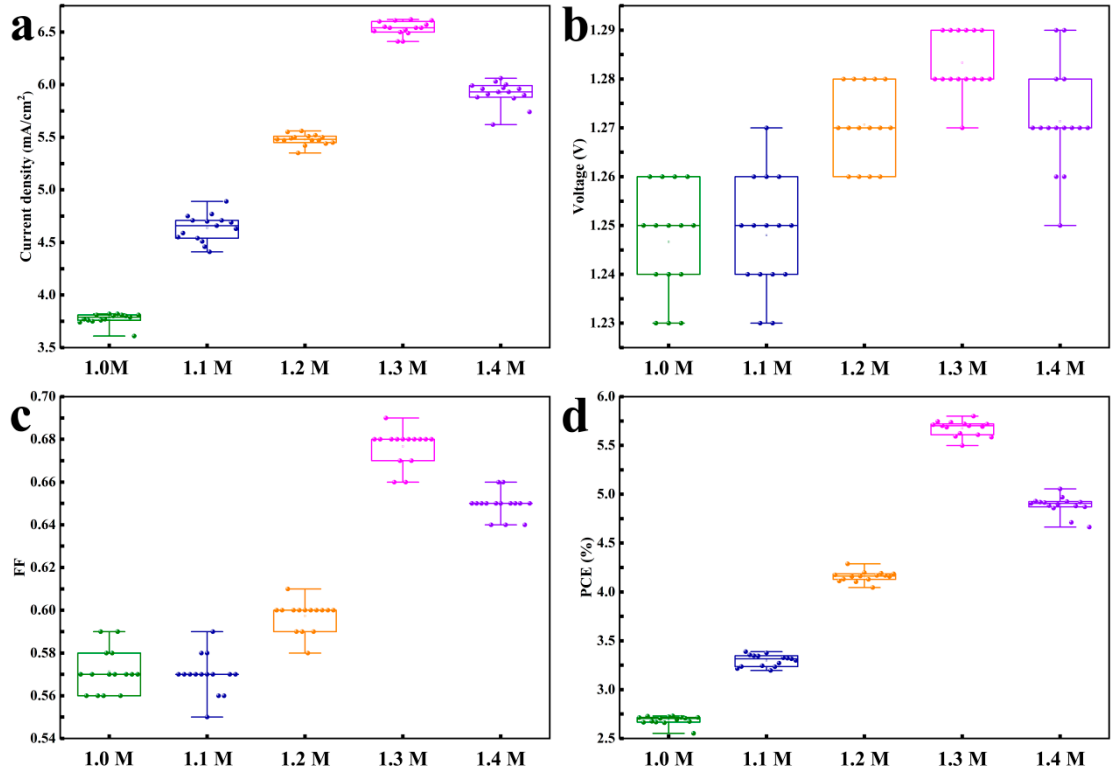


Figure S3. The schematic diagram of of 15 CsPbBr₃ PSCs synthesized with different PbBr₂ concentration: (a) J_{sc}, (b) V_{oc}, (c) FF and (e) PCE.

Table S1. The average photovoltaic parameters of 15 CsPbBr₃ PSCs synthesized with different PbBr₂ concentration.

| PbBr ₂ concentration | | J _{sc} (mA/cm ²) | V _{oc} (V) | FF | PCE(%) |
|---------------------------------|----------------------|---------------------------------------|---------------------|-------------|-------------|
| 1.0 M | w/ InBr ₃ | 3.77 ± 0.16 | 1.25 ± 0.02 | 0.57 ± 0.02 | 2.68 ± 0.14 |
| 1.1 M | w/ InBr ₃ | 4.64 ± 0.18 | 1.25 ± 0.02 | 0.57 ± 0.02 | 3.30 ± 0.13 |
| 1.2 M | w/ InBr ₃ | 5.48 ± 0.10 | 1.27 ± 0.01 | 0.60 ± 0.01 | 4.16 ± 0.13 |
| 1.3 M | w/ InBr ₃ | 6.54 ± 0.13 | 1.28 ± 0.01 | 0.68 ± 0.01 | 5.68 ± 0.18 |
| 1.4 M | w/ InBr ₃ | 5.92 ± 0.14 | 1.27 ± 0.02 | 0.68 ± 0.01 | 4.88 ± 0.12 |

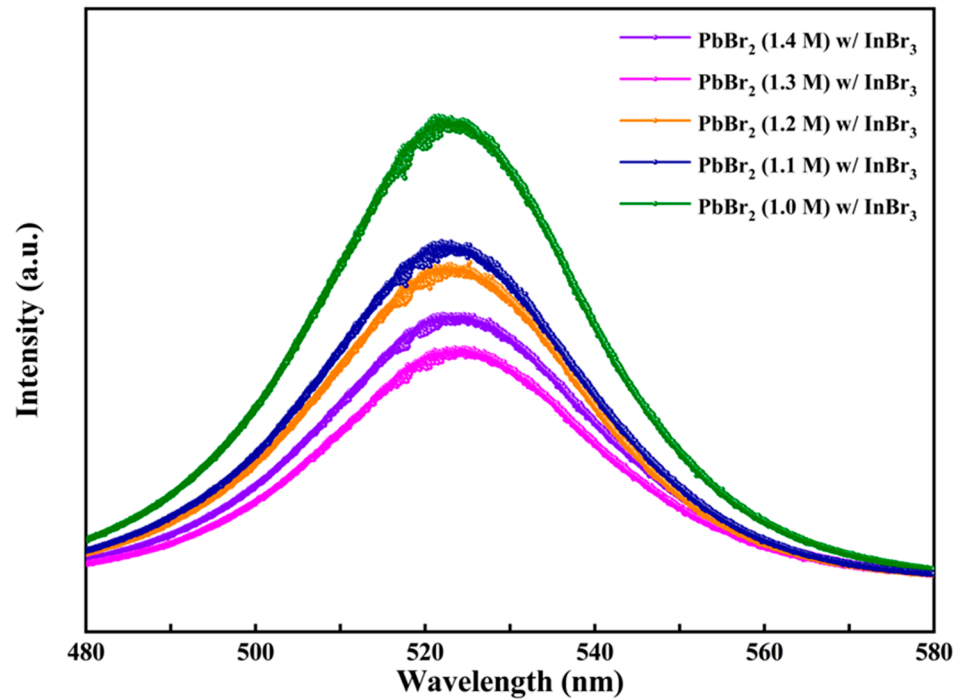


Figure S4. PL spectra of the InBr₃:CsPbBr₃ synthesized with different PbBr₂ concentration.

Table S2. The fitted data of TRPL characterization.

| CsPbBr₃ | τ_1 (ns) | A₁ (%) | τ_2 (ns) | A₂ (%) | τ_{ave} (ns) |
|---------------------------------------|---------------------------------|--------------------------|---------------------------------|--------------------------|-------------------------------------|
| 1.3 M w/ InBr₃ | 1.35 | 53.2 | 3.06 | 46.8 | 2.49 |
| 1.3 M w/o InBr₃ | 2.65 | 73.1 | 5.61 | 26.9 | 3.95 |