

Supporting information

Undesirable Role of Remnant PbI_2 Layer On Low Temperature

Processed Planar Perovskite Solar Cells

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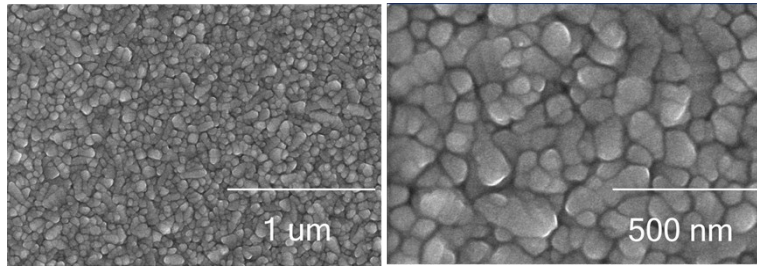


Fig. S1 Scanning electron microscope (SEM) image of c-TiO₂ via anodic oxidation;

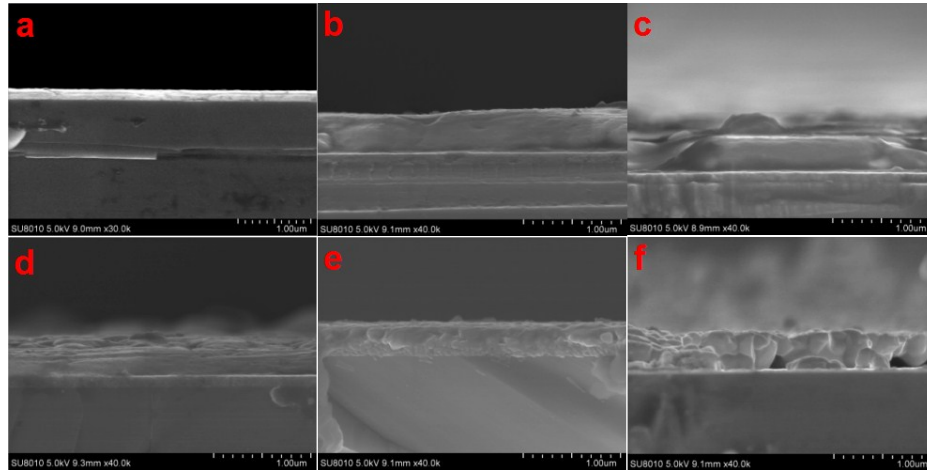


Fig. S2 Cross section SEM images. (a) PbI₂ film fabricated by spinning PbI₂ DMF precursor solution (40 wt%); And CH₃NH₃PbI₃ films fabricated by CSD with various dipping time. (b) 1 min; (c) 3 min; (d) 5 min; (e) 7 min; (f) 9 min.

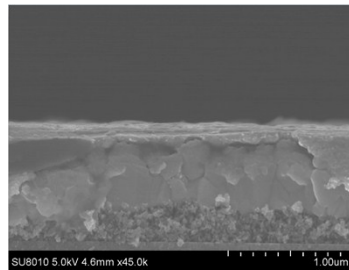


Fig. S3 Cross section SEM image of CH₃NH₃PbI₃ fabricated by CSD method on mesoporous TiO₂ substrate with only 5 min dipping time.

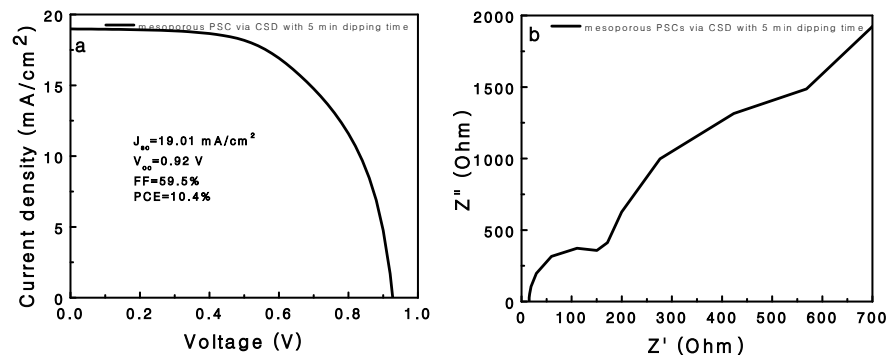


Fig. S4 (a) J-V curve performance for mesoporous PSCs via CSD without encapsulation by 5 min dipping the CH₃NH₃I IPA solution; (b) corresponding Nyquist plots.

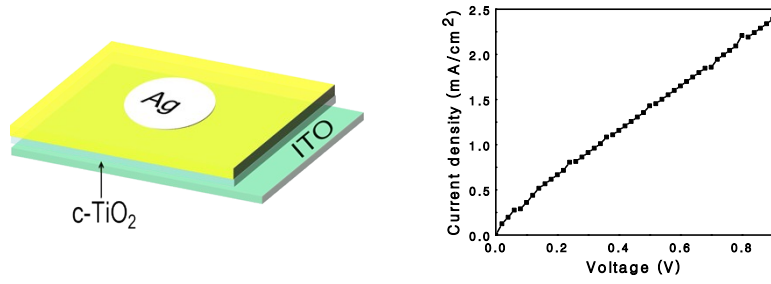


Fig. S5 Device structure replacing $\text{CH}_3\text{NH}_3\text{PbI}_3$ with PbI_2 film and corresponding J-V curves performance .

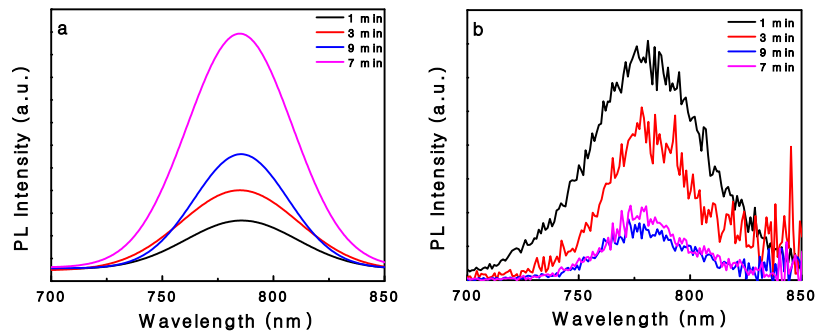


Fig. S6 (a) steady-state photoluminescence (PL) for the pure $\text{CH}_3\text{NH}_3\text{PbI}_3$ on glasses via CSD with different dipping time; (b) corresponding PL measurement when $\text{CH}_3\text{NH}_3\text{PbI}_3$ contacted with c-TiO_2 .

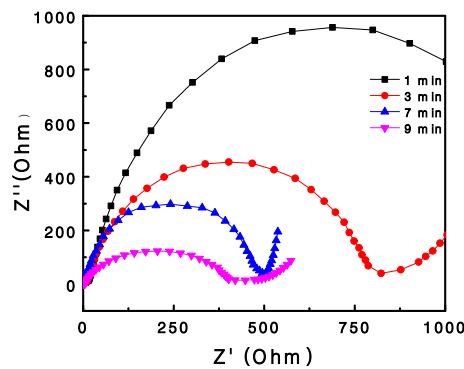


Fig. S7 Nyquist plots at $V=1.0$ v for planar PSCs based on CSD method with different dipping time.

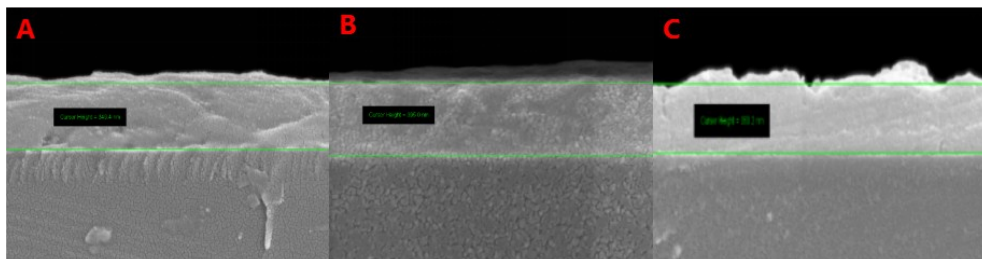


Fig. S8 SEM cross section images for $\text{CH}_3\text{NH}_3\text{PbI}_3$ films with different dipping time. (a) 3 min; (b) 5 min; (c) 7min.

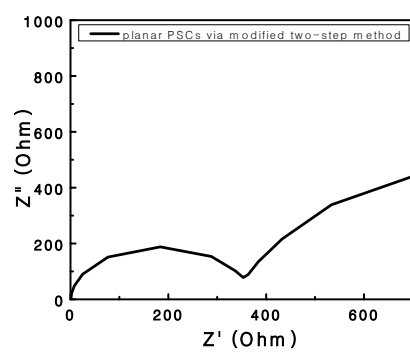


Fig. S9 Nyquist plot at $V=1.0$ v for planar PSCs based on modified two-step method.

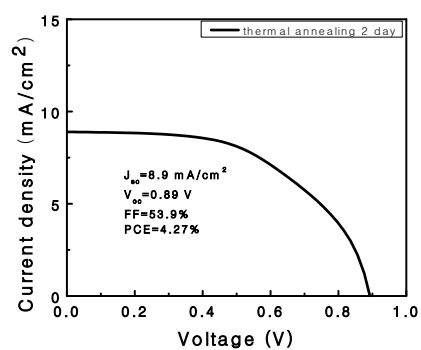


Fig. S10 J-V curve performance for planar PSCs fabricated by modified two-step method with thermal annealing reaching 2 day.