Electronic Supplementary Material (ESI) for RSC Advances.


**Supporting Information**

# Highly Reproducible Perovskite Solar Cells with Excellent $CH_3NH_3PbI_{3-x}Cl_x$ Films Morphology Fabricated via High Precursor Concentration

*Dong Liu,* [a] *Cai Liu,* *[a] *Lili Wu,* [a] *Wei Li,* [a] *Fang Chen,* [a] *Bangqing Xiao,* [a] *Jingquan Zhang,* *[a] *Lianghuan Feng*[a]

[a]Institute of Solar Energy Materials and Devices, College of Materials Science and Engineering, Sichuan University, Chengdu, China, 610064.

**Corresponding Authors**

*Tel & Fax: +86 (0)28 85412542

*E-mail: liucaicn@foxmail.com

*E-mail: zhangjq@scu.edu.cn

| concentration | Thickness |
|---|---|
| 40wt% | 287 nm |
| 45wt% | 311 nm |
| 50wt% | 335 nm |

**Table S1**. The thickness of the corresponding perovskite layers prepared with different precursor solution concentration.

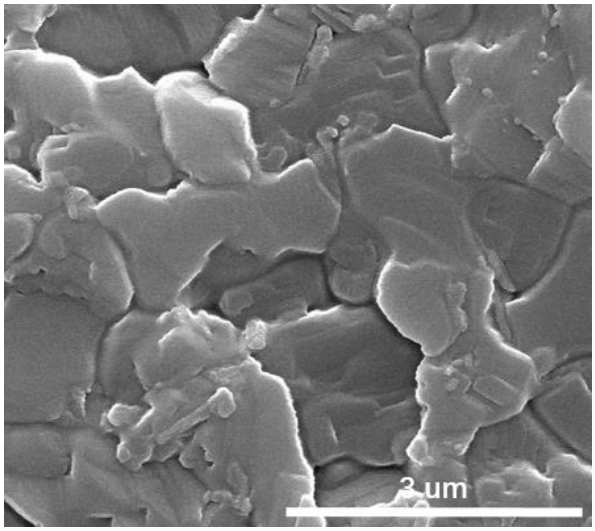


**Fig. S2** SEM images of the $CH_3NH_3PbI_{3-x}Cl_x$ perovskite films prepared with 55 wt% concentration.

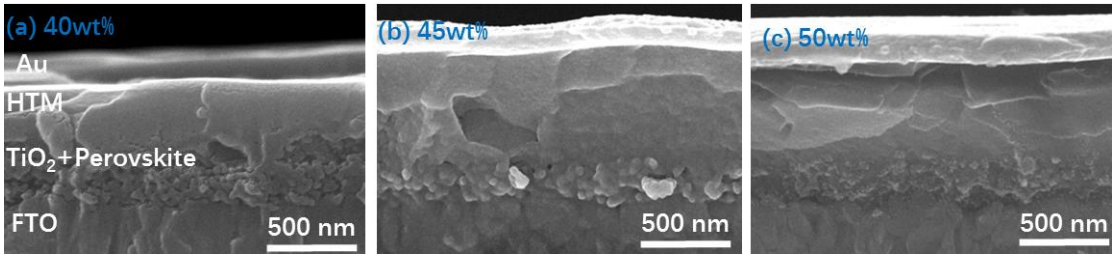


**Fig. S3** The cross-sectional SEM images of the devices consisting of FTO/bl-$TiO_2$/mp-$TiO_2$/perovskite/HTM/Au.

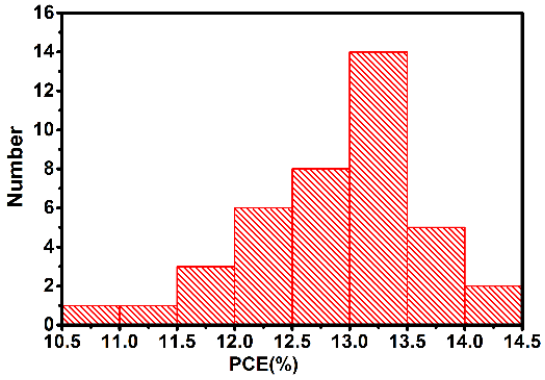

**Fig. S4** Histograms of device efficiency for 40 cells.

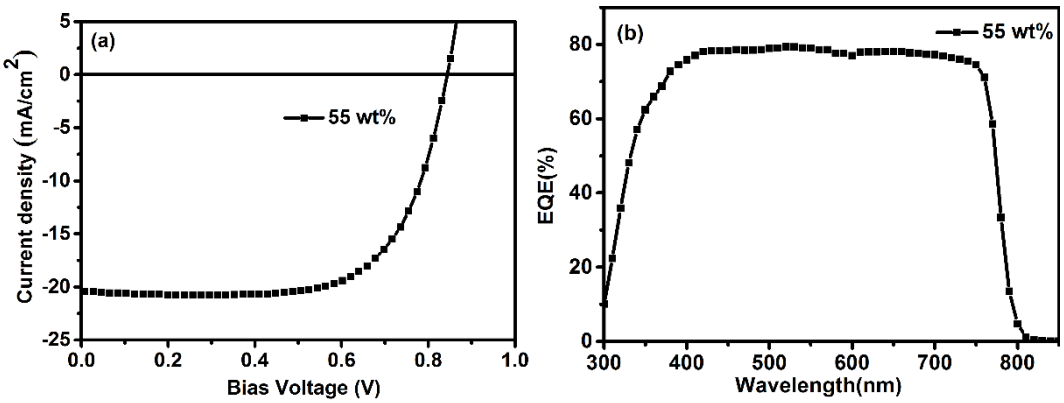


**Fig. S5** (a)J−V curve and (b) EQE spectra of the device fabricated with 55wt% concentration measured under AM1.5 simulated sun light.