Supporting information

Intrinsic Charge Carrier Dynamics and Device Stability of Perovskite/ZnO Mesostructured Solar Cells in moisture

Yan Lei, Longyan Gu, Weiwei He, Zuxiao Jia, Xiaogang Yang, Huimin Jia, and Zhi Zheng*

Key Laboratory of Micro-Nano Materials for Energy Storage and Conversion of Henan Province and Institute of Surface Micro and Nano Materials, Xuchang University, Henan 461000, China
Email: zzheng@xcu.edu.cn

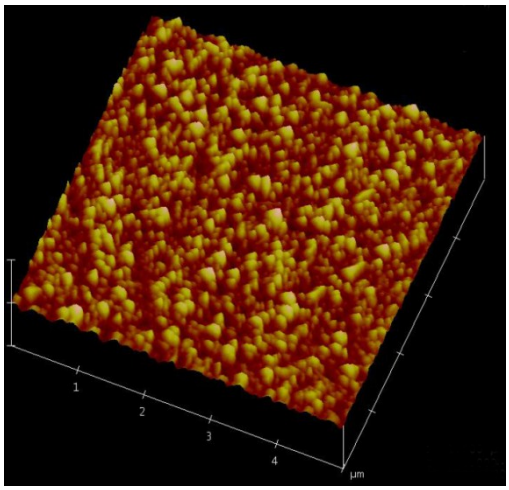

Figure S1. AFM images of the ZnO dense thin films (converted from 30nm Zn thin film).

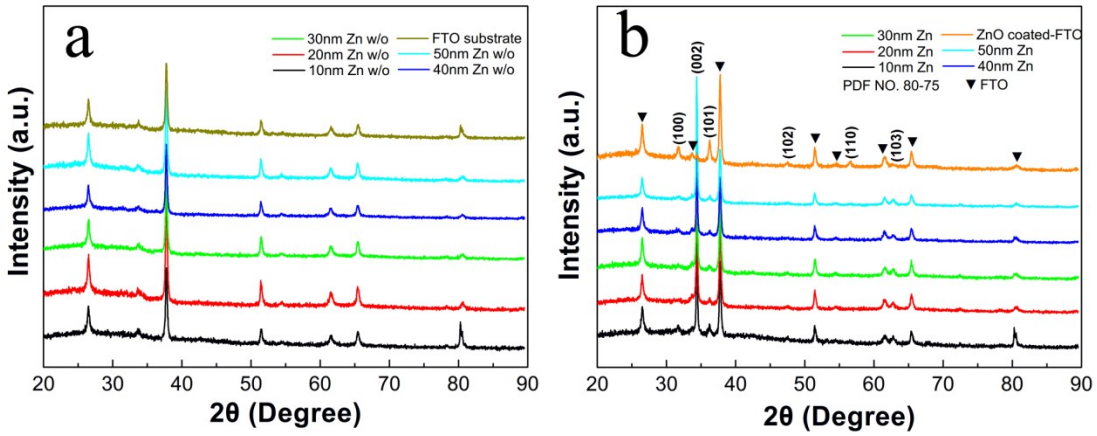

Figure S2. XRD patterns of the ZnO dense thin film (a) and the ZnO dense/porous thin film on the FTO substrate (b). (w/o means that the ZnO dense layer without ZnO nano-array)

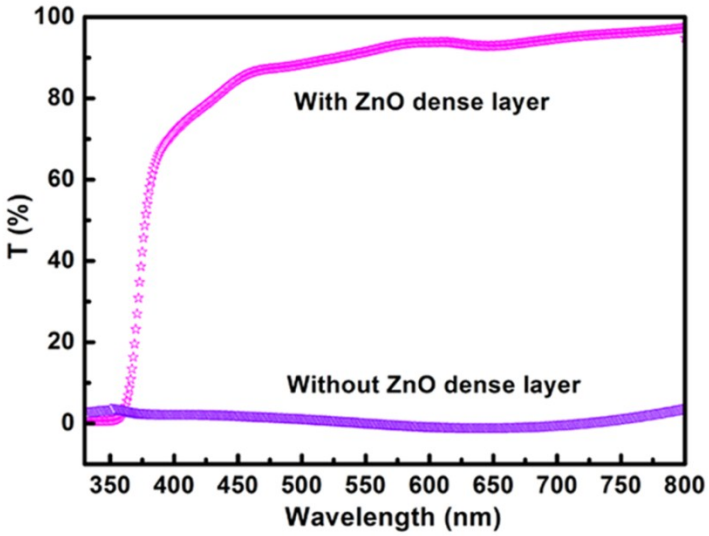

Figure S3. Transmittance of the porous ZnO thin film with and without the dense ZnO layer

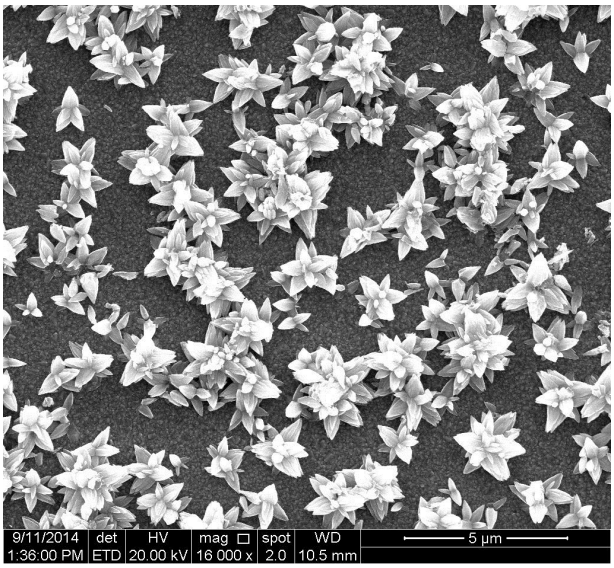

Figure S4. SEM image of the porous ZnO thin film grew on the FTO substrate without ZnO dense layer.

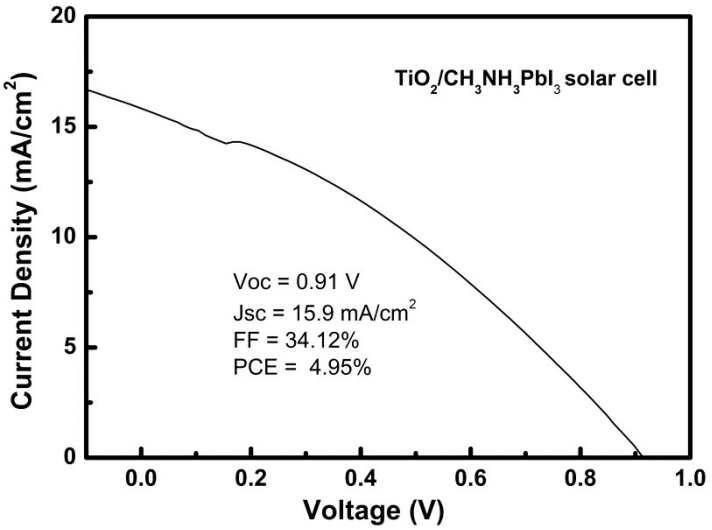

Figure S5. I-V curve of TiO_2/ $CH_3NH_3PbI_3$ solar cell device (under AM 1.5G 100mW/ cm^2 simulated sun light).

Table S1. Parameters of thin films measured with 355 nm laser.

	T_t (s)	T_r (s)	L
$CH_3NH_3PbI_3$	7.5×10^{-8}	4.0×10^{-4}	1.4×10^{-4}
PbI_2	7.3×10^{-6}	4.0×10^{-4}	1.38×10^{-2}

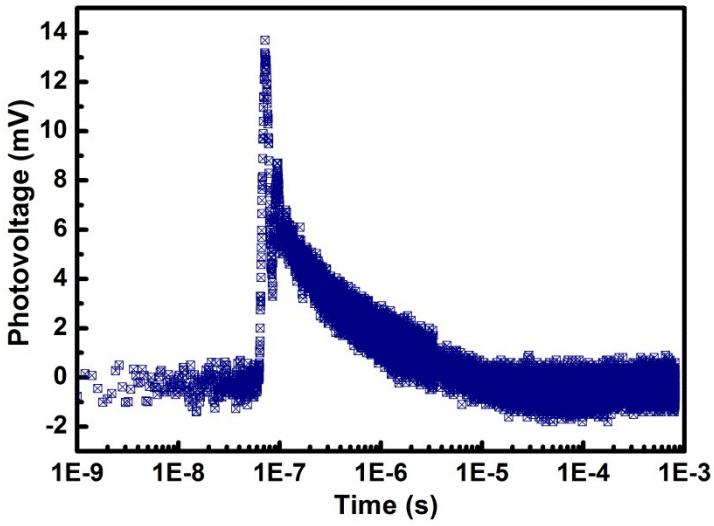

Figure S6. TPV curve of the porous ZnO nano-array thin film.

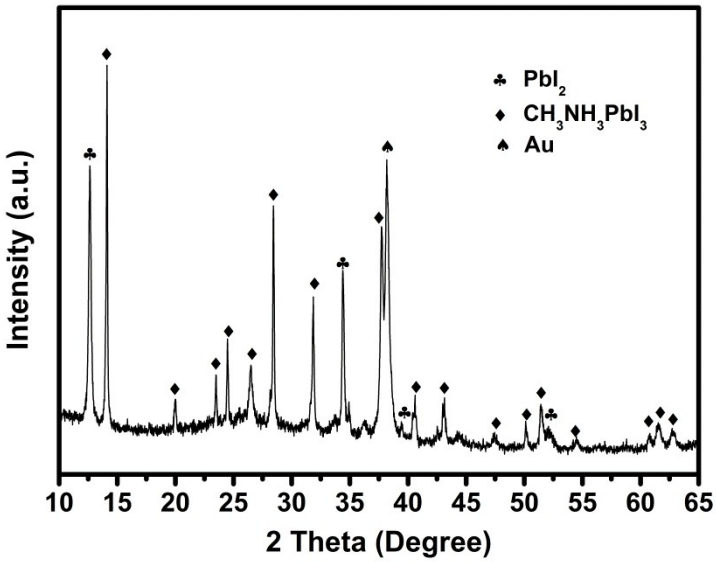

Figure S7. XRD pattern of fresh $CH_3NH_3PbI_3$/ ZnO solar cell device.