Electronic Supplementary Material (ESI) for Nanoscale.

Supplementary Information

Controlled growth of vertically aligned ultrathin In_2S_3 nanosheet arrays for photoelectrochemical water splitting

Ming Li,[a,b] Xinglong Tu,[a,c] Yanjie Su,[a*] Jing Lu,[c] Jing Hu,[a] Baofang Cai,[a] Zhihua Zhou,[a] Zhi Yang[a] and Yafei Zhang[a*]

[a] *Key Laboratory for Thin Film and Microfabrication of the Ministry of Education, Department of Micro/Nano Electronics, School of Electronics, Information and Electrical Engineering, Shanghai Jiao Tong University, Shanghai 200240, China. Email: yanjiesu@sjtu.edu.cn, yfzhang@sjtu.edu.cn; Fax: +86-021-34205665; Tel: +86-021-34205665.*

[b] State Key Lab of Transducer Technology, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, 865 Changning Road, Shanghai 200050, China

[c] *National Engineering Research Center for Nanotechnology, No. 28 East Jiang Chuan Road, Shanghai 200241, China.*

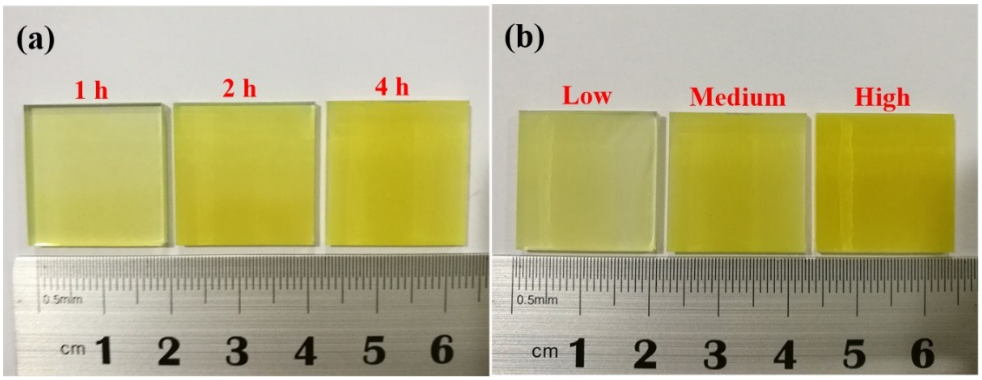

Fig. S1 Optical images of In_2S_3 NSAs grown on FTO substrates with (a) different reaction times and (b) In^{3+} concentrations.

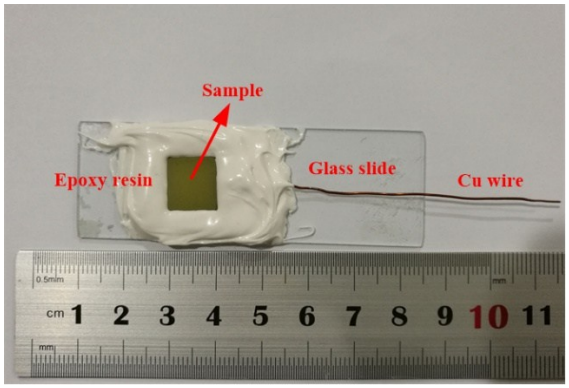

Fig. S2 Optical image of a home-made photoanode based on In_2S_3 NSAs.

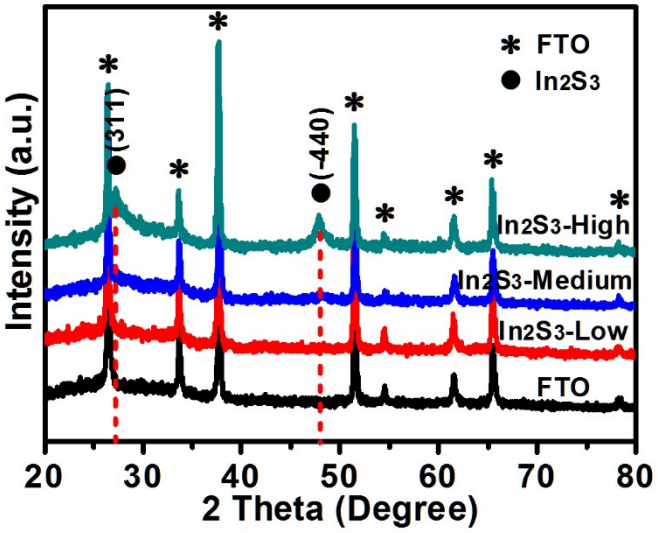

Fig. S3 XRD patterns of In_2S_3 NSAs prepared with varied In^{3+} concentrations.

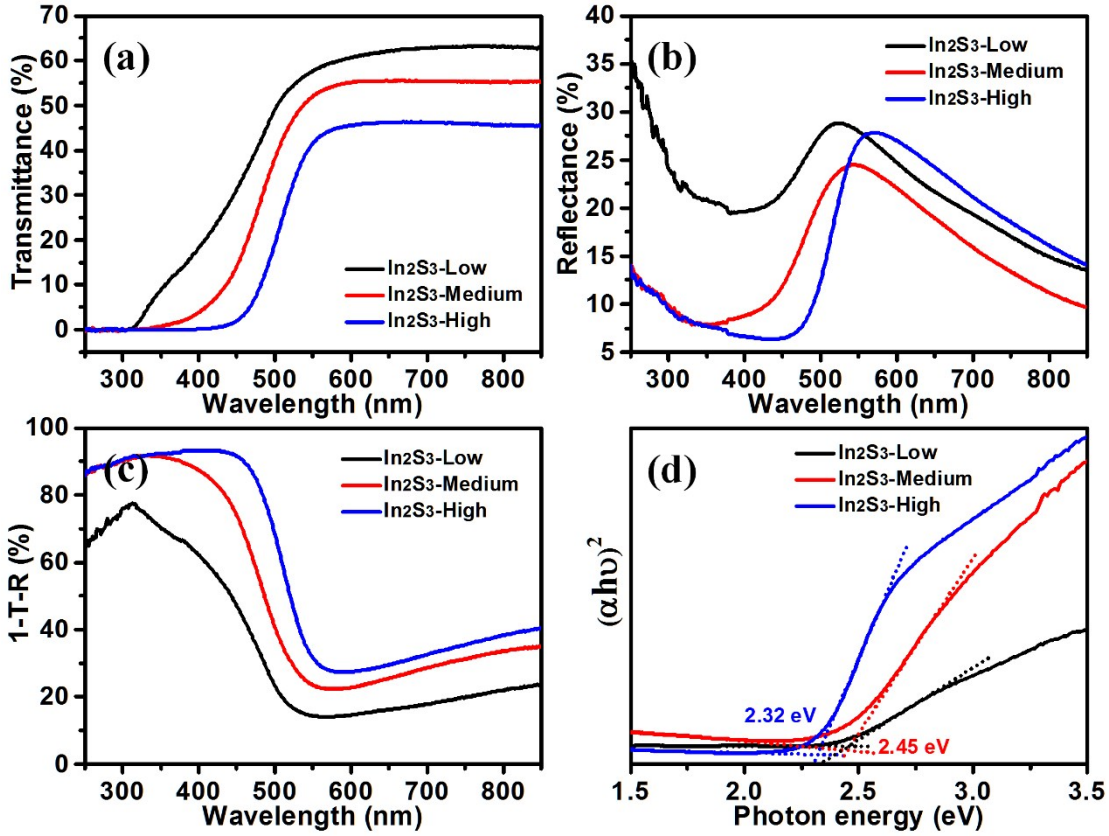

Fig. S4 (a) Transmission spectra, (b) reflection spectra, (c) absorption spectra and (d) energy bandgap determination of the In_2S_3 NSAs prepared with varied In^{3+} concentrations.

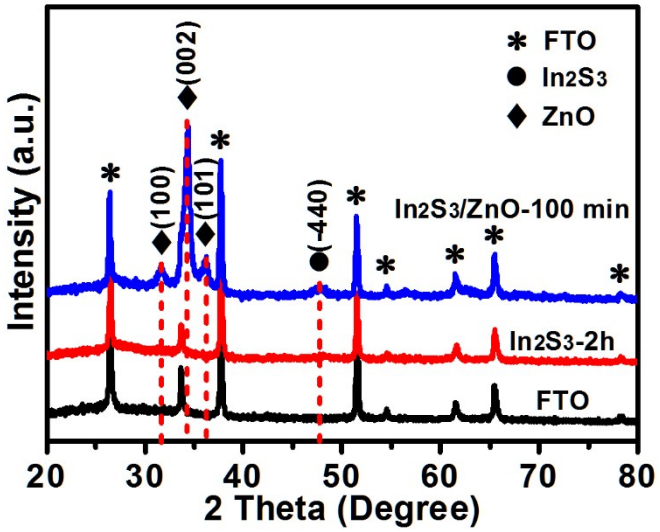

Fig. S5 XRD patterns of FTO substrate, pristine In_2S_3-2h NSAs and In_2S_3/ZnO-100 min NSAs.

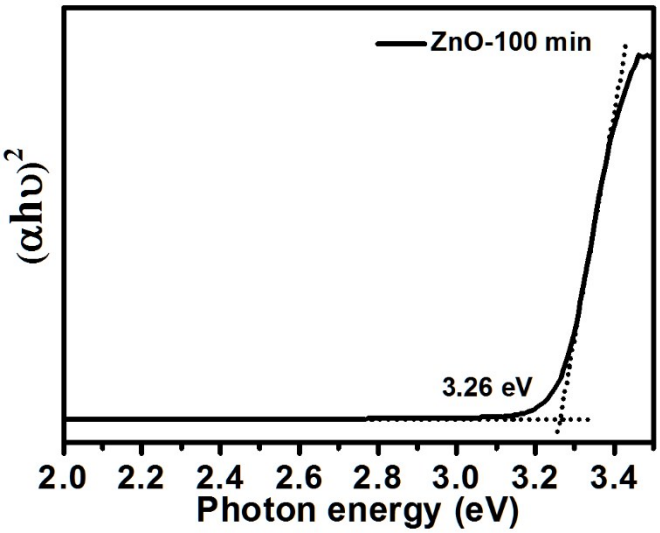

Fig. S6 Energy bandgap determination of the ZnO film grown on FTO substrate with the sputtering time of 100 min (thickness: 350 nm).

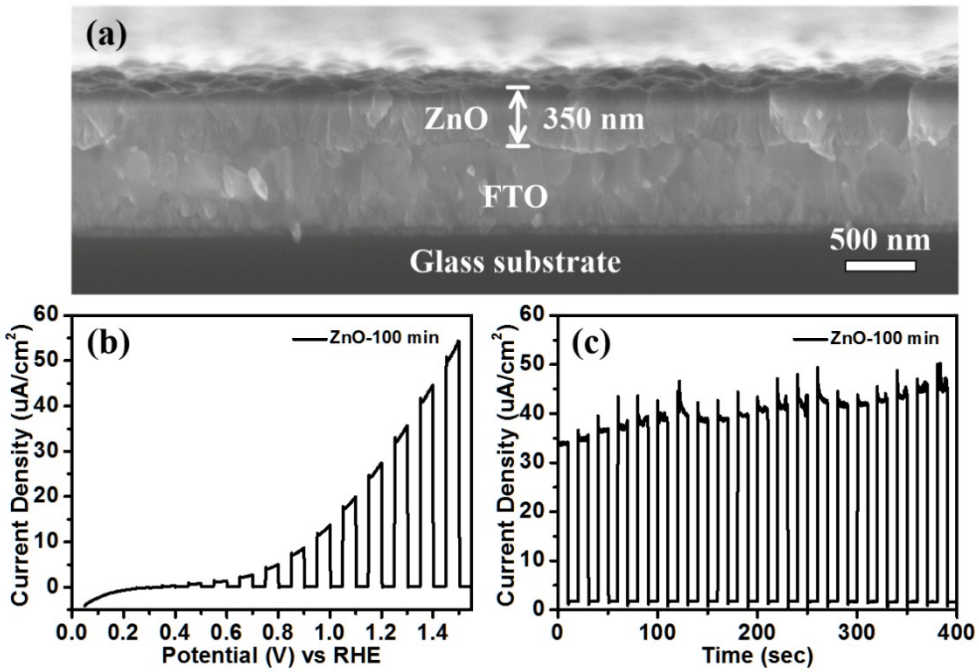

Fig. S7 (a) Cross-sectional SEM image, (b) LSV curve and (c) Amperometric I-t curve at 1.23 V vs. RHE under chopped AM 1.5G simulated solar illumination for the ZnO thin film with the deposition time of 100 min.

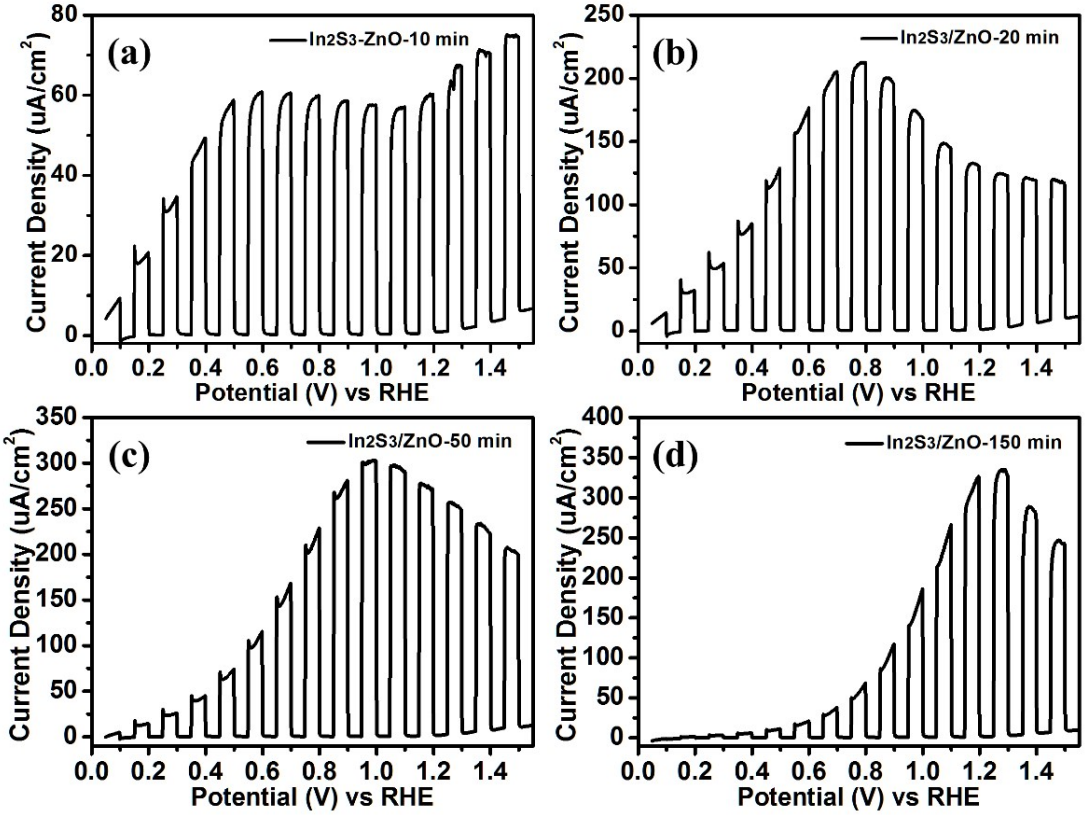

Fig. S8 LSV curves of the In_2S_3/ZnO-x min NSAs at 1.23 V vs. RHE under chopped AM 1.5G simulated solar illumination: (a-d) 10, 20, 50 and 150 min, respectively.

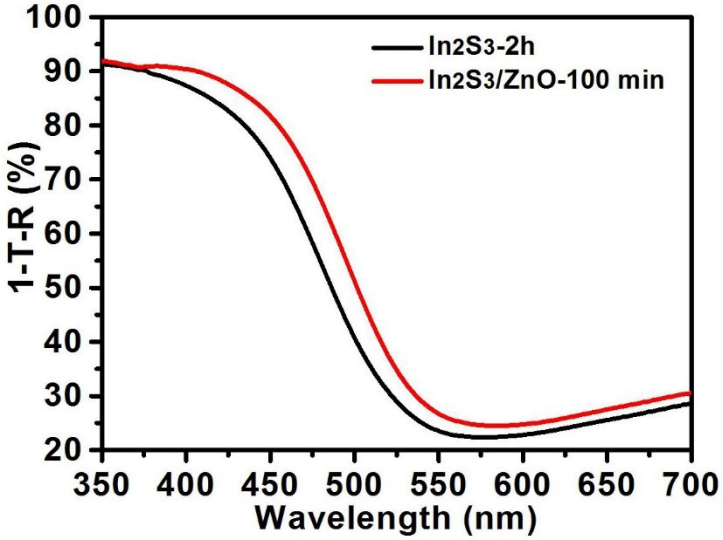

Fig. S9 Absorption spectra of the In_2S_3-2h and In_2S_3/ZnO-100 min NSAs.

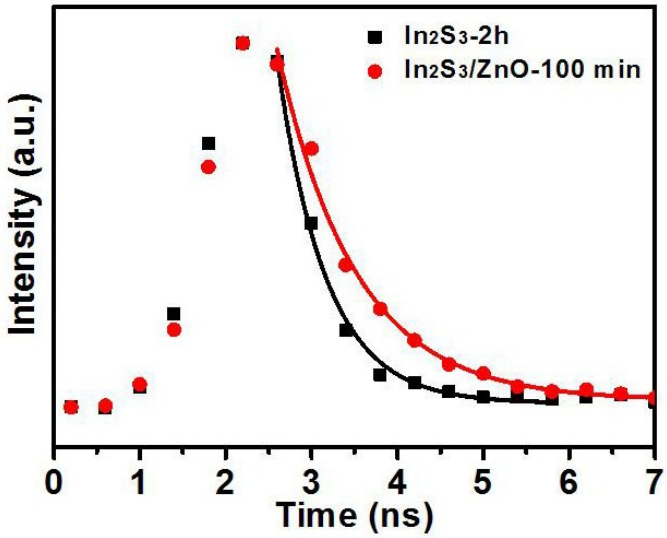

Fig. S10 Time-resolved PL spectra of the In_2S_3-2h and In_2S_3/ZnO-100 min NSAs.

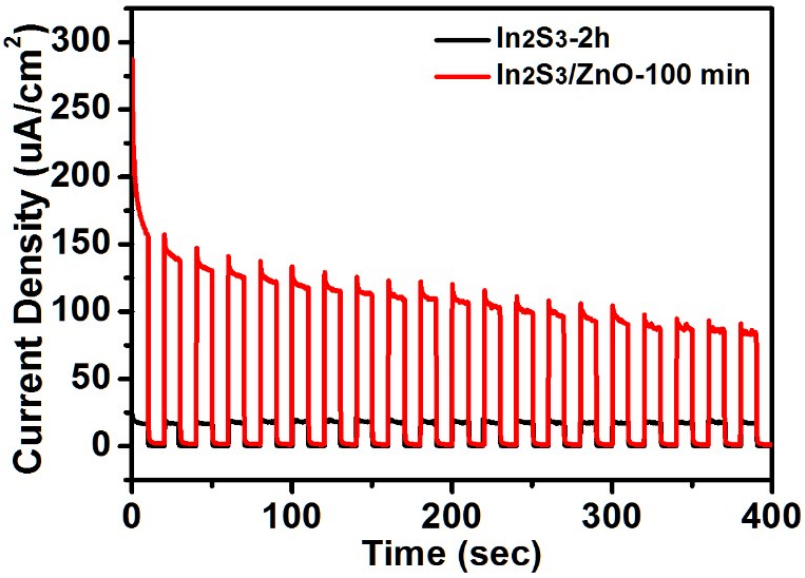

Fig. S11 Amperometric I-t curves of the In_2S_3-2h and In_2S_3/ZnO-100 min NSAs at 1.23 V vs. RHE under chopped AM 1.5G simulated solar illumination.

Table S1 Fitted parameters of the EIS results of the pristine In_2S_3-2h NSAs, ZnO-100 min film and In_2S_3/ZnO-100 min NSAs.

Sample	R_s (Ω cm^2)	R_{ct} (kΩ cm^2)
In_2S_3-2h	16.81	15.95
ZnO-100 min	63.24	224.44
In_2S_3/ZnO-100 min	238.7	5.96