Supporting Information for

Highly Enhanced Visible-Light-Driven Photoelectrochemical Performance of ZnO Modified In_2S_3 Nanosheet Arrays by Atomic Layer Deposition

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Supplementary Figures and Tables

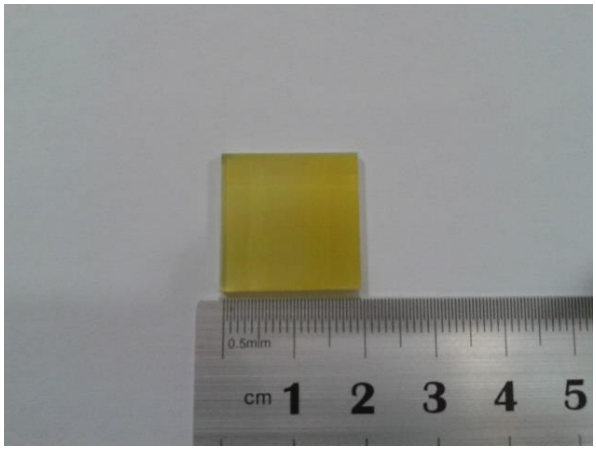

Fig. S1 Optical image of In_2S_3 NSAs grown on FTO glass substrate

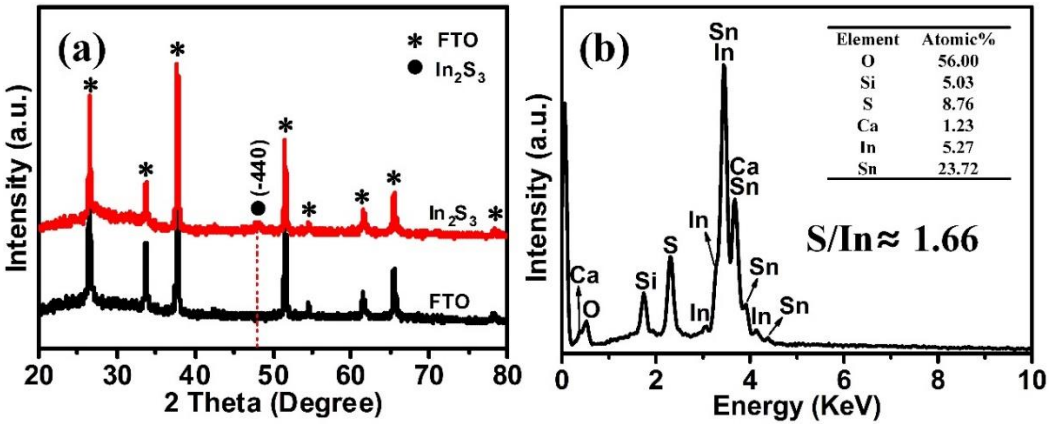

Fig. S2 a XRD pattern of In_2S_3 NSAs compared to that of the FTO substrate. **b** The typical EDS spectrum of In_2S_3 NSAs

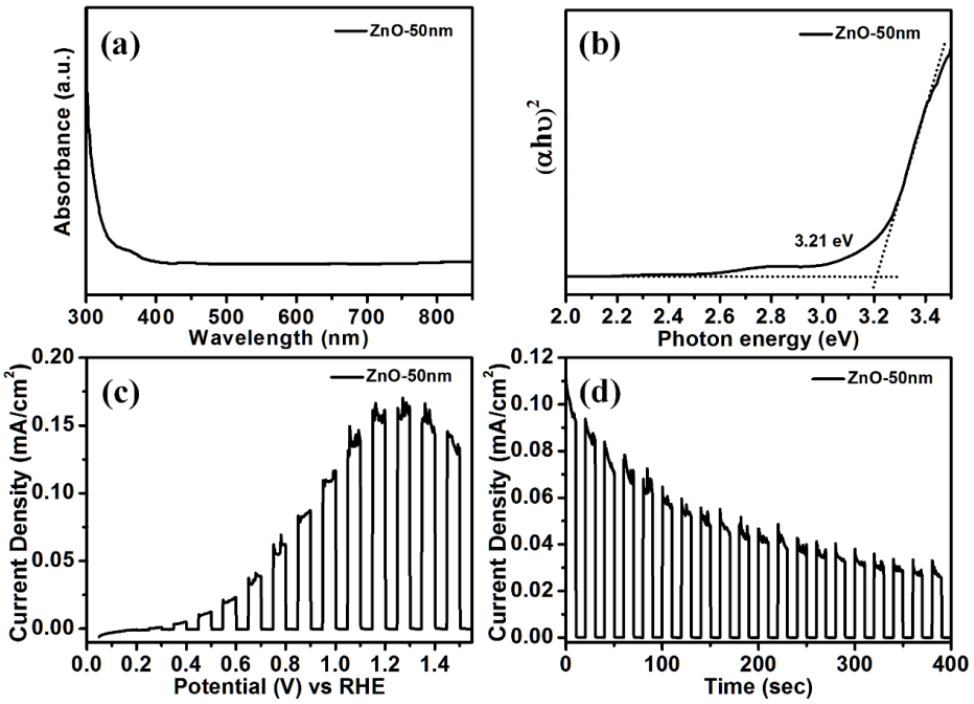

Fig. S3 a Absorbance, **b** energy band gap determination, **c** LSV curve and **d** amperometric *I-t* curve at 1.23 V_{RHE} under chopped AM 1.5G illumination for the ZnO thin film with thickness of 50 nm

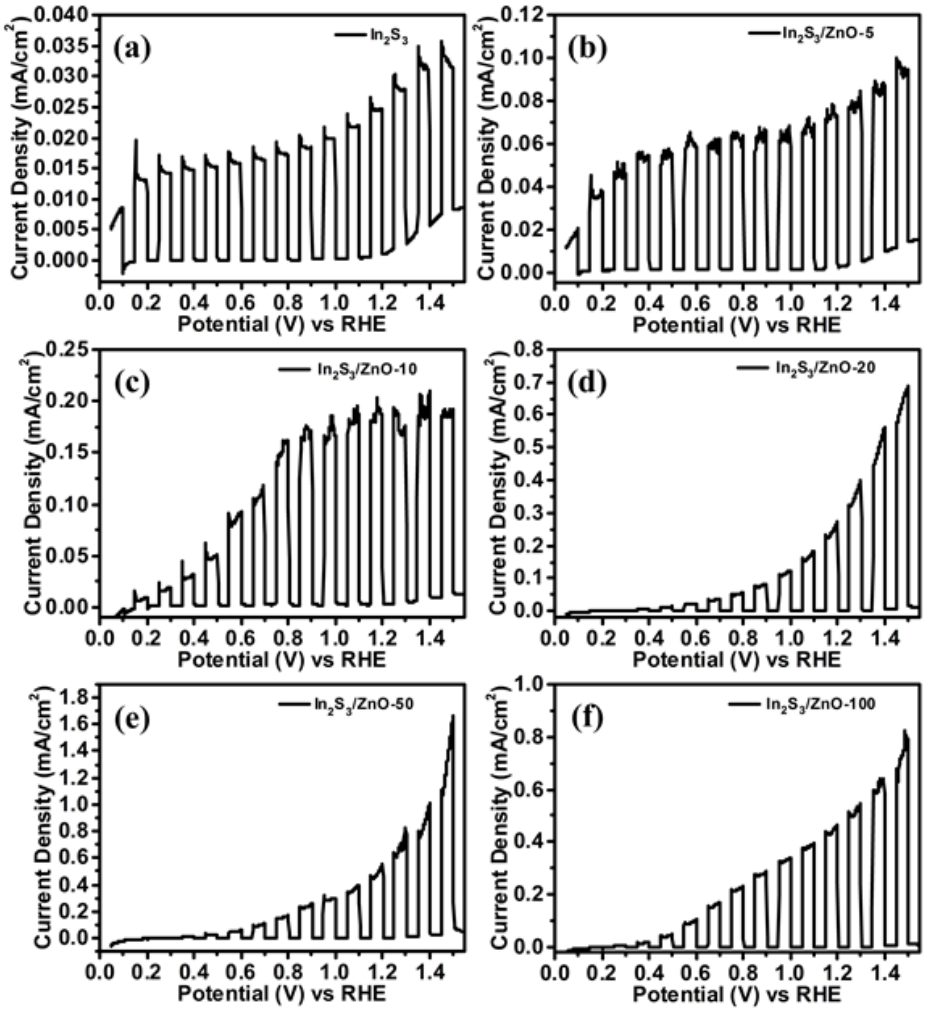

Fig. S4 LSV curves under chopped AM 1.5G illumination of the In_2S_3/ZnO-x NSAs

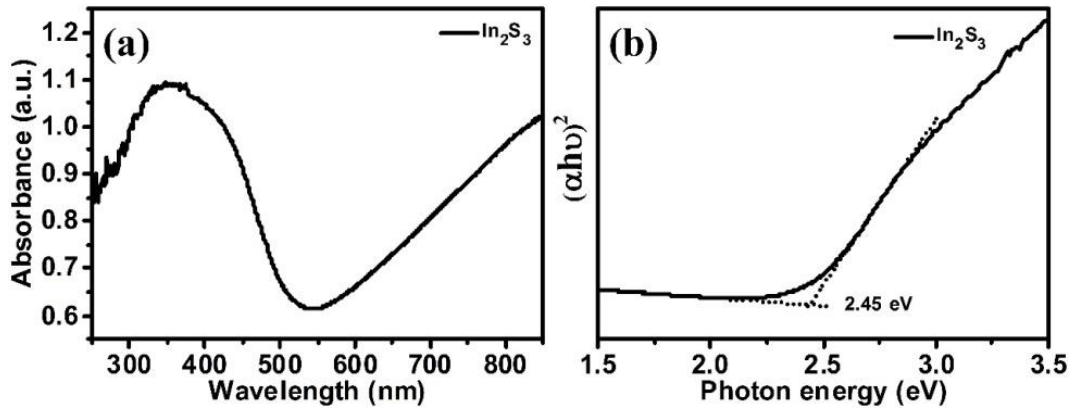

Fig. S5 a Absorbance and **b** energy band gap determination of In_2S_3 NSAs

Table S1 PEC performance of 2D nanostructured In_2S_3-based photoanodes

Photoanodes	Morphology	Photocurrent	IPCE	Reference
In_2S_3/ZnO-50	NSAs	1.64 mA cm^{-2} (1.5 V_{RHE})	27.64% @380nm (1.23 V_{RHE})	This work
In_2S_3/ZnO	NSAs	0.35 mA cm^{-2} (1.2 V_{RHE})	10.26% @380nm (1.23 V_{RHE})	[34]
Zr-doped In_2S_3	nanoflakes	1.1 mA cm^{-2} (1.3 V_{RHE})	2.5% @400nm (1.2 V_{RHE})	[23]
MoS_2-In_2S_3	nanoplates	~1 μA cm^{-2} (0.5 V_{RHE})	/	[24]
In_2S_3	nanoflakes	37 μA cm^{-2} (1.3 V_{RHE})	/	[25]
In_2S_3	nanobelts	10 μA cm^{-2} (1.3 V_{RHE})	/	[25]
Co-doped In_2S_3	nanosheets	1.17 mA cm^{-2} (1.5 V_{RHE})	46% @450nm (1.5 V_{RHE})	[26]

Table S2 Energy levels of the In_2S_3 and ZnO layers determined using UPS and UV-Vis absorption spectra, the data come from the ZnO layer for In_2S_3/ZnO-5

Sample	E_L (eV)	E_H (eV)	E_F (eV)	E_{VBM} (eV)	E_{CBM} (eV)	E_g (eV)
In_2S_3	2.40	17.30	3.92	6.32	3.87	2.45
ZnO	2.53	18.37	2.85	5.38	2.17	3.21
In_2S_3/ZnO	2.52	18.07	3.15	5.67	2.46	/