Electronic Supplementary Material (ESI) for RSC Advances.

Support Information

Effect of ZnS buffer layers in ZnO/ZnS/CdS nanorod array photoelectrode on the photoelectrochemical performance

L.P. Wu,[a] Y.L. Zhang,[a] L.Z. Long,[a] C.P. Cen[b] and X.J. Li*[a]

[a] *Guangzhou Institute of Energy Conversion, Chinese Academy of Sciences, Guangzhou 510640, China. Fax: 86 20 87057677; Tel: 86 20 87057781; E-mail: lixj@ms.giec.ac.cn;*

[b] *The Key Laboratory of Water and Air Pollution Control of Guangdong Province, South China Institute of Environmental Science, Ministry of Environmental Protection, Guangzhou 510640, China*

Fig.S1

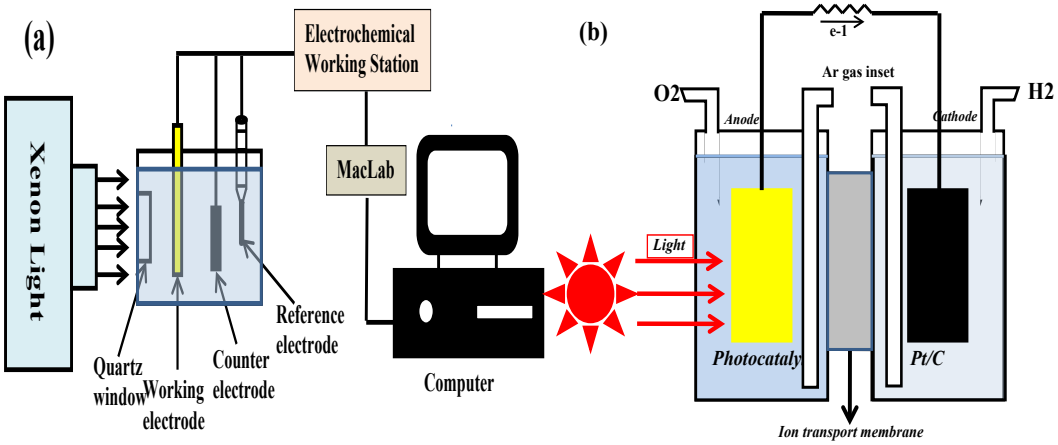

Fig. S1 Schematic diagram of three-electrode photoelectrochemical cell (a) and the home-made photochemical cell for hydrogen generation (b).

Fig.S2

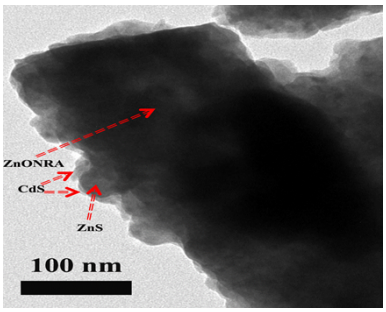

Fig. S2 The TEM image of ZnONRA/ZnS/CdS

Fig.S3

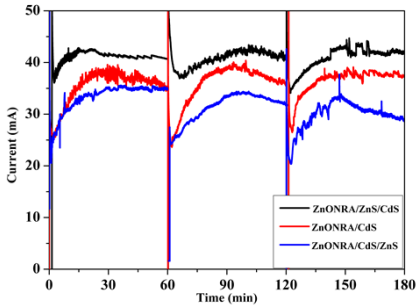

Fig. S3 Time-profiled photocurrent generations during photocatalytic water splitting reaction on the ZnO/CdS, ZnO/ZnS/CdS and ZnO/CdS/ZnS photoelectrodes under visible light irradiation.

Fig.S4

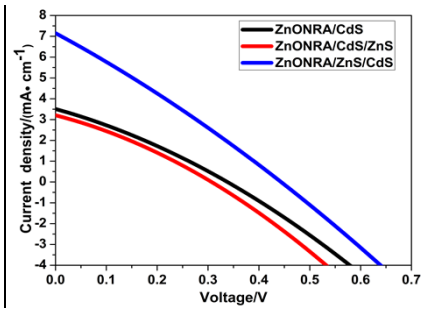

Fig.S4 Photocurrent-voltage (J-V) characteristics of the assembled solar cells with ZnONRA/CdS, ZnONRA/CdS/ZnS and ZnONRA/ZnS/CdS.

The current photocurrent-voltage (J-V) and the photovoltaic performances of the assembled ZnONRA/CdS, ZnONRA/CdS/ZnS and ZnONRA/ZnS/CdS solar cells are shown in Fig.S3 and in table S1. It can be seen that the solar cells based on ZnONRA/ZnS/CdS and ZnONRA/CdS show much higher performance than that based on ZnONRA/CdS/ZnS. The solar cells based on ZnONRA/ZnS/CdS have more superior performance than that based on ZnONRA/CdS. For example, the short-circuit current of ZnONRA/ZnS/CdS is 7.14 $mA \cdot cm^{-2}$ much higher than the value of ZnONRA/CdS (3.50 $mA \cdot cm^{-2}$), and then leading a higher conversion efficiency (η=0.88 %) as shown in Table S1. It indicates that the introduction of ZnS buffer layers between ZnONRA and CdS is helpful for the transfer of excited electrons from CdS to ZnONRA.

Tab. S1

Photoelectrode	J_{sc} ($mA \cdot cm^{-1}$)	Voc (V)	FF	η (%)
ZnONRA/CdS	3.50	0.34	0.35	0.42
ZnONRA/CdS/ZnS	3.20	0.31	0.30	0.30
ZnONRA/ZnS/CdS	7.14	0.44	0.28	0.88

Tab. S1 Photovoltaic performances of the assembled solar cells of ZnONRA/CdS, ZnONRA/CdS/ZnS and ZnONRA/ZnS/CdS.