

Supporting information

In situ photodeposition of amorphous Ni_xP on CdS nanorods for efficient visible-light photocatalytic H₂ generation

Simeng Zhu, Jing Wang, Yishan He, Zhiyang Yu, Xuxu Wang, Wenyue Su*

*State Key Laboratory of Photocatalysis on Energy and Environment, College of
Chemistry, Fuzhou University, Fuzhou Fujian 350116 P. R. China*

* Corresponding author. E-mail: suweny@fzu.edu.cn; Tel: +86 0591 22865820

* Corresponding author. E-mail: suweny@fzu.edu.cn; Tel: +86 0591 22865820

Supplementary materials:

Table S1 The loading amount of Ni_xP in the Ni_xP/CdS-t samples

Samples	Ni(wt%)	P(wt%)	The molar ratio of Ni:P	Ni _x P(wt%)
Ni _x P/CdS-10min	2.14	0.62	1.84	2.76
Ni _x P/CdS-20min	2.34	0.82	1.51	3.16
Ni _x P/CdS-40min	2.47	0.9	1.44	3.37
Ni _x P/CdS-60min	2.55	0.97	1.42	3.52

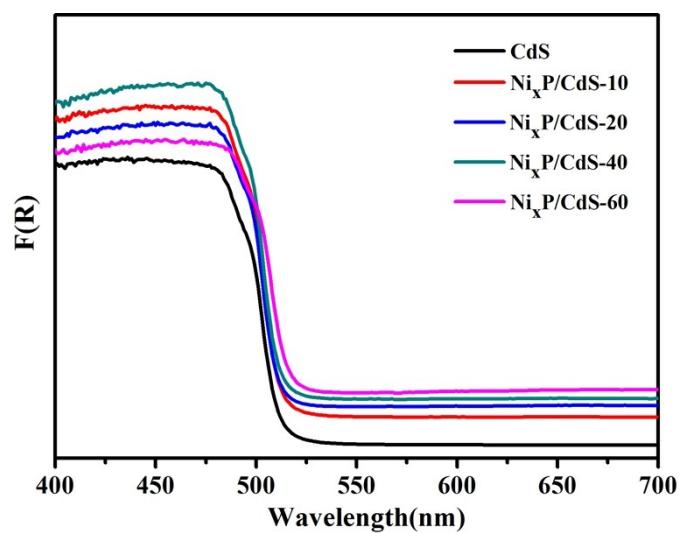


Fig. S1. UV-vis diffuse reflectance spectra of CdS and Ni_xP/CdS-t samples.

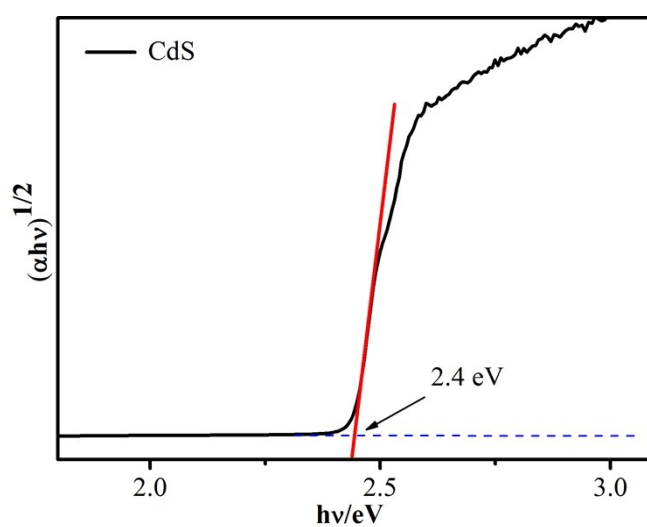


Fig. S2. Tauc plots of the CdS sample UV-vis spectra.

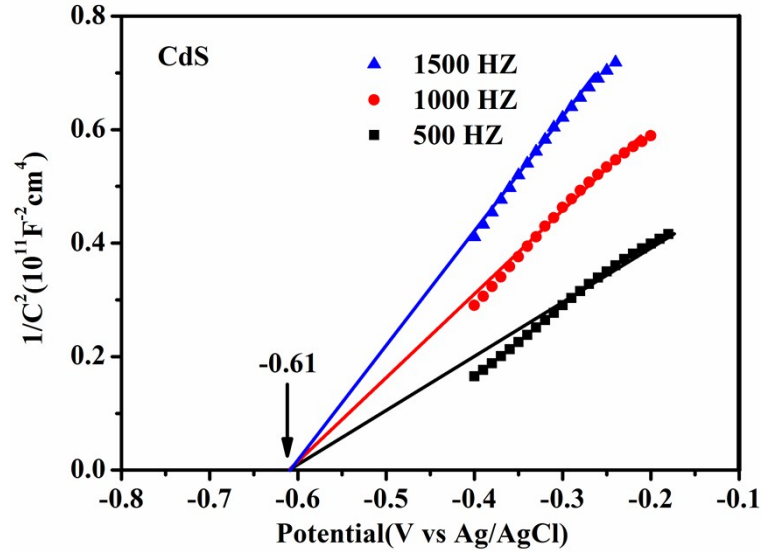


Fig. S3. Mott-Schottky plots of CdS sample.

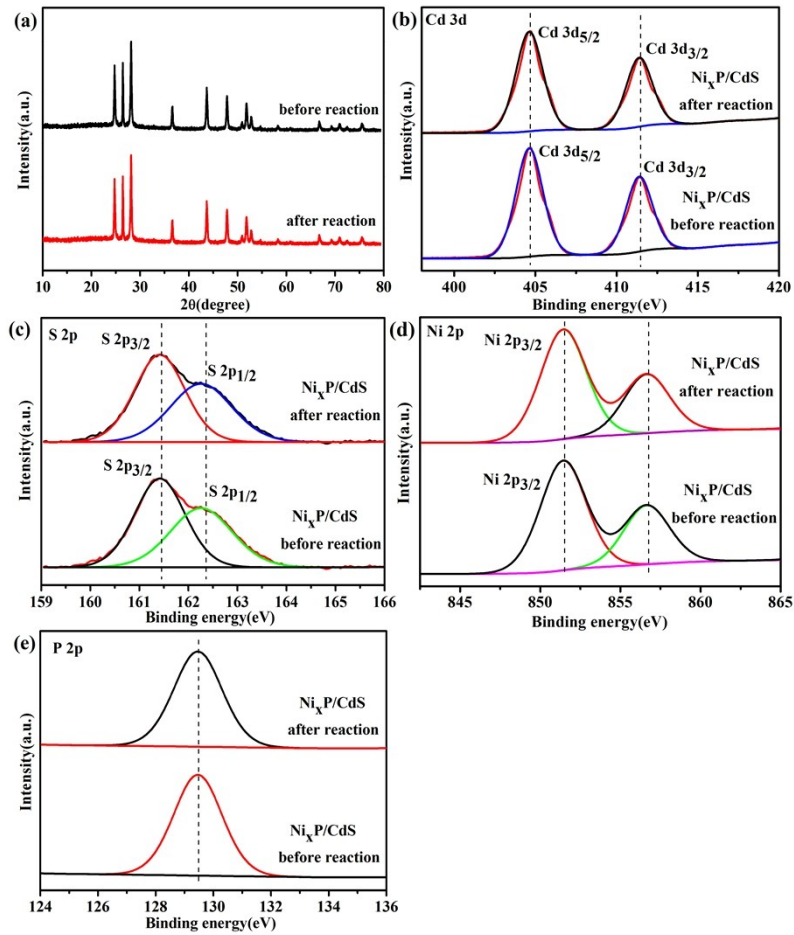


Fig. S4. Characterization of the Ni_xP/CdS sample before and after cycling experiment: (a) XRD patterns, high-resolution XPS spectra of (b) Cd 3d; (c) S 2p; (d) Ni 2p; (e) P 2p.

Table S2. Preparation conditions for control experiments

Samples	CdS/mg	NiCl ₂ (0.1M)/mL	NaH ₂ PO ₂ (0.2M)/mL	H ₂ O/mL	Irradiation/min
Ni _x P/CdS ^[a]	100	2	7	1	20
Ni/CdS ^[b]	100	2	0	8	20
P/CdS ^[c]	100	0	7	3	20
D/CdS ^[d]	100	2	7	1	dark 20
N/CdS ^[e]	0	2	7	1	20

[a] CdS (100 mg), NiCl₂ (0.1 M 2 mL), NaH₂PO₂ (0.2 M 7 mL), H₂O (1 mL), illumination time (20 min); [b] absence of NaH₂PO₂; [c] absence of NiCl₂; [d] absence of light; [e] absence of CdS.

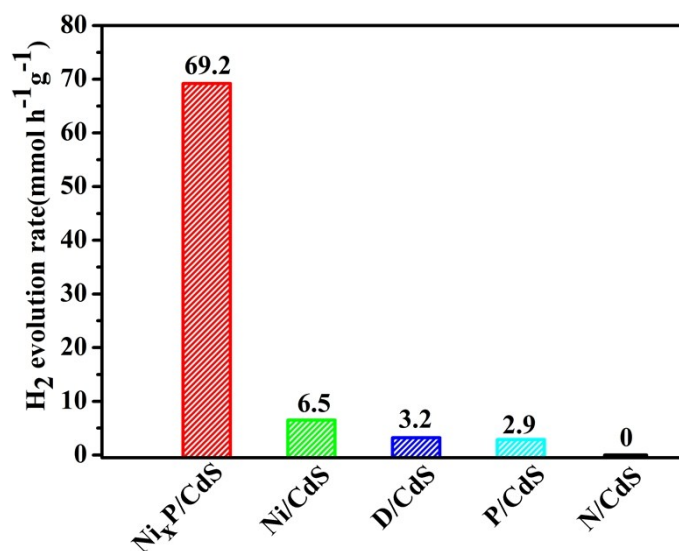


Fig. S5. Comparison of the photocatalytic H₂ evolution activity of samples obtained by control experiments in Table S2. Experimental conditions: 20 mg photocatalyst, 10 mL lactic acid and 90 mL water. The light source was a 300 W Xe lamp with a 420 nm cut-off filter.

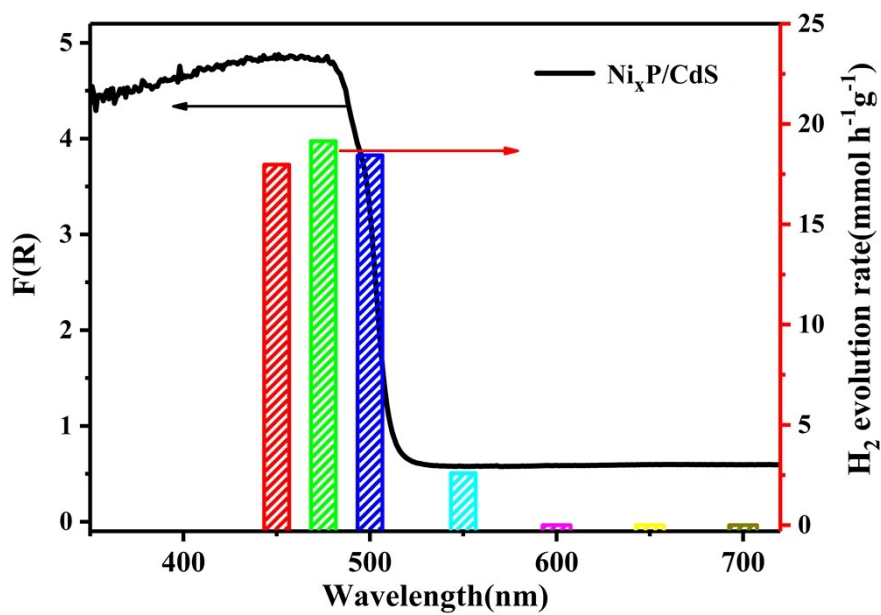


Fig. S6. Wavelength-dependent photocatalytic H₂ evolution performance over Ni_xP/CdS sample.

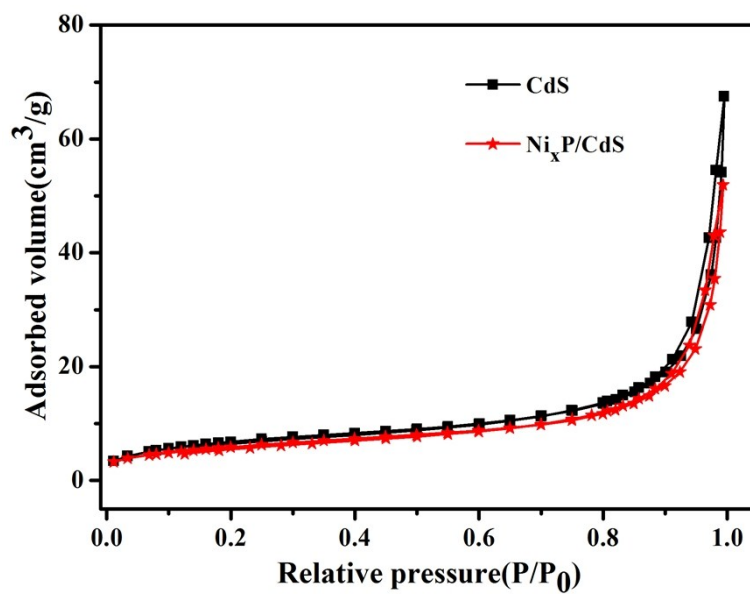


Fig. S7. N₂ adsorption-desorption isotherms of CdS and Ni_xP/CdS samples.

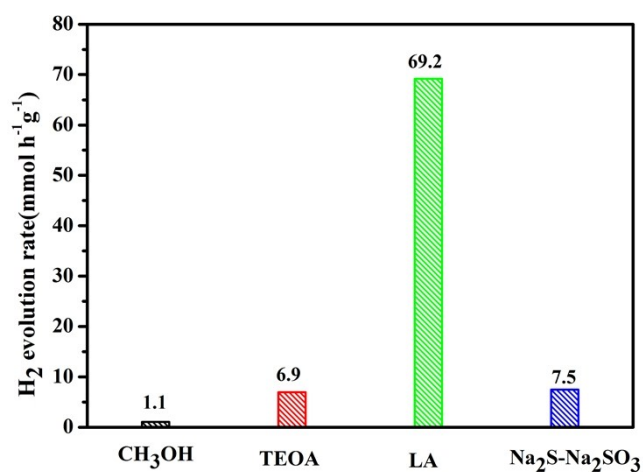


Fig. S8. Photocatalytic H₂ evolution performance under different sacrificial reagents over Ni_xP/CdS sample.

Table S3. The data of time-resolved fluorescence

Samples	τ_1 (ns)		τ_2 (ns)		Ave. τ (ns)
	Value/ns	Rel %	Value/ns	Rel %	
Ni _x P/CdS	1.215	56.32	6.924	43.68	3.71
CdS	0.952	62.30	6.407	37.70	3.02

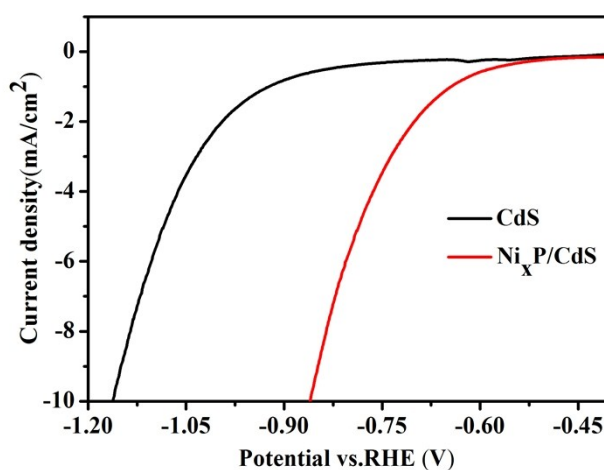


Fig. S9. LSV curves of CdS and Ni_xP/CdS samples. The scan rate is 5 mV/s.