Supporting Information

Construction of 2D/2D Ni_2P/CdS heterojunctions with significantly enhanced photocatalytic H_2 evolution performance

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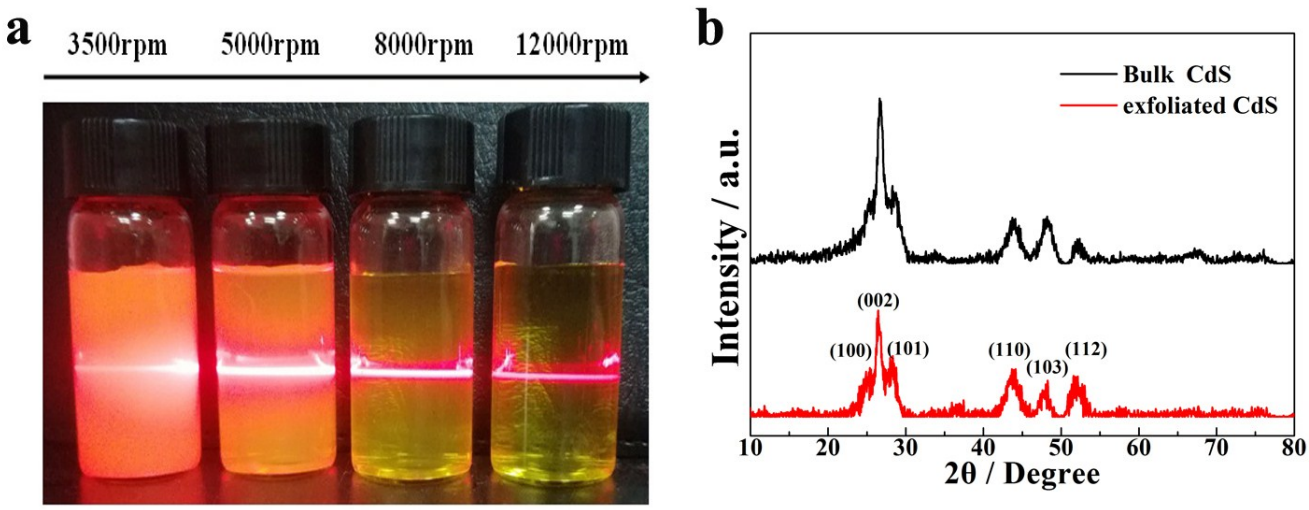

Fig. S1. Photographs of CdS dispersion obtained at different centrifugal speeds and the corresponding Tyndall effect (a); XRD pattern of bulk and exfoliated CdS (b).

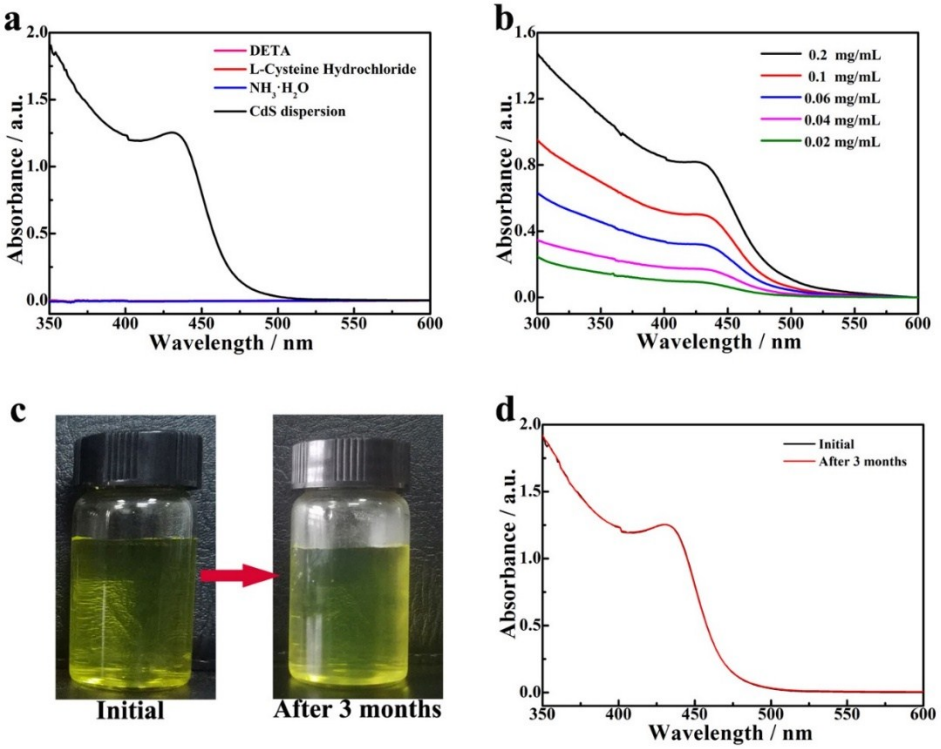

Fig. S2. UV-vis absorption spectra of exfoliated CdS dispersion, L-cysteine hydrochloride aqueous solution, $NH_3 \cdot H_2O$ solution and DETA aqueous solution (a); UV-vis absorption spectra of exfoliated CdS dispersion with the different concentrations (b); Photographs (c) and UV-vis absorption spectra (d) of initial and stored for 3 months CdS dispersion.

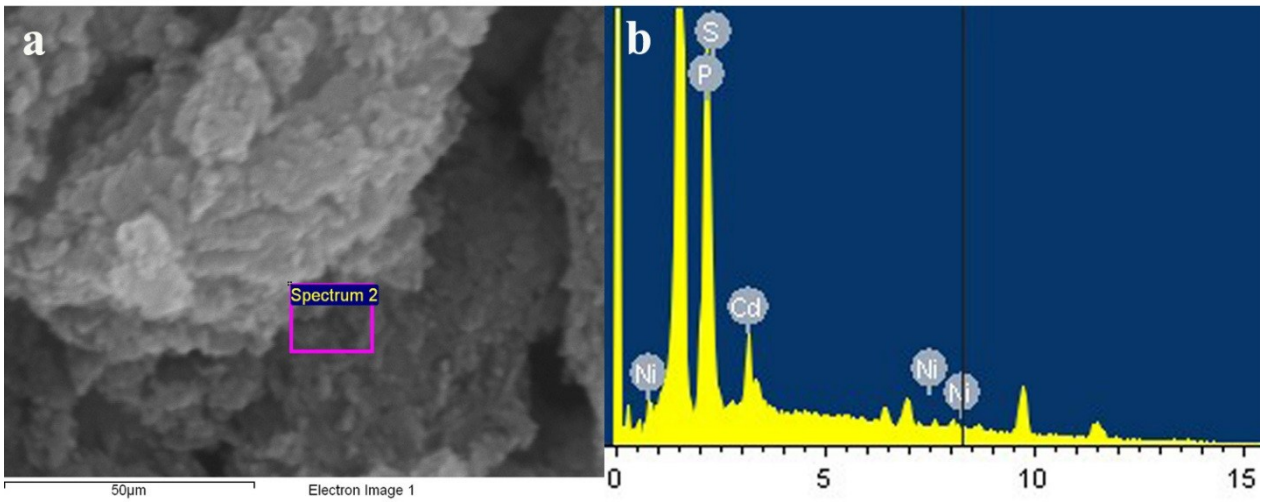

Fig. S3. EDS spectrum of 4wt% Ni_2P/CdS heterojunction.

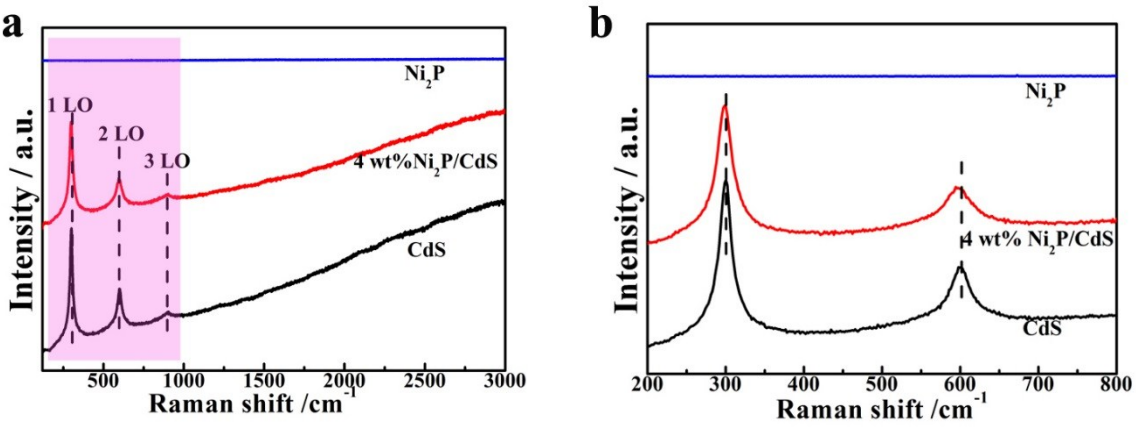

Fig. S4. The Raman spectra of Ni_2P, CdS and 4wt% Ni_2P/CdS heterojunction.

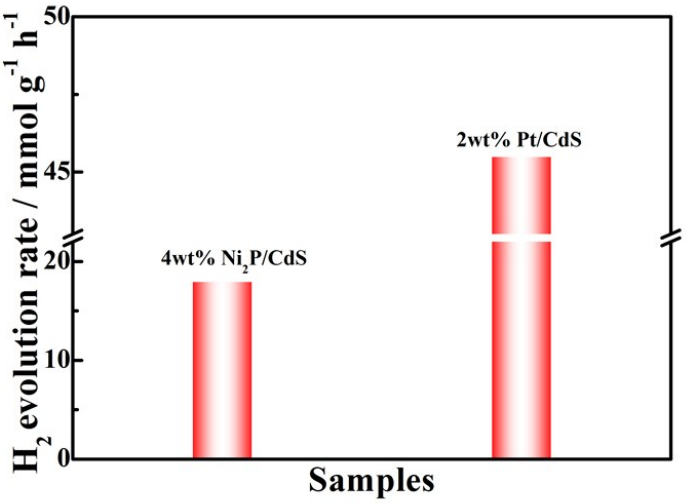

Fig. S5. The H_2 evolution rate of 4wt% Ni_2P/CdS heterojunction and 2wt% Pt/CdS hybrid.

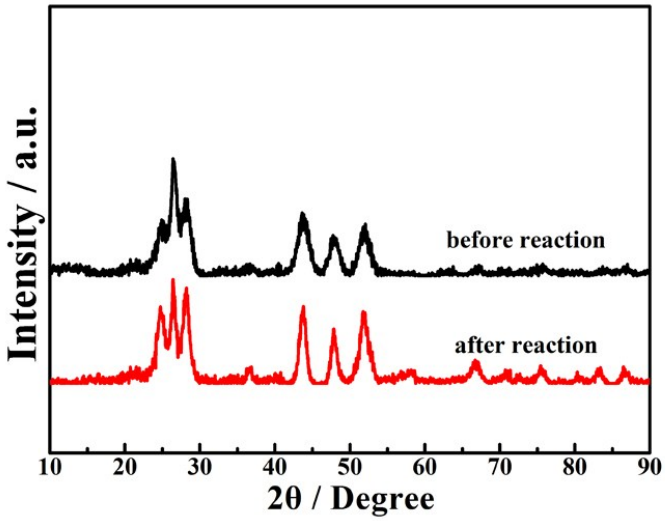

Fig. S6. the XRD pattern of before and after reaction of 4wt% Ni_2P/CdS heterojunction.

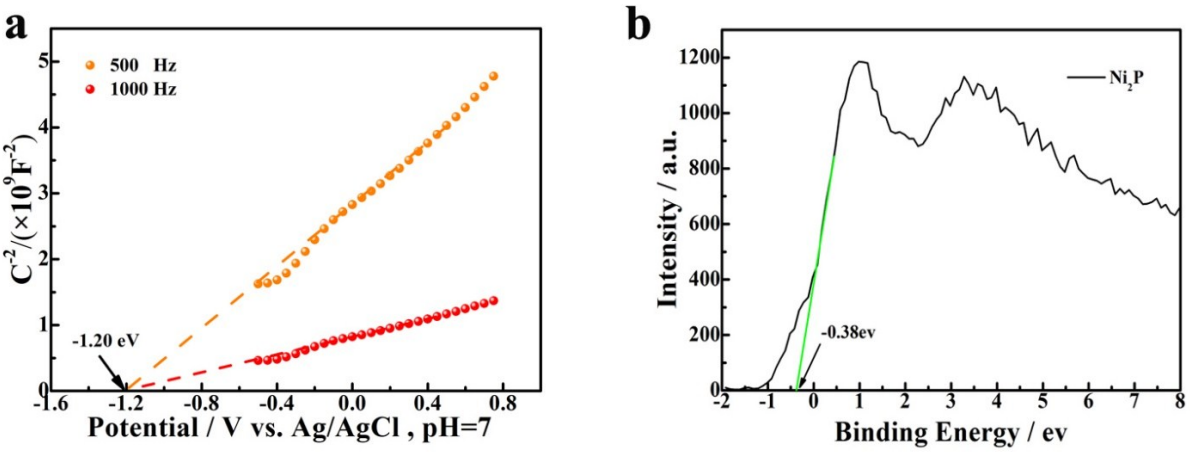

Fig. S7. The Mott-Schottky curves of exfoliated CdS (a) and XPS valence band spectrum of Ni_2P (b).

Table S1. Comparing the photocatalytic H_2 evolution activity with other reported photocatalysts.

Photocatalyst	Light source	Sacrificial reagent	H_2 (mmol g^{-1} h^{-1})	Reference
$CoP/Zn_{0.5}Cd_{0.5}S$	λ≥420 nm	Lactic acid	14.68	[31]
$Ni_2P/Cd_{0.5}Zn_{0.5}S$	λ≥420 nm	Na_2S/Na_2SO_3	1.05	[45]
Ni_2P /CdS	λ≥420 nm	Lactic acid	2.07	[46]
$Ni_2P/Cd_{0.5}Zn_{0.5}S$	λ≥400 nm	Na_2S-Na_2SO_3	9.12	[47]
CoP/CdS	λ≥420 nm	Na_2S-Na_2SO_3	13.8	[48]
$CoP/Zn_{0.5}Cd_{0.5}S$	AM 1.5G filter	Ascorbic acid	12.18	[49]
$MoS_2/ZnIn_2S_4$	λ≥400 nm	TEOA	0.89	[50]
WS_2/CdS	λ≥420 nm	Lactic acid	14.1	[51]
MoS_2/CdS	λ≥420 nm	Na_2S/Na_2SO_3	4.65	[52]
$MoSe/ZnIn_2S_4$	λ≥420 nm	Lactic acid	6.45	[53]
$MoS_2/ZnIn_2S_4$	λ≥420 nm	Lactic acid	6.88	[54]
Ni_2P/CdS	λ≥420 nm	Lactic acid	17.95	This Work