Electronic Supplementary Material (ESI) for Inorganic Chemistry Frontiers.

Electronic Supplementary Information

A robust CdS/In_2O_3 hierarchical heterostructure derived from a metal-organic framework for efficient visible-light photocatalytic hydrogen production

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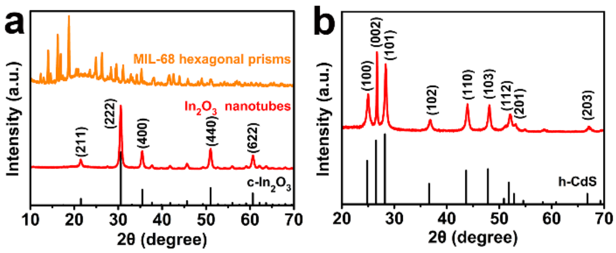

Figure S1. XRD patterns of (a) MIL-68 hexagonal prisms and In_2O_3 hierarchical nanotubes, and (b) CdS nanoparticle aggregates.

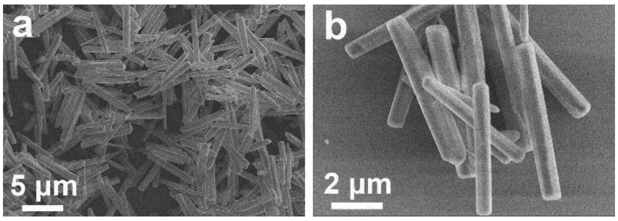

Figure S2. (a, b) SEM images of MIL-68 hexagonal prisms.

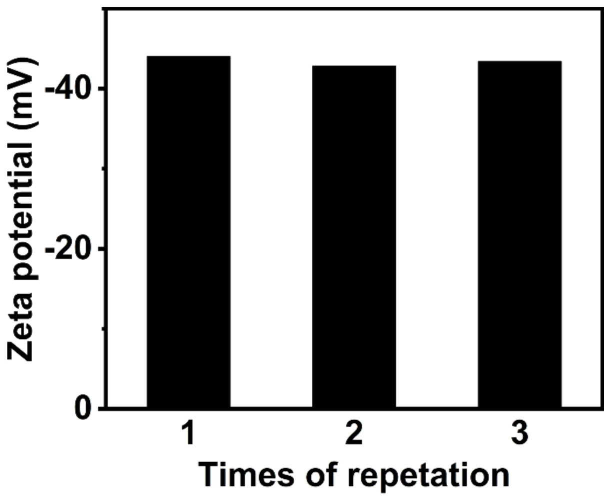

Figure S3. Zeta potential of In_2O_3 hierarchical nanotubes.

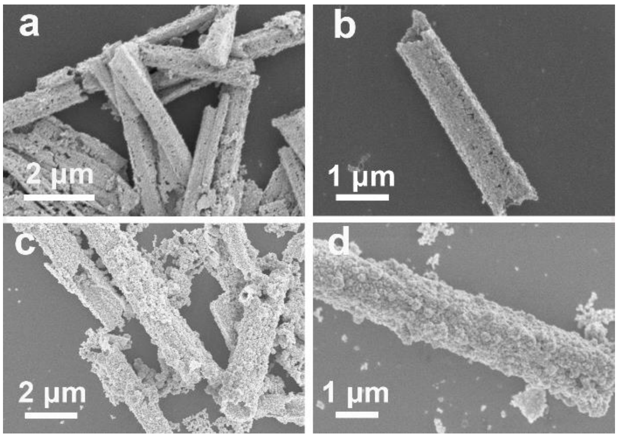

Figure S4. SEM images of (a, b) CdS/In_2O_3-1 and (c, d) CdS/In_2O_3-3.

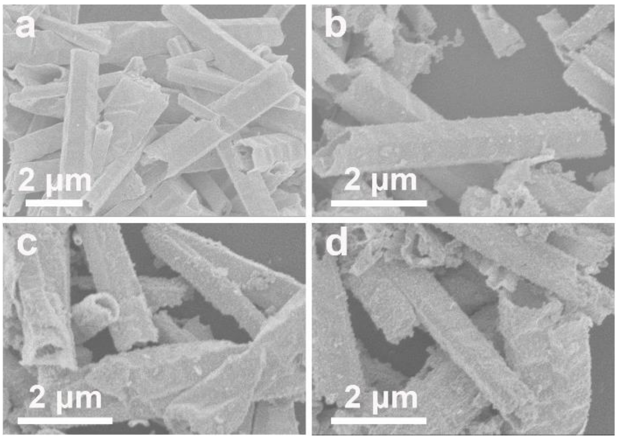

Figure S5. SEM images of CdS/In_2O_3-2 at (a) 10 min, (b) 30 min, (c) 60 min and (d) 120 min in the growth process of CdS.

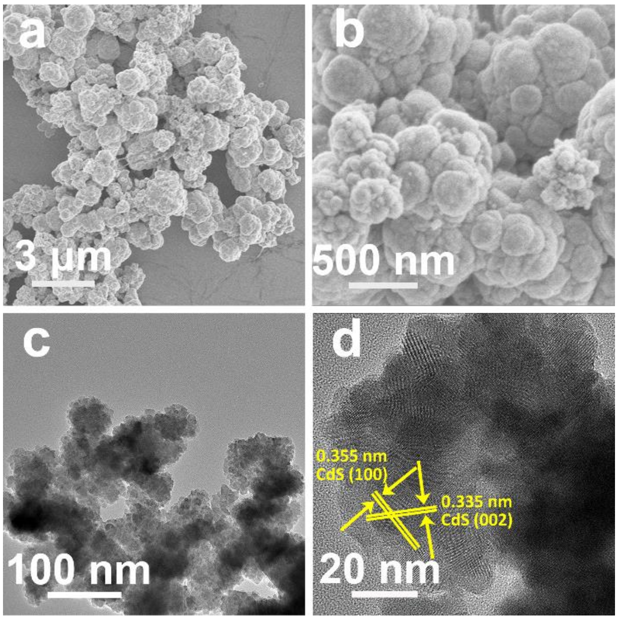

Figure S6. (a, b) SEM, (c) TEM and (d) HRTEM images of CdS nanoparticle aggregates.

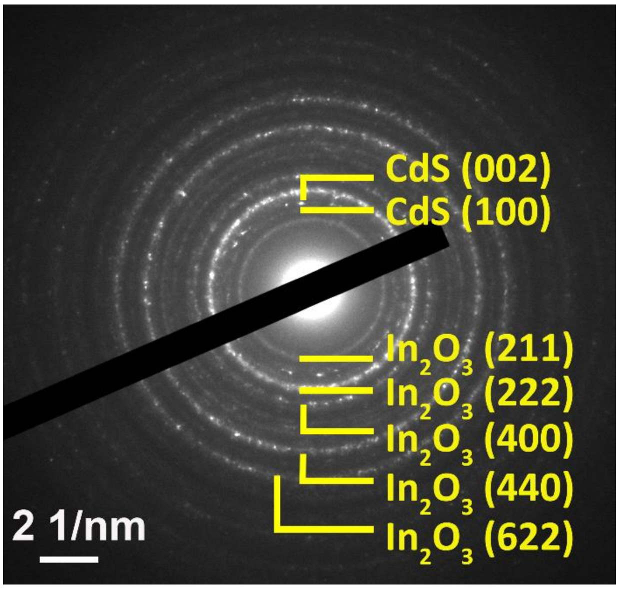

Figure S7. SAED pattern of CdS/In_2O_3-2.

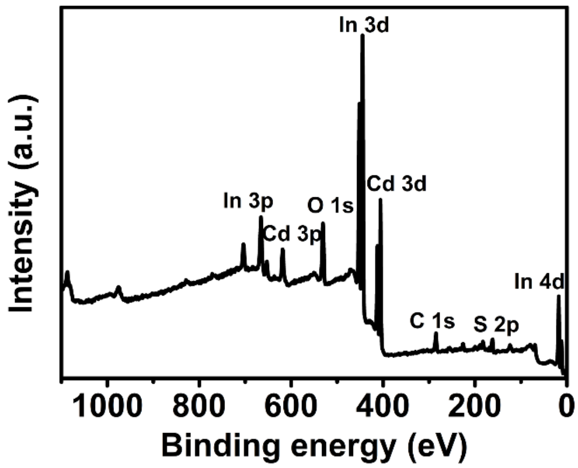

Figure S8. XPS survey-scan spectrum of CdS/In_2O_3-2.

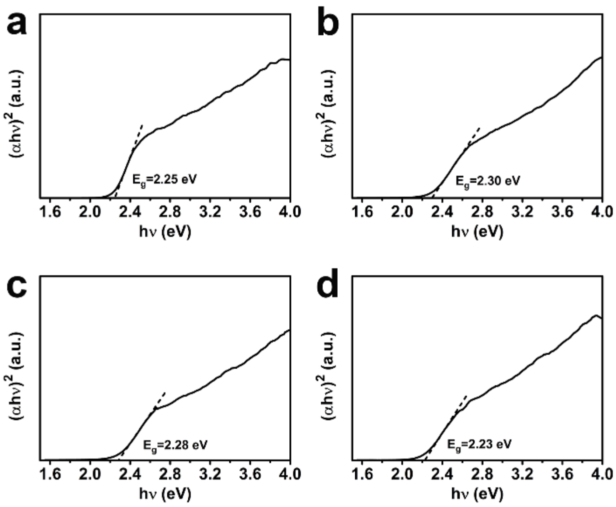

Figure S9. Tauc plots of (a) CdS nanoparticles, (b) CdS/In_2O_3-1, (c) CdS/In_2O_3-2 and (d) CdS/In_2O_3-3.

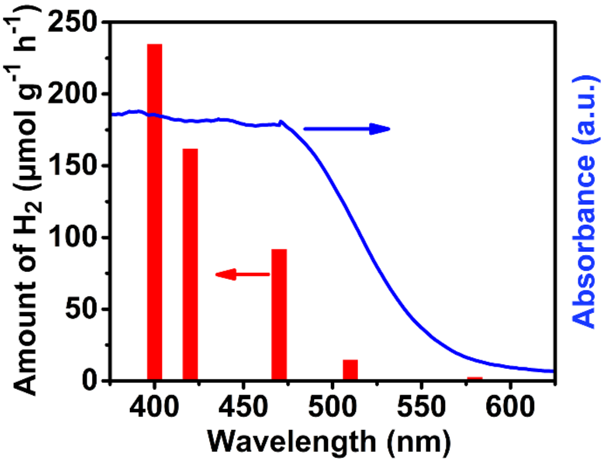

Figure S10. Wavelength-dependent hydrogen generation activity of CdS/In_2O_3-2.

Table S1. Comparison of activity for photocatalytic H_2 generation between CdS/In_2O_3-2 and some other photocatalysts.

Catalyst	Light source	Sacrificial agent	Cocatalyst	Amount of H_2 ($\mu mol\ g^{-1}\ h^{-1}$)	AQE[a]	Ref.
CdS/In_2O_3-2	300 W Xe lamp ($\lambda > 400$ nm)	10 vol% TEOA	/	235.05	0.2 % at 420 nm	This work
Cr-Doped $Ba_2In_2O_5/In_2O_3$	300 W Xe lamp ($\lambda > 420$ nm)	18.5 vol% methanol	0.5 wt % Pt	15.8	0.3 % at 420 nm	1
$In_2O_3/La_2Ti_2O_7$	500 W Xe lamp	25 vol% methanol	1 wt % Pt	68.14	0.41 %	2
$Gd_2Ti_2O_7/In_2O_3$	125 W Hg lamp ($\lambda > 400$ nm)	10 vol% methanol	/	5798	/	3
In_2O_3/ZnO	125 W Hg lamp ($\lambda > 400$ nm)	10 vol% methanol	/	1760	/	4
$In_2O_3/g\text{-}C_3N_4$	300 W Xe lamp ($\lambda > 420$ nm)	0.1 M L-ascorbic acid	0.5 wt % Pt	197.5	/	5
$In_2S_3/CdIn_2S_4/In_2O_3$	225 W Xe lamp	0.35 M Na_2S + 0.25 M Na_2SO_3	1 wt % Pt	2004	/	6
In_2S_3/In_2O_3	300 W Xe lamp	10 vol% methanol	1 wt % Pt	61.4	/	7
CdS/In_2O_3	300 W Xe lamp ($\lambda > 420$ nm)	20 vol % lactic acid	1 wt % Pt	573.6	/	8
CdS/WO_3	500 W Xe lamp ($\lambda > 400$ nm)	lactic acid	/	369	/	9

[a]AQE: Apparent quantum efficiency.

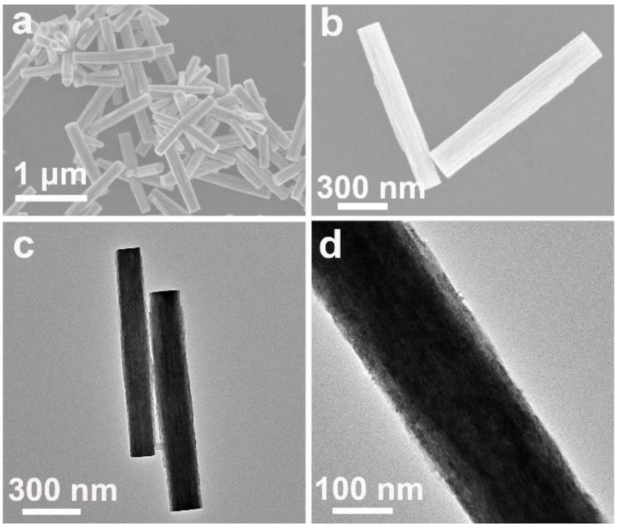

Figure S11. (a, b) SEM and (c, d) TEM images of In_2O_3 nanorods.

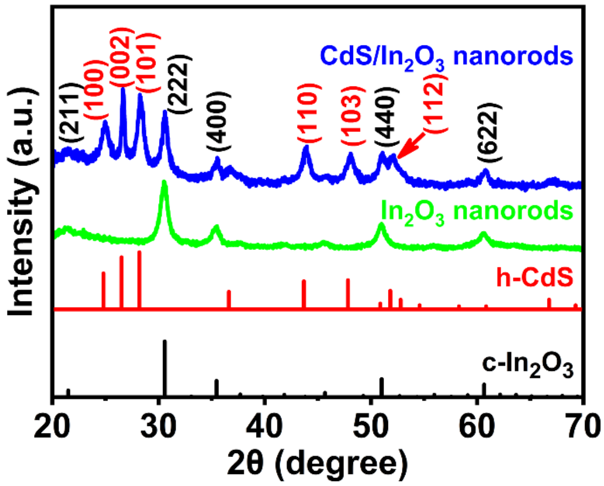

Figure S12. XRD patterns of the as-prepared In_2O_3 nanorods and CdS/In_2O_3 nanorods.

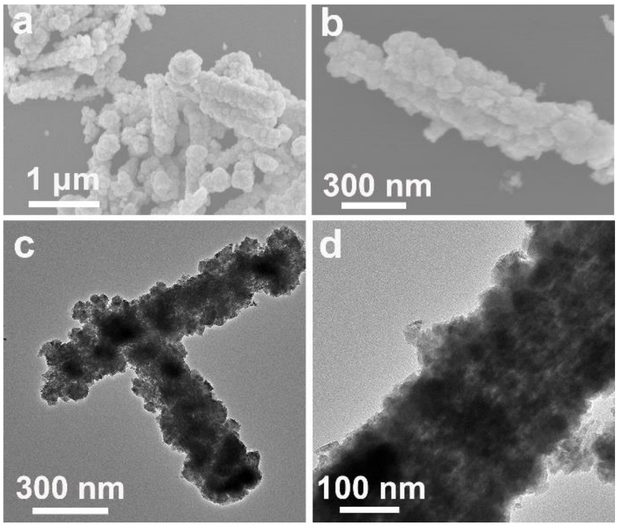

Figure S13. (a, b) SEM and (c, d) TEM images of CdS/In_2O_3 nanorods.

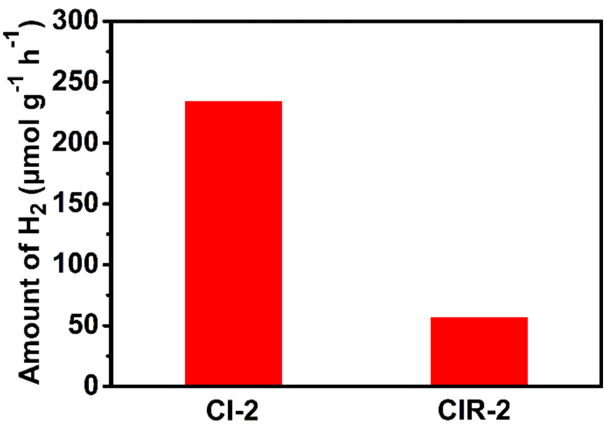

Figure S14. Photocatalytic activities of CdS/In_2O_3-2 (CI-2) and CdS/In_2O_3 nanorods (CIR-2) towards visible-light hydrogen production from water.

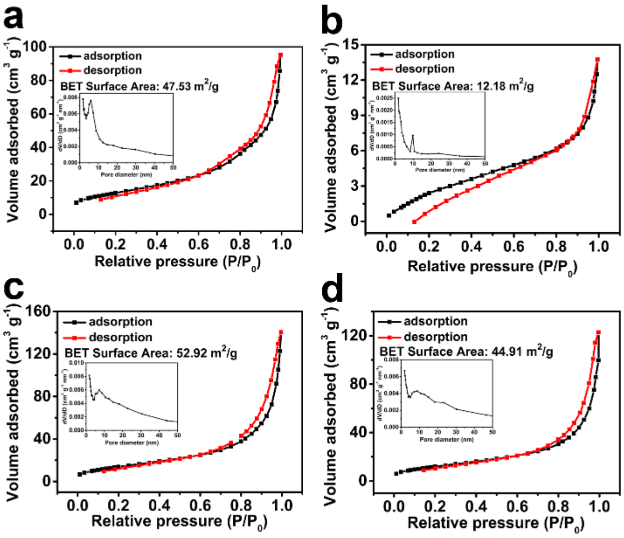

Figure S15. Nitrogen adsorption-desorption isotherms of (a) In_2O_3 nanotubes, (b) CdS nanoparticles, (c) CdS/In_2O_3-1 and (d) CdS/In_2O_3-3. Insets in (a-d) are the pore size distributions of corresponding samples.

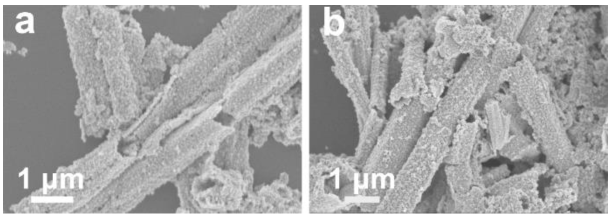

Figure S16. SEM images of CdS/In_2O_3-2 (a) before and (b) after the photocatalytic cyclic test.

Supplementary references

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