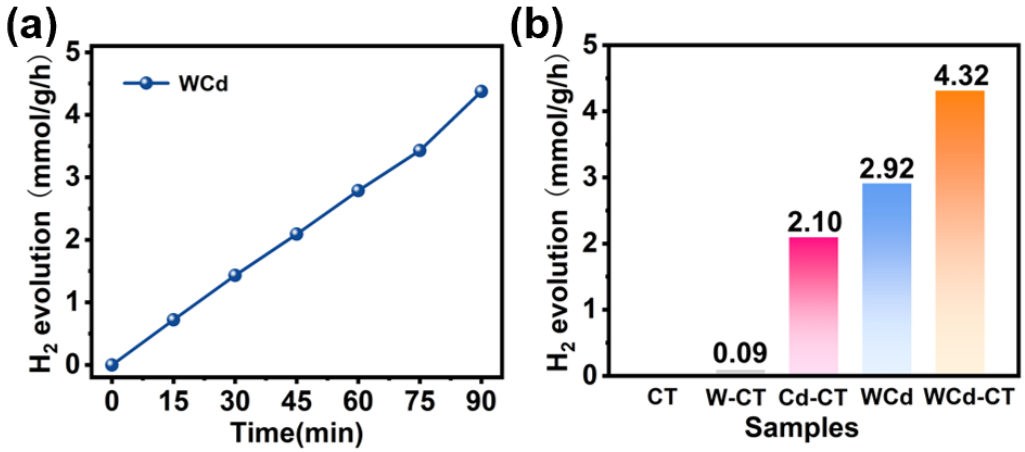
Electronic Supplementary Material



(a) (b)

Fig. S1 Diagrams of hydrogen production performance of prepared samples.
(a) Time course hydrogen evolution of powder WO_3/CdS; (b) comparison of hydrogen production rate of different samples.

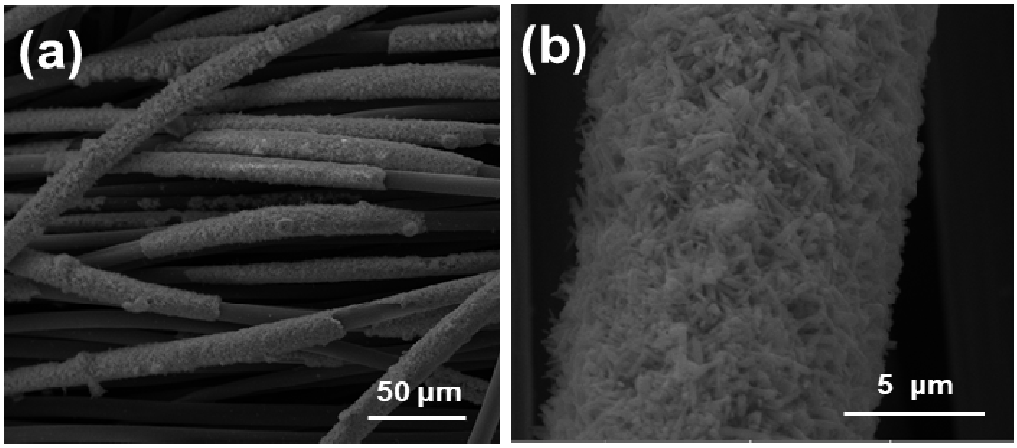


Fig. S2 SEM images of WCd-CT after reaction.

Table S1 Comparison of catalytic activities of different Z-scheme systems

Photocatalyst	Sacrificial agent	Light source	H_2 production/ ($\mu mol \cdot h^{-1} \cdot g^{-1}$)	Ref.
CdS/WO_3/CT	$Na_2S+Na_2SO_3$	300 W Xe lamp, AM 1.5	4320	This work
$CdS/Pt/WO_3$	Lactic acid	500 W Xe lamp, λ > 400 nm	2900	[1]
$CdS/CdWO_4$	$Na_2S+Na_2SO_3$	300 W Xe lamp, AM 1.5	2400	[2]
CdS/ZnO	$Na_2S+Na_2SO_3$	350 W Xe lamp	4134	[3]
WO_3@MoS_2/CdS	Lactic acid	300 W Xe lamp	8200	[4]
CdS QDs/CeO_2	$Na_2S+Na_2SO_3$	300 W Xe lamp, λ > 300 nm	101	[5]
CdS@$ZnIn_2S_4$	/	300 W Xe lamp, λ > 400 nm	540	[6]
CdS/MnS	$Na_2S+Na_2SO_3$	300 W Xe lamp, λ > 400 nm	1595	[7]
CdS/MoS_2 QDs/$ZnIn_2S_4$	Lactic acid	300 W Xe lamp	2107	[8]

References

1. Zhang L J, Li S, Liu B K, et al. Highly efficient CdS/WO_3 photocatalysts: Z-scheme photocatalytic mechanism for their enhanced photocatalytic H_2 evolution under visible light. ACS Catalysis, 2014, 4(10): 3724–3729
2. Cui H, Li B, Li Z, et al. Z-scheme based $CdS/CdWO_4$ heterojunction visible light photocatalyst for dye degradation and hydrogen evolution. Applied Surface Science, 2018, 455: 831–840
3. Wang S, Zhu B, Liu M, et al. Direct Z-scheme ZnO/CdS hierarchical photocatalyst for enhanced photocatalytic H2-production activity. Applied Catalysis B: Environmental, 2019, 243: 19–26
4. Zhang L, Zhang H, Jiang C, et al. Z-scheme system of WO_3@MoS_2/CdS for photocatalytic evolution H_2: MoS_2 as the charge transfer mode switcher, electron-hole mediator and cocatalyst.

Applied Catalysis B: Environmental, 2019, 259: 118073

5. Ma Y, Bian Y, Liu Y, et al. Construction of Z-scheme system for enhanced photocatalytic H_2 evolution based on CdS quantum dots/CeO_2 nanorods heterojunction. ACS Sustainable Chemistry and Engineering, 2018, 6(2): 2552–2562
6. Zhang E, Zhu Q, Huang J, et al. Visually resolving the direct Z-scheme heterojunction in CdS@$ZnIn_2S_4$ hollow cubes for photocatalytic evolution of H_2 and H_2O_2 from pure water. Applied Catalysis B: Environmental, 2021, 293: 120213
7. Li J, Liu X, Zhang J. Smart assembly of sulfide heterojunction photocatalysts with well-defined interfaces for direct Z-scheme water splitting under visible light. ChemSusChem, 2020, 13(11): 2996–3004
8. Chen W, Yan R, Zhu J, et al. Highly efficient visible-light-driven photocatalytic hydrogen evolution by all-solid-state Z-scheme CdS/QDs/$ZnIn_2S_4$ architectures with MoS_2 quantum dots as solid-state electron mediator. Applied Surface Science, 2020, 504: 144406