

## **Supporting information**

### **Synergistic Precise Construction of All-Solid-State Z-Scheme Heterojunctions by Electrospinning and Photodeposition for Photocatalytic Hydrogen Evolution**

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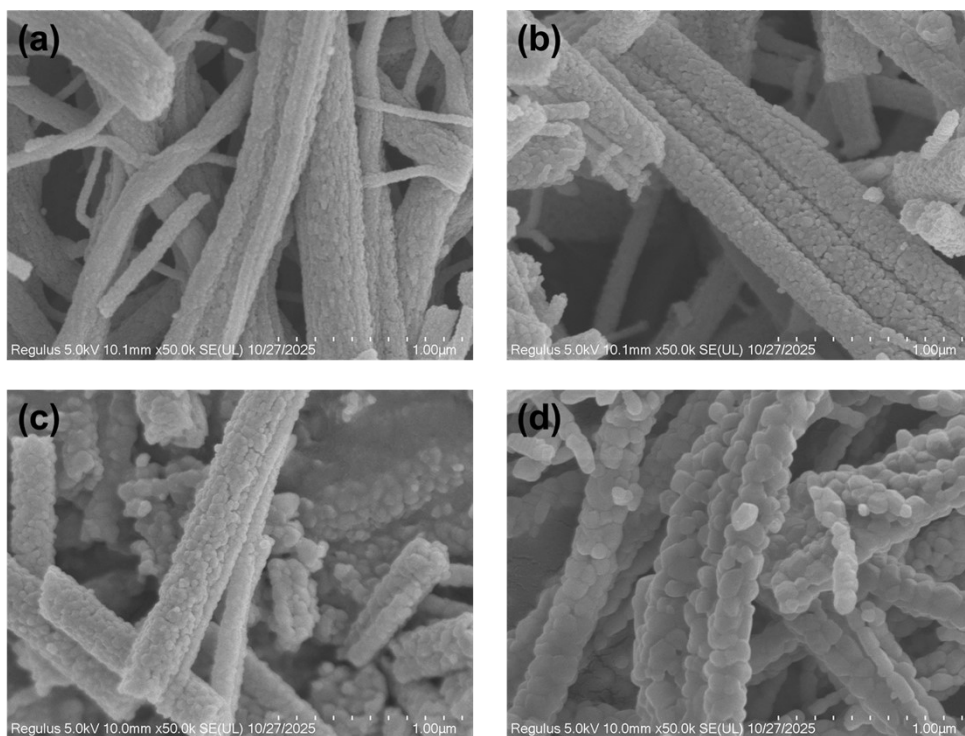


Figure S1.  $\text{TiO}_2$  nanofibers sintered at different temperature (a)550°C, (b) 650°C, (c) 750°C and (d) 850°C.

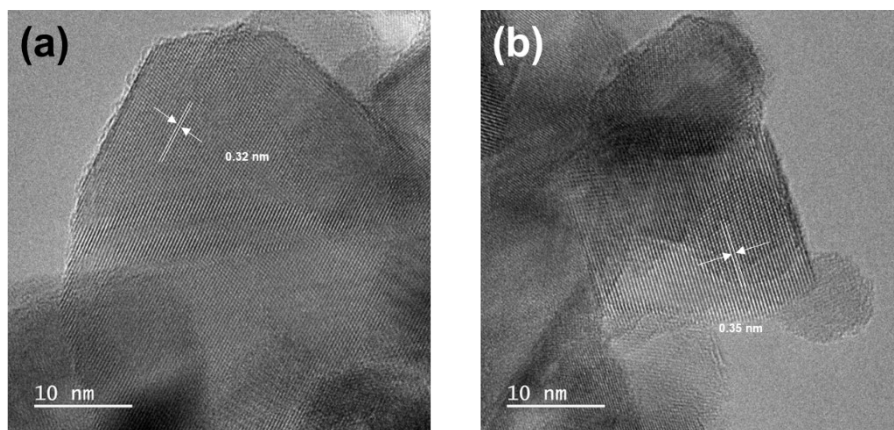


Figure. S2 (a-b) HRTEM images of TiO<sub>2</sub>-750.

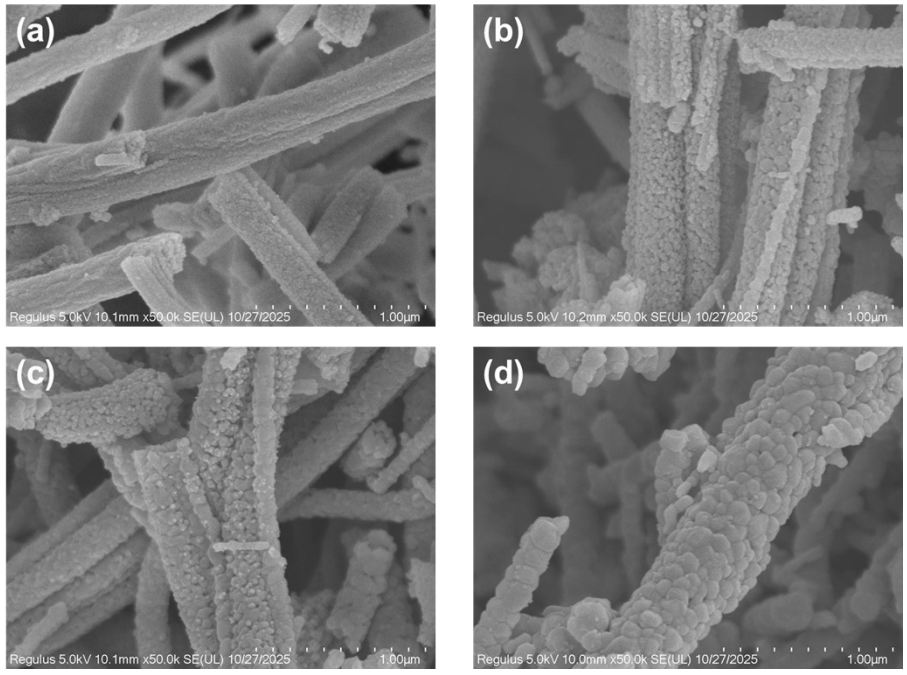


Figure S3. Different TiO<sub>2</sub> nanofibers photo-deposition Pt nanoparticles (a)550°C, (b) 650°C, (c) 750°C and (d) 850°C.

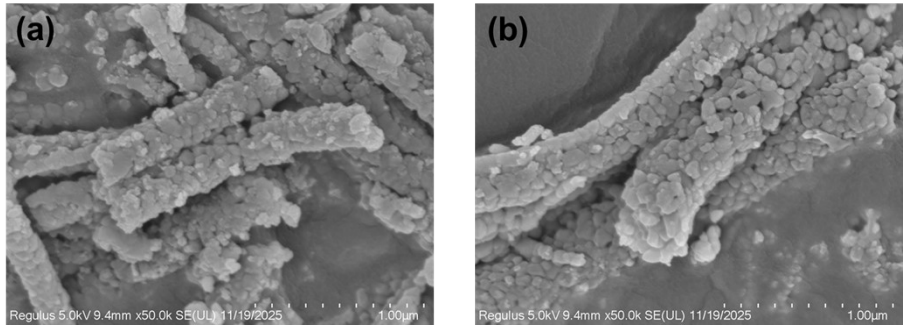


Figure S4. TiO<sub>2</sub> (750 °C) nanofibers photo-deposition CdS (30 min) nanoparticles.

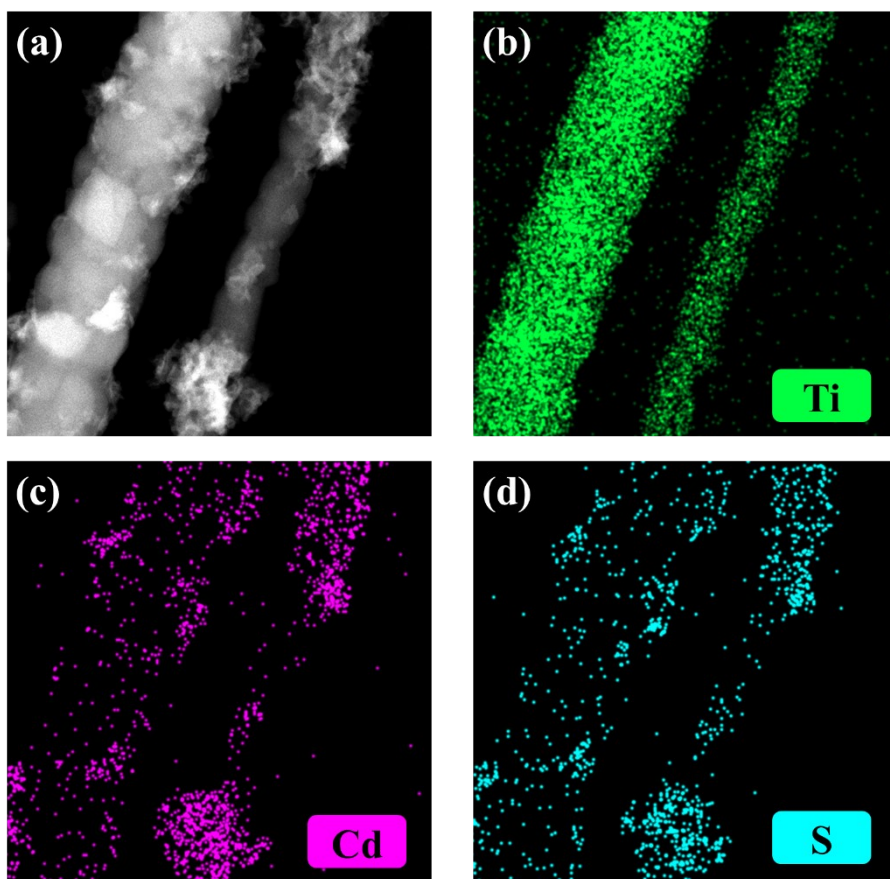


Figure S5 (a-d) EDX mapping of  $\text{TiO}_2\text{-CdS}$ .

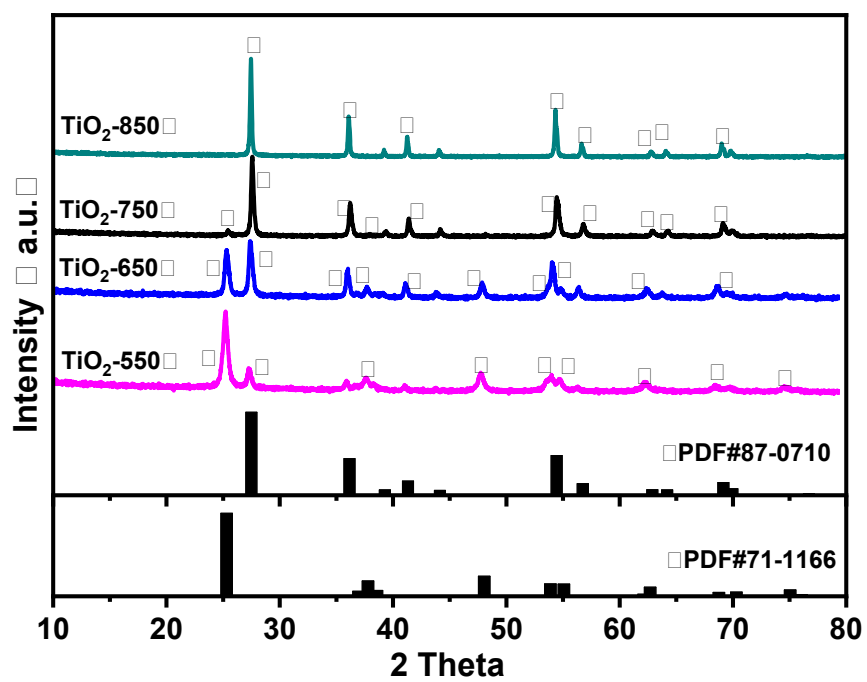


Figure S6. XRD patterns of TiO<sub>2</sub> NFs sintered at different temperature.

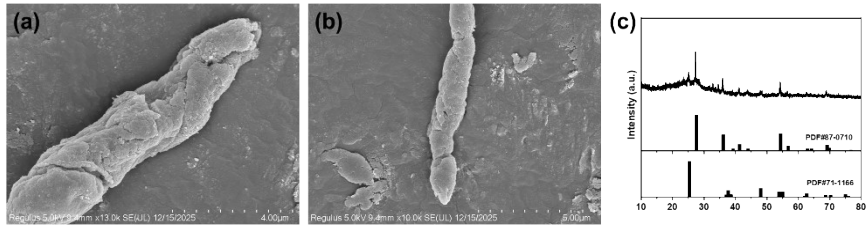


Figure S7. (a-b) SEM images and (c) XRD pattern of TiO<sub>2</sub>-Pt-CdS after photocatalytic hydrogen production.

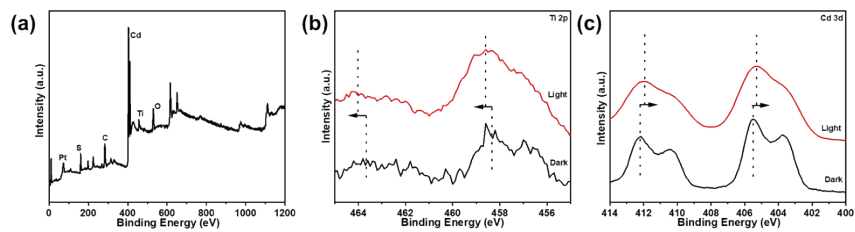


Figure S8. (a) Survey XPS spectrum and In-situ XPS spectra of (b) Ti 2p and (c) Cd 3d of TiO<sub>2</sub>-Pt-CdS.

Table S1 Comparison of obtained results of photocatalytic hydrogen evolution rate with literature reports.

Photocatalyst	Light source	Efficiency	Reference
TiO <sub>2</sub> -Pt-CdS	300 W Xenon Light	4.02 mmol·g <sup>-1</sup> ·h <sup>-1</sup>	This work
CuO/PI	300 W Xenon Light (λ ≥ 420 nm)	418.4 μmol·g <sup>-1</sup>	1
Au@CdS/U-WO <sub>3</sub>	300 W Xenon Light (420 nm cut-off filter)	1.39 mmol·g <sup>-1</sup> ·h <sup>-1</sup>	2
ZnIn <sub>2</sub> S <sub>4</sub> /ZnS	300 W Xenon Light (AM 1.5G)	464.1 μmol·h <sup>-1</sup>	3
0.5%-MoS <sub>x</sub> /TiO <sub>2</sub>	300 W Xenon Light	1835.7 μmol·g <sup>-1</sup> ·h <sup>-1</sup>	4
CdS-MoS <sub>2</sub> /OCN	visible light (λ > 420 nm)	638.5 μmol·g <sup>-1</sup> ·h <sup>-1</sup>	5
Bi-BiOCl/AgCl	300 W Xenon Light (420 nm cut-off filter)	198.2 μmol·g <sup>-1</sup> ·h <sup>-1</sup>	6
g-C <sub>3</sub> N <sub>4</sub> /Au/P25	300 W Xenon Light	259 μmol·g <sup>-1</sup> ·h <sup>-1</sup>	7
CdS/QDs/ZnIn <sub>2</sub> S <sub>4</sub>	300 W Xenon Light (λ ≥ 420 nm)	2107.5 μmol·g <sup>-1</sup> ·h <sup>-1</sup>	8
ZnIn <sub>2</sub> S <sub>4</sub> /CQDs/CeO <sub>2</sub> -2	300 W Xenon Light (λ ≥ 420 nm)	7.7 mmol·g <sup>-1</sup> ·h <sup>-1</sup>	9
g-C <sub>3</sub> N <sub>4</sub> /Au/C-TiO <sub>2</sub>	300 W Xenon Light (420 nm cut-off filter)	129 μmol·g <sup>-1</sup> ·h <sup>-1</sup>	10

## Reference

- [1] S.Q. Chu, Y. Hu, J. Zhang, Z.W. Cui, J.Y. Shi, Y. Wang, Z.G. Zou, Constructing direct Z-scheme CuO/PI heterojunction for photocatalytic hydrogen evolution from water under solar driven, *INT J HYDROGEN ENERG*, 2021, **46**, 9064-9076.
- [2] X.L. Yin, J. Liu, W.J. Jiang, X. Zhang, J.S. Hu, L.J. Wan, Urchin-like Au@CdS/WO<sub>3</sub> micro/nano heterostructure as a visible-light driven photocatalyst for efficient hydrogen generation, *CHEM COMMUN*, 2015, **51**, 13842-13845.
- [3] S.S. Liu, Y.C. Mao, Z.Y. Su, F. Fang, K. Li, Y.H. Wu, P.Y. Liu, P. Li, K. Chang, A Z-scheme ZnIn<sub>2</sub>S<sub>4</sub>/ZnS heterojunction catalyst: insight into enhanced photocatalytic performance and mechanism, *CATAL SCI TECHNOL*, 2023, **13**, 3351-3357.
- [4] F.Y. Du, H. Lu, S.S. Lu, J. Wang, Y. Xiao, W.R. Xue, S.N. Cao, Photodeposition of amorphous MoS<sub>x</sub> cocatalyst on TiO<sub>2</sub> nanosheets with {001} facets exposed for highly efficient photocatalytic hydrogen evolution, *INT J HYDROGEN ENERG*, 2018, **43**, 3223-3234.
- [5] H.F. Yin, H.J. Chen, X.R. Feng, X. Chen, Q. Fei, Y.J. Zhang, Q.Y. Zhao, Y.Z. Zhang, CdS/MoS<sub>2</sub> nanoparticles anchored on oxygen-doped g-C<sub>3</sub>N<sub>4</sub> nanosheets all-solid-state Z-scheme heterojunctions for efficient H<sub>2</sub> evolution, *INT J HYDROGEN ENERG*, 2024, **51**, 433-442.
- [6] M. Du, S.Y. Zhang, Z.P. Xing, Z.Z. Li, J.W. Yin, J.L. Zou, Q. Zhu, W. Zhou, All-Solid Z-Scheme Bi-BiOCl/AgCl Heterojunction Microspheres for Improved Electron-Hole Separation and Enhanced Visible Light-Driven Photocatalytic Performance, *Langmuir*, 2019, **35**, 7887-7895.
- [7] W.R. Zhao, L.H. Xie, M. Zhang, Z.Y. Ai, H.P. Xi, Y.J. Li, Q.M. Shi, J.S. Chen, Enhanced photocatalytic activity of all-solid-state g-C<sub>3</sub>N<sub>4</sub>/Au/P25 Z-scheme system for visible-light-driven H<sub>2</sub> evolution, *INT J HYDROGEN ENERG*, 2016, **41**, 6277-6287.
- [8] W. Chen, R.Q. Yan, J.Q. Zhu, G.B. Huang, Z. Chen, Highly efficient visible-light-driven photocatalytic hydrogen evolution by all-solid-state Z-scheme CdS/QDs/ZnIn<sub>2</sub>S<sub>4</sub> architectures with MoS<sub>2</sub> quantum dots as solid-state electron mediator, *APPL SURF SCI*, 2020, **504**, 144406.
- [9] Y. Liu, X.J. Chu, C. Zhu, W.D. Li, C.Q. Li, S.Y. Lu, Carbon quantum dots as photogenerated carrier transfer bridges in all-solid Z-scheme ZnIn<sub>2</sub>S<sub>4</sub>/CQDs/CeO<sub>2</sub> heterostructures for efficient visible-light-driven photocatalytic hydrogen generation, *NANO RES*, 2025, **18**, 94907559.
- [10] Y.J. Zou, J.W. Shi, D.D. Ma, Z.Y. Fan, C.M. Niu, L.Z. Wang, Fabrication of g-C<sub>3</sub>N<sub>4</sub>/Au/C-TiO<sub>2</sub> Hollow Structures as Visible-Light-Driven Z-Scheme Photocatalysts with Enhanced Photocatalytic H<sub>2</sub> Evolution, *CHEMCATCHEM*, 2017, **9**, 3752-3761.