

Supplementary data

Rationally Designed 3DTiO₂@CdZnS heterojunction photocatalyst for effectively enhanced visible-light-driven hydrogen evolution

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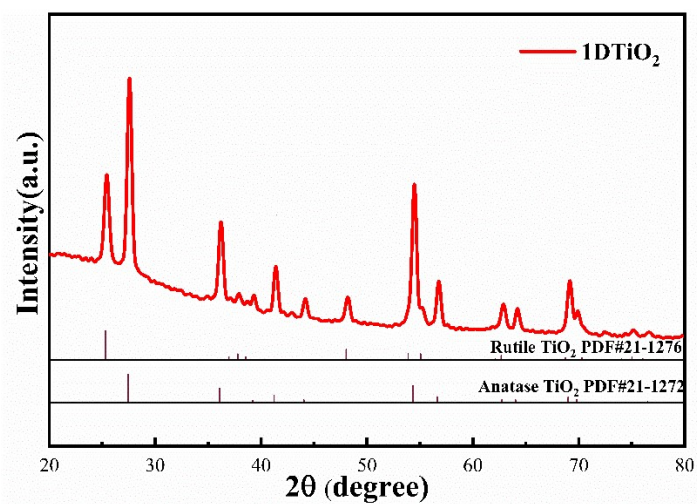


Fig. S1. X-ray diffraction patterns of 1DTiO₂

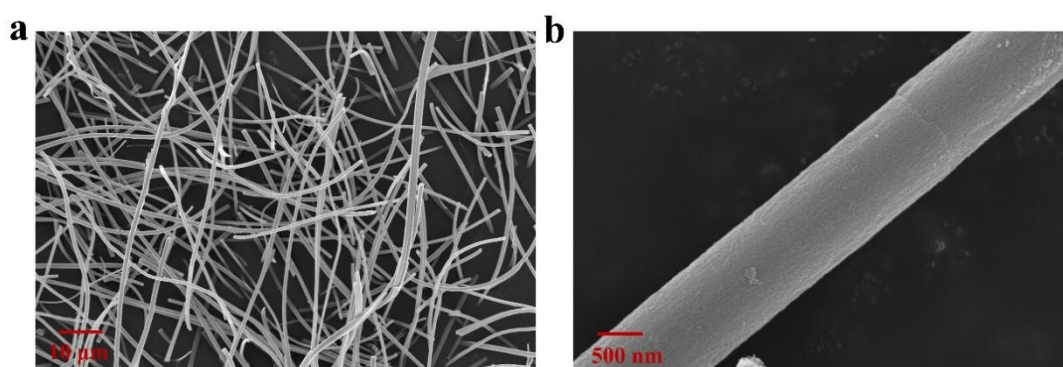


Fig. S2. SEM images of 1DTiO₂

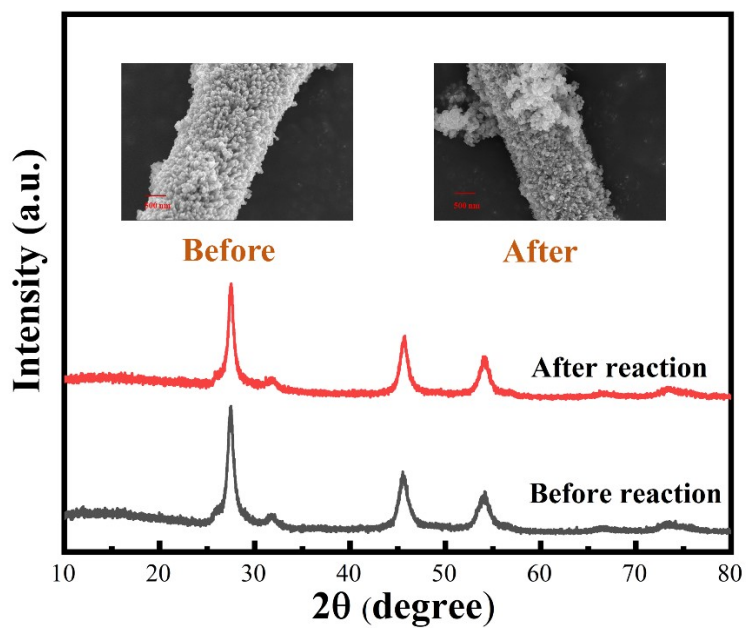


Fig. S3. XRD and SEM images before and after the reaction for 3DTiO₂/CZS-3

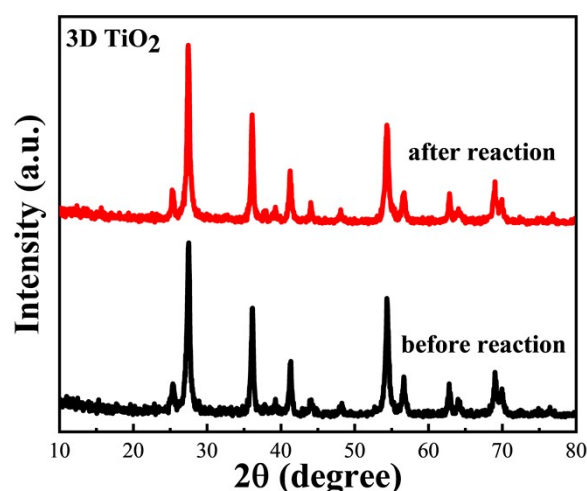


Fig. S4. X-ray diffraction patterns of raw 3D TiO₂ and 3D TiO₂ during composite synthesis without Zn and Cd.

Table S1. The comparison of photocatalytic H₂ production activity of recently reported Cd_xZn_{1-x}S composite photocatalysts.

Photocatalyst	Amount of photocatalyst (mg)	Scavenger	Light source	Rate of H ₂ production [mmol h ⁻¹ g ⁻¹]	AQY at 420 nm	Reference
3DTiO₂/Cd_{0.5}Zn_{0.5}S	10	Na₂S/Na₂SO₃	300 W Xe lamp	75.38	19.67%	This work
Ni ₃ C/Zn _{0.5} Cd _{0.5} S	50	Na ₂ S/Na ₂ SO ₃	300 W Xe lamp	15.66	19.25%	1
ZnO/Cd _{0.5} Zn _{0.5} S	20	Na ₂ S/Na ₂ SO ₃	300 W Xe lamp	40.14	22.8%	2
CoO/Cd _{0.5} Zn _{0.5} S	10	Na ₂ S/Na ₂ SO ₃	300 W Xe lamp	178	37.1%	3
Ni ₂ P/Cd _{0.5} Zn _{0.5} S	50	Na ₂ S/Na ₂ SO ₃	300 W Xe lamp	23.46	18.95%	4
NiTiO ₃ /Cd _{0.5} Zn _{0.5} S	40	Na ₂ S/Na ₂ SO ₃	300 W Xe lamp	26.45	34%	5
CrOx/ZnCdS	50	TEOA	300 W Xe lamp	21.1		6
g-C ₃ N ₄ /CNTs/CdZnS	50	Na ₂ S/Na ₂ SO ₃	300 W Xe lamp	28.74		7
Ti ₃ C ₂ /Cd _{0.5} Zn _{0.5} S	50	Na ₂ S/Na ₂ SO ₃	300 W Xe-lamp	9.071		8
CoPPi-M/Cd _{0.5} Zn _{0.5} S	50	Na ₂ S/Na ₂ SO ₃	300 W Xe-lamp	6.87	20.7%	9
Na ₈ Ta ₆ O ₁₉ /Cd _{0.7} Zn _{0.3} S	10	Na ₂ S/Na ₂ SO ₃	300 W Xe-lamp	43.05	37%	10

References

1. R. Shen, Y. Ding, S. Li, P. Zhang, Q. Xiang, Y. H. Ng and X. Li, *Chinese Journal of Catalysis*, 2021, **42**, 25-36.
2. G. Liu, J. Chen, Z. Xie, S. Lin, L. Xie, Y. Deng and C.-Z. Lu, *ACS Applied Energy Materials*, 2022, **5**, 3502-3513.
3. H. Zhao, L. Guo, C. Xing, H. Liu and X. Li, *Journal of Materials Chemistry A*, 2020, **8**, 1955-1965.
4. D. Dai, L. Wang, N. Xiao, S. Li, H. Xu, S. Liu, B. Xu, D. Lv, Y. Gao, W. Song, L. Ge and J. Liu, *Applied Catalysis B: Environmental*, 2018, **233**, 194-201.
5. B. Li, W. Wang, J. Zhao, Z. Wang, B. Su, Y. Hou, Z. Ding, W.-J. Ong and S. Wang, *Journal of Materials Chemistry A*, 2021, **9**, 10270-10276.
6. M. Ahmad, X. Quan, S. Chen, H. Yu and Z. Zeng, *Applied Catalysis B: Environmental*, 2021, **283**.
7. C. Feng, Z. Chen, J. Jing, M. Sun, J. Tian, G. Lu, L. Ma, X. Li and J. Hou, *Journal of Materials Science & Technology*, 2021, **80**, 75-83.
8. G. Zeng, Y. Cao, Y. Wu, H. Yuan, B. Zhang, Y. Wang, H. Zeng and S. Huang, *Applied Materials Today*, 2021, **22**.
9. L. J. Gao, C. C. Weng, Y. S. Wang, X. W. Lv, J. T. Ren and Z. Y. Yuan, *J Colloid Interface Sci*, 2022, **606**, 544-555.
10. X. Zhou, H. Yu, D. Zhao, X. Wang and S. Zheng, *Applied Catalysis B: Environmental*, 2019, **248**, 423-429.