

Optimization of Electron Distribution by Sulfidation: Constructing 1D S-Co₃O₄/ZnIn₂S₄ Heterojunction for Efficient Visible-Light- Driven Hydrogen Evolution Catalysis

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Table S1. Comparison of photocatalytic activity with Co₃O₄/ZnIn₂S₄.

Catalyst	Catalyst weight	Sacrificial agents	Rate of H ₂ evolution(mmol/g/h)	Refs.
Co ₃ O ₄ /ZnIn ₂ S ₄	50mg	TEOA	10.77	1
S-Co ₃ O ₄ /ZnIn ₂ S ₄	10mg	TEOA	4.3	This work
ZnIn ₂ S ₄ @CoS ₂	40mg	TEOA	2.768	2
Co ₃ O ₄ /Ag:ZnIn ₂ S ₄	10mg	TEOA	0.695	3
Co ₃ O ₄ /ZnIn ₂ S ₄	10mg	TEOA	3.844	4
CoS _{1.097} @ZnIn ₂ S ₄	20mg	TEOA	2.632	5
C/MoS ₂ @ZnIn ₂ S ₄ /Co ₃ O	10mg	TEOA	6.7	6

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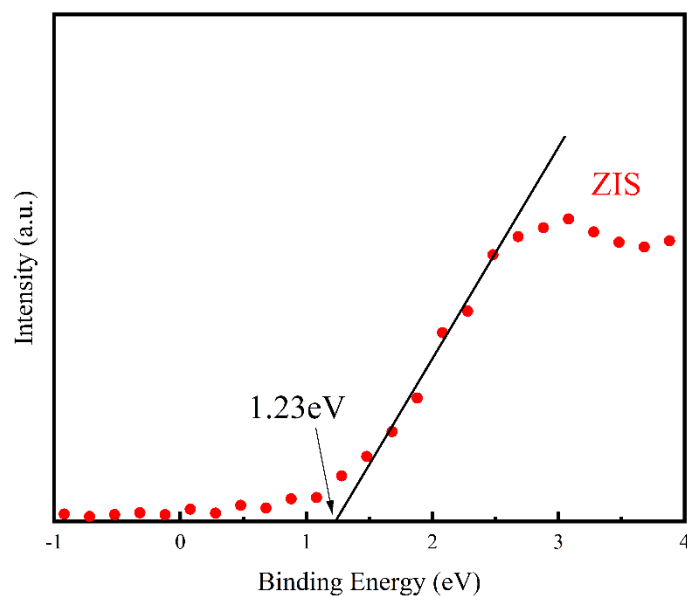


Fig. S1. The XPS valence band spectrum of ZIS.

References

1. Z. H. Yan, W. Gong, X. M. Liu, A. L. Gao, Y. Li, Y. Y. Wang and J. Lin, *Fuel*, 2025, **393**, 13.
2. X. Q. Xi, Q. Dang, G. Y. Wang, W. Q. Chen and L. Tang, *New J. Chem.*, 2021, **45**, 20289-20295.
3. Z. M. Liang, B. B. Bai, X. F. Wang, Y. Gao, Y. Li, Q. H. Bu, F. Ding, Y. G. Sun and Z. H. Xu, *RSC Adv.*, 2024, **14**, 6205-6215.
4. Y. B. Zhang, D. Y. Chen, N. J. Li, Q. F. Xu, H. Li and J. M. Lu, *Appl. Surf. Sci.*, 2023, **610**, 10.
5. X. J. Feng, H. S. Shang, J. L. Zhou, D. Wang, B. Zhang, X. Y. Gao and Y. F. Zhao, *Chem. Eng. J.*, 2023, **457**, 9.
6. W. Yan, Y. Y. Xu, S. W. Hao, Z. D. He, L. L. Wang, Q. Y. Wei, J. Xu and H. Tang, *Inorg. Chem.*, 2022, **61**, 4725-4734.