Sting ball-like heterostructures of SnS₂/ZnTe with improved bifunctional photo/electrocatalytic activity towards Overall Water Splitting

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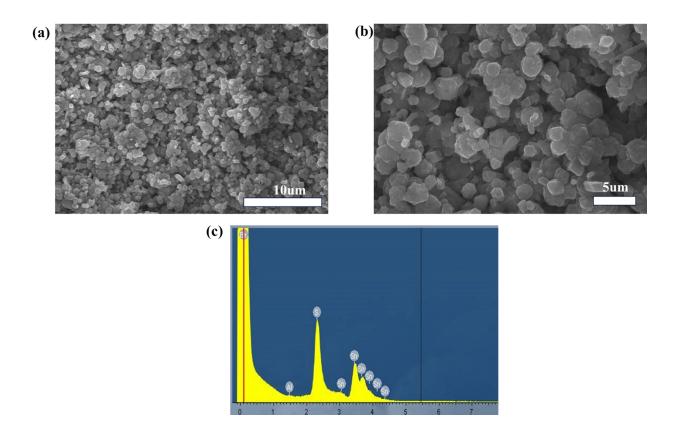


Figure S1. (a-b) Sem image of SnS₂ (b) EDX spectra of SnS₂

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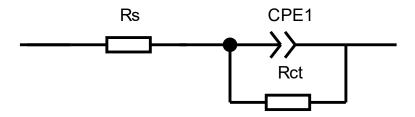


Figure S2. Circuit diagram

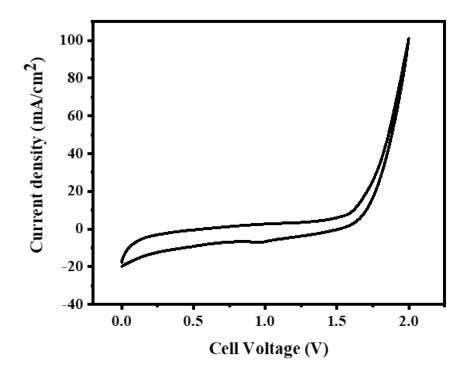


Figure S3: Overall water-splitting CV

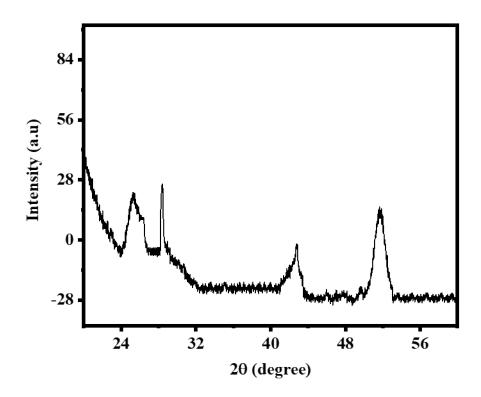


Figure S4: XRD pattern of SnS₂/ZnTe after OER and HER study

Table S1. Comparison table for OER

Sr.No	Sample Name	Over Potential	Tafel Slop	Ref
-		(mV)	(mV/dec)	
1	CuS/SnS ₂ /rGO	264	47	[1]
2	TiO ₂ /SnS ₂	570	107	[2]
3	C@SnS ₂ /SnS	380	63	[3]
4	Co-doped SnS ₂	281	62	[4]
5	NiFe-SnS ₂ / CC-3	251	41	[5]
6	SnS ₂ /ZnTe	105	47	Present
				work

Table S2. Comparison table for HER.

Sr No.	Sample Name	Over Potential (mV)	Tafel Slop (mV/dec)	Ref.
1	MoS ₂ /SnS ₂	288	50	[6]
2	SnS ₂ /SnO ₂	108	50	[7]
3	MoSe ₂ /SnS ₂ -1.5	285	109	[8]
4	MoS ₂ NPs/SnS ₂ NS	249	42	[9]
5	SnS ₂ /ZnTe	231	80	Present work

References

- 1. Yao, S., et al., Coupling SnS 2 and rGO aerogel to CuS for enhanced light-assisted OER electrocatalysis. 2021. **50**(16): p. 5530-5539.
- 2. Li, M., et al., Synergistic effect of the valence bond environment and exposed crystal facets of the TiO 2/SnS 2 heterojunction for achieving enhanced electrocatalytic oxygen evolution. 2018. **6**(8): p. 3488-3499.
- 3. Jiang, M., et al., *Hollow C@ SnS2/SnS nanocomposites: high efficient oxygen evolution reaction catalysts.* 2021. **583**: p. 149-156.
- 4. Jiang, M., et al., *Co-doped SnS 2 nanosheet array for efficient oxygen evolution reaction electrocatalyst.* 2019. **54**: p. 13715-13723.
- 5. Deng, K., et al., Synergistic Coupling of SnS2 Nanosheet Arrays with Ni/Fe Dual Metal and Ru Nanodots via a Cation Exchange Strategy for Overall Water Splitting. 2021. **61**(1): p. 382-391.
- 6. Xiao, X., et al., *Preparation of the flower-like MoS2/SnS2 heterojunction as an efficient electrocatalyst for hydrogen evolution reaction.* 2020. **487**: p. 110890.
- 7. Wu, J., et al., Exposing highly active (100) facet on a SnS2/SnO2 electrocatalyst to boost efficient hydrogen evolution. 2021. **292**: p. 120200.
- 8. Chen, Y., et al., *Electrocatalytically inactive SnS2 promotes water adsorption/dissociation on molybdenum dichalcogenides for accelerated alkaline hydrogen evolution.* 2019. **64**: p. 103918.
- 9. Hu, L., et al., *MoS2 nanoparticles coupled to SnS2 nanosheets: The structural and electronic modulation for synergetic electrocatalytic hydrogen evolution.* 2018. **366**: p. 8-15.