Supplementary Information

for

Path of electron transfer created by S-doped NH_2-UiO-66 bridged $ZnIn_2S_4/MoS_2$ nanosheet heterostructure for boosting photocatalytic hydrogen evolution

Qi Ran[a], Zebin Yu[a,*], Ronghua Jiang[b], Lun Qian[a], Yanping Hou[a,c], Fei Yang[d], Fengyuan Li[a], Mingjie Li[a], Qianqian Sun[a], Heqing Zhang[a]

[a] School of Resources, Environment and Materials, Guangxi University, Nanning 530004, PR China

[b] School of Chemical and Environmental Engineering, Shaoguan University, Shaoguan 512005, P.R. China

[c] Guangxi Bossco Environmental Protection Technology Co., Ltd, 12 Kexin Road, Nanning 530007, China

[d] Guangzhou Institution Energy Testing, Guangzhou 510170, Guangzhou, P. R. China

[*] Corresponding author: Tel.: + 8613877108420; E-mail: yuzebin@gxu.edu.cn (Z. Yu)

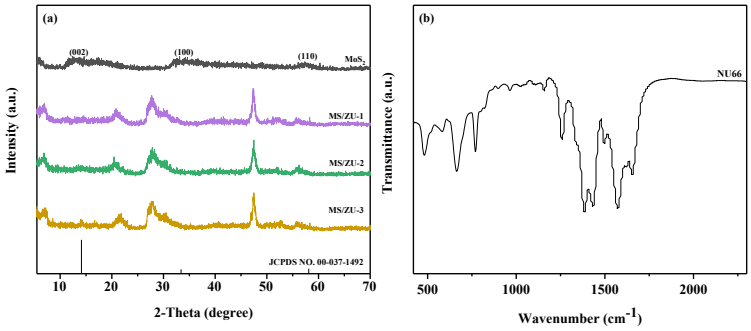


Fig. S1 (a) PXRD patterns of MoS_2 and MS/ZU samples, (b) FT-IR spectra of NU66 sample.

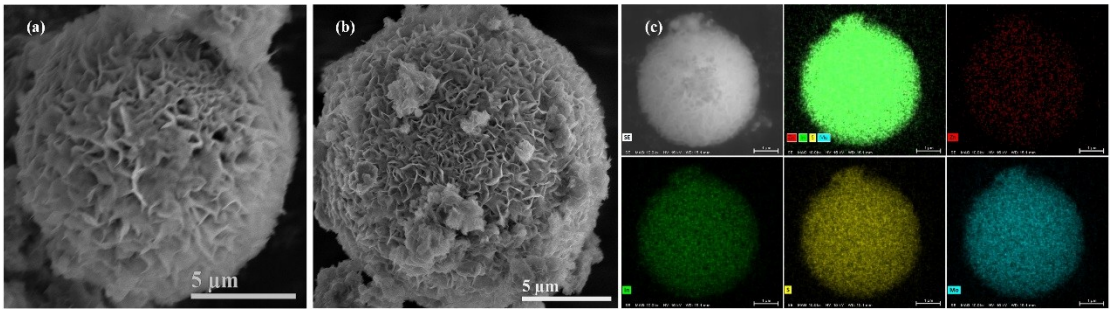


Fig. S2 FE-SEM images of (a) MS/ZU-1, (b) MS/ZU-3; (c) Elemental mapping images of MS/ZIS sample.

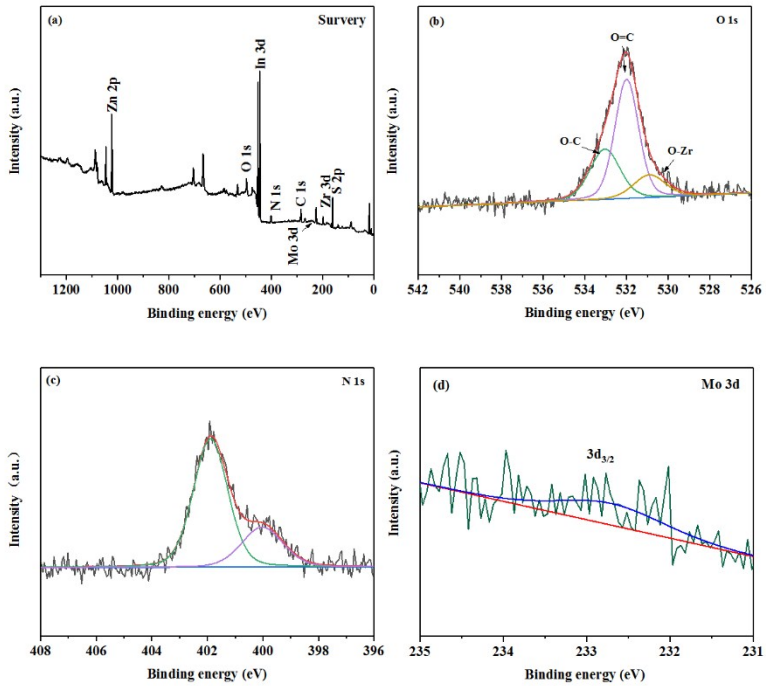


Fig. S3 XPS spectra of MS/ZU-2 (a) survey spectra, (b) O 1s, (c) N 1s, (d) Mo 3d spectra.

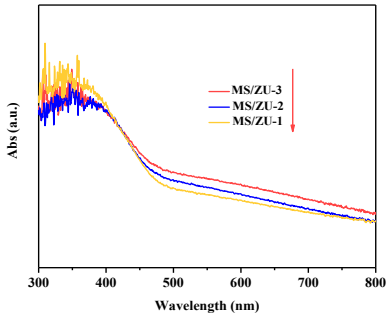


Fig.S4 UV–vis diffuse reflectance spectra of the synthesized MS/ZU samples.

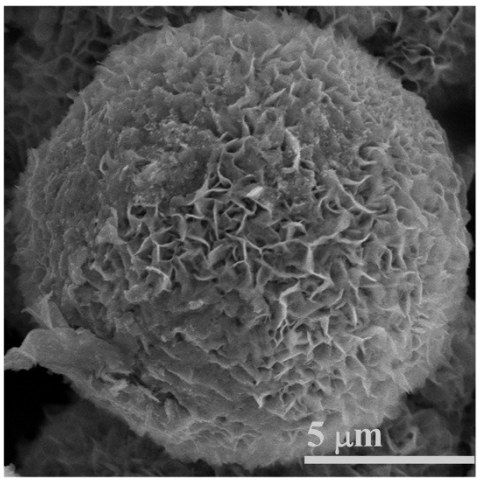


Fig. S5 The SEM image of used MS/ZU-2 sample.

Table S1 The BET surface area, pore volume and average pore size of ZIS, NU66 and MS/ZU-2.

Samples	S_{BET}($m^2 g^{-1}$)	Pore volume ($cm^3 g^{-1}$)	Average pore size (nm)
NU66	653.5	0.231	2.665
ZIS	102.9	0.159	18.639
MS/ZU-2	131.1	0.226	18.569

Table S2 the ZIS, MS/ZIS and MS/ZU-2 samples are fitted with R_s, R_{ct} and constant phase elements (CPE).

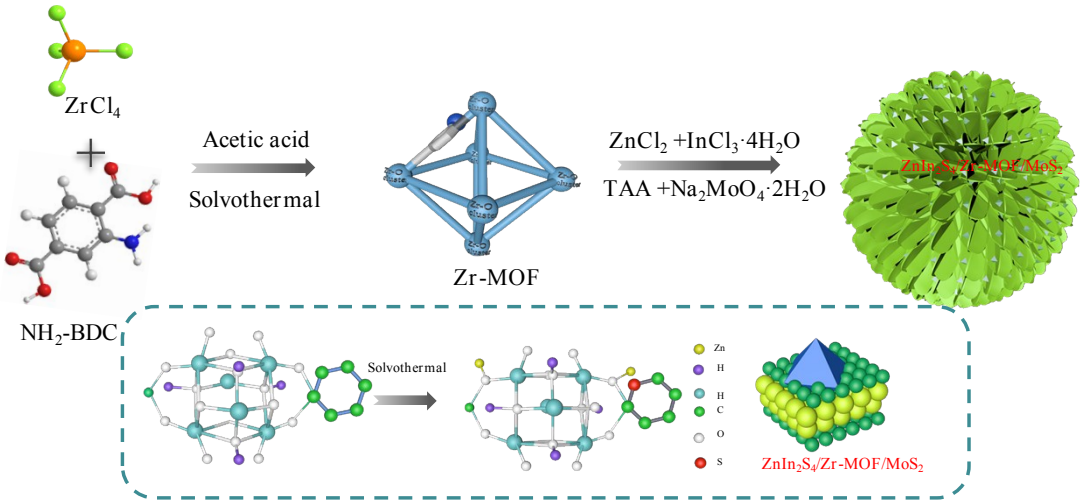
Sample	R_s (Ω)	R_{ct} (Ω)	CPE (F, 10^{-4})
ZIS	8.961	1220	2.309
MS/ZIS	10.82	580	1.412
MS/ZU-2	9.704	403.8	2.245

Table S3 TRPL decay spectra of samples

Samples	ZIS	MS/ZIS	MS/ZU-2
t1 (ns)	124.7	124.6	124.5
A1 (%)	36.52	22.78	17.09
t2 (ns)	27.89	26.29	21.98
A2 (%)	63.48	77.22	82.91
tA (ns)	97.59	83.61	77.21
$K_{ET\ (}10^6\ s^{-1}{}_{)}$	—	1.7	2.7
η_{inj} (%)	—	14.3	20.9

Table S4 Photocatalytic hydrogen evolution over the reported $ZnIn_2S_4$ composites

Photocatalysts	Catalyst, Sacrificial agents	Hydrogen production rate	Light Source	Reference
$ZnIn_2S_4$/ UiO-66-NH_2 /5%-MoS_2	40 mg, 10% TEOA	5.69 mmol g^{-1} h^{-1}	λ > 420 nm	Our work
MoS_2/ZnIn2S_4	50 mg, 0.25 M Na_2SO_3 and 0.35 M Na_2S	3.89 mmol g^{-1} h^{-1}	λ > 420 nm	[1]
$ZnIn_2S_4$/ NH_2-MIL-125	50 mg, 0.25 M Na_2SO_3 and 0.35 M Na_2S	2.21 mmol g^{-1} h^{-1}	λ > 420 nm	[2]
$ZnIn_2S_4$/UiO-66-NH_2	20 mg, 0.25 M Na_2SO_3 and 0.35 M Na_2S	2.19 mmol g^{-1} h^{-1}	λ > 420 nm	[3]
g-C_3N_4 @$ZnIn_2S_4$	50 mg, 50 ml water with 10 ml TEOA	2.78 mmol g^{-1} h^{-1-}	λ > 420 nm	[4]
TiO_2/$ZnIn_2S_4$	100 mg, 0.25 M Na_2SO_3 and 0.35 M Na_2S	0.35 mmol g^{-1} h^{-1-}	300 W Xe-lamp with a cutoff filter	[5]
MoS_2/$ZnIn_2S_4$	36 ml water with 4 ml lactic acid	4.97 mmol g^{-1} h^{-1}	300 W Xe lamp with a UV cutoff filter.	[6]
NiS/ $ZnIn_2S_4$	1.5 mg, 5 mL water with 50% lactic acid	5 μmol·h^{-1}	λ = 420 nm	[7]



Scheme. 1 Schematic representation of the formation process of $ZnIn_2S_4$/ NH_2-UiO-66 /MoS_2 sample.

References

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