Electronic supplementary information (ESI)

Construction of novel MoS_2@COF-Ph Heterojunction Photocatalysts for boosted photocatalytic efficiency and hydrogen production performance under sunlight

Bowen Dong[1], ‡ [a] Yuqi Wan[1], [a] Qingrong Cheng, [a,*] Hong Zhou, [a] Zhiquan Pan[a]

[a] School of Chemistry and Environmental Engineering, Wuhan Institute of Technology, Wuhan, 430205, PR China.

Corresponding authors:

*(Q.C.) E-mail: chengqr383121@sina.com

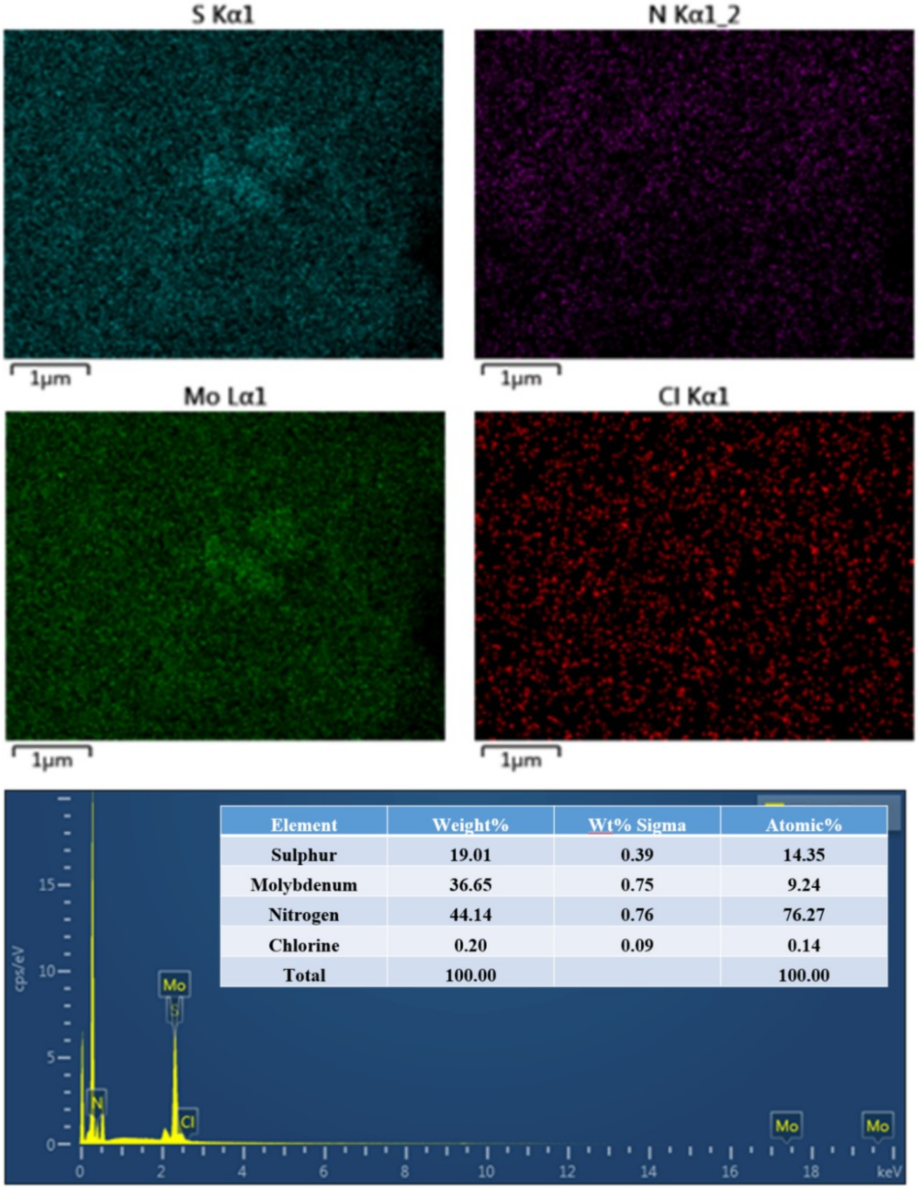
‡These authors contributed equally to this work.

Table S1 Comparison of TC degradation over MoS_2@COF-$Ph_{0.25}$ and other photocatalysts.

Catalyst /mg	*V(mL)/C_0 (mg·L^{-1})*	*Light source(λ>420nm)*	*Time (minutes)*	*Result(%)*	*TOF*	*Ref.*
MoS_2@COF-Ph/10	50/20	300 W Xe lamp	90	91.1%	143.6	This work
MoS_2/GO/25	25/20	300 W Xe lamp	120	54.8%	9.1	[1]
CdS/g-C_3N_4/50	100/10	300 W Xe lamp	20	93.2%	74.6	[2]
CoS_2/MoS_2@Z-50 /10	50/200	300 W Xe lamp	1440	81.76%	56.8	[3]
MoS_2/ Ag/g-C_3N_4/10	50/20	300 W Xe lamp	50	79.7%	159.4	[4]
Fe_3O_4@g-C_3N_4/RGO/10	50/20	visible light	120	90%	75	[5]
Pt/WO_3/100	100/20	250 W Xe lamp	60	72.82%	24.3	[6]
TiO_2-P25/20	100/10	300 W Xe lamp	120	76.6%	39.5	[7]
In_2S_3/MIL-100(Fe)/30	100/10	300 W Xe lamp	90	70%	25.9	[8]

Table S2 Comparison of hydrogen production of MoS_2@COF-Ph and other photocatalysts

Catalyst /mg	*Light source(λ>420nm)*	**Amount of H_2 (μmol)**	*Time(h)*	**H_2 generation rate(μmol·h^{-1}·g^{-1})**	*Ref.*
MoS_2@COF-Ph/30	300 W Xe lamps	870	4	7251.9	This work
g-C_3N_4–MoS_2/50	300 W Xe lamps	1500	3	615.9	[9]
g-C_3N_4/ZIF-67/MoS_2/20	300 W Xe lamps	321	4	4012.5	[10]
Ni_3S_2/MoS_2/50	150 W Xe arc lamp	157.79	1.67	540.75	[11]
$CuInS_2$/MoS_2/TiO_2/50	300 W Xenon lamp	206.8	4	1034	[12]



Element	Weight%	Wt% Sigma	Atomic%
Sulphur	19.01	0.39	14.35
Molybdenum	36.65	0.75	9.24
Nitrogen	44.14	0.76	76.27
Chlorine	0.20	0.09	0.14
Total	100.00		100.00

Fig. S1 S, Mo, N and Cl STEM EDX mapping of MoS_2@COF-$Ph_{0.25}$.

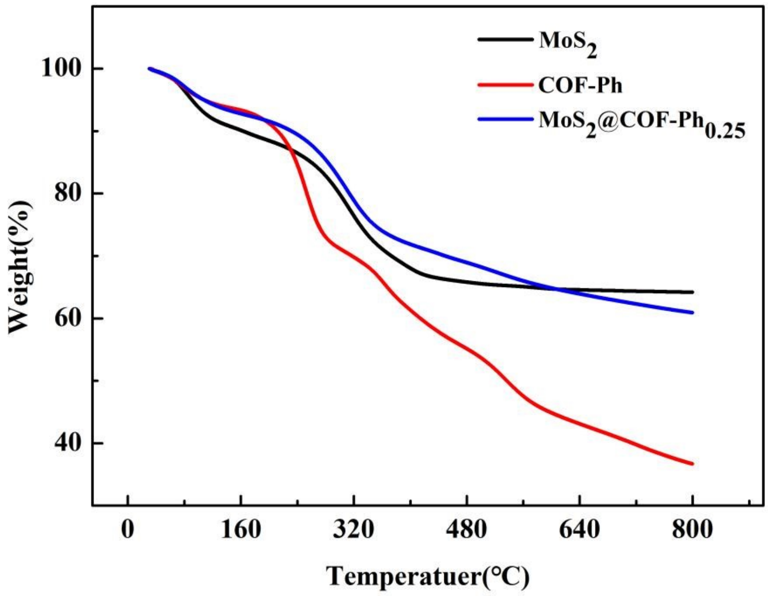


Fig. S2 TGA curves of MoS_2, COF-Ph and MoS_2@COF-$Ph_{0.25}$.

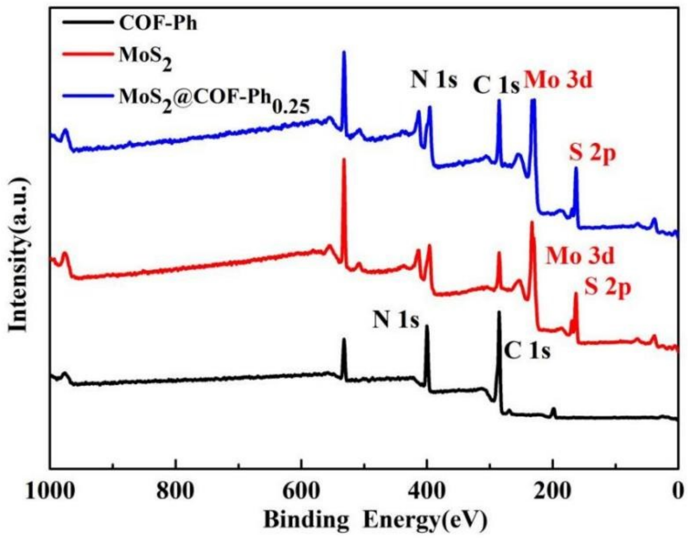


Fig.S3 XPS spectra of MoS_2, COF-Ph and MoS_2@COF-$Ph_{0.25}$ catalysts.

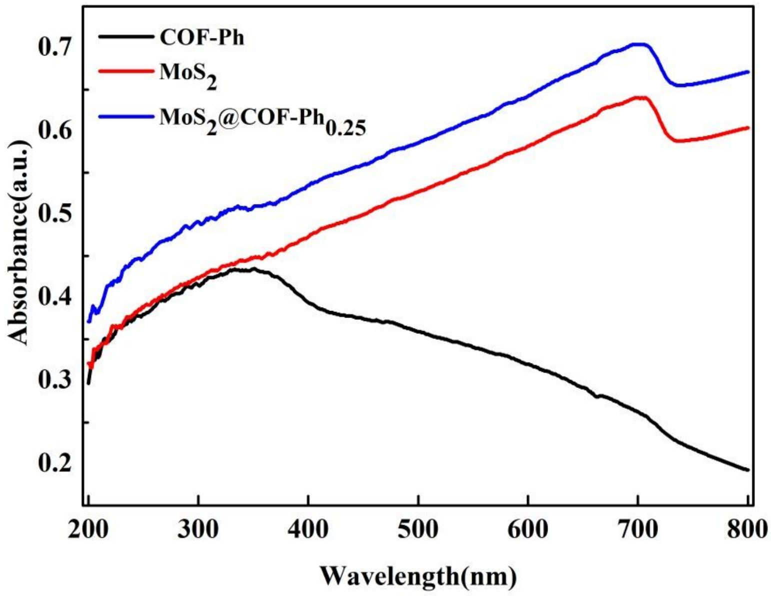


Fig. S4 UV-vis diffuse reflectance spectra of MoS_2, COF-Ph and MoS_2@COF-$Ph_{0.25}$.

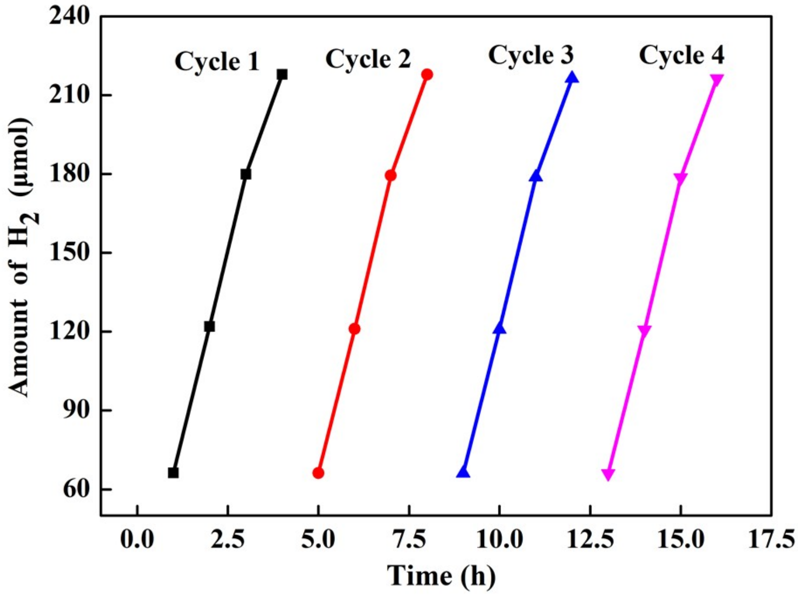


Fig. S5 H_2 volume produced by MoS_2@COF-$Ph_{0.25}$ for 4 consecutive cycles in every 4h time interval.

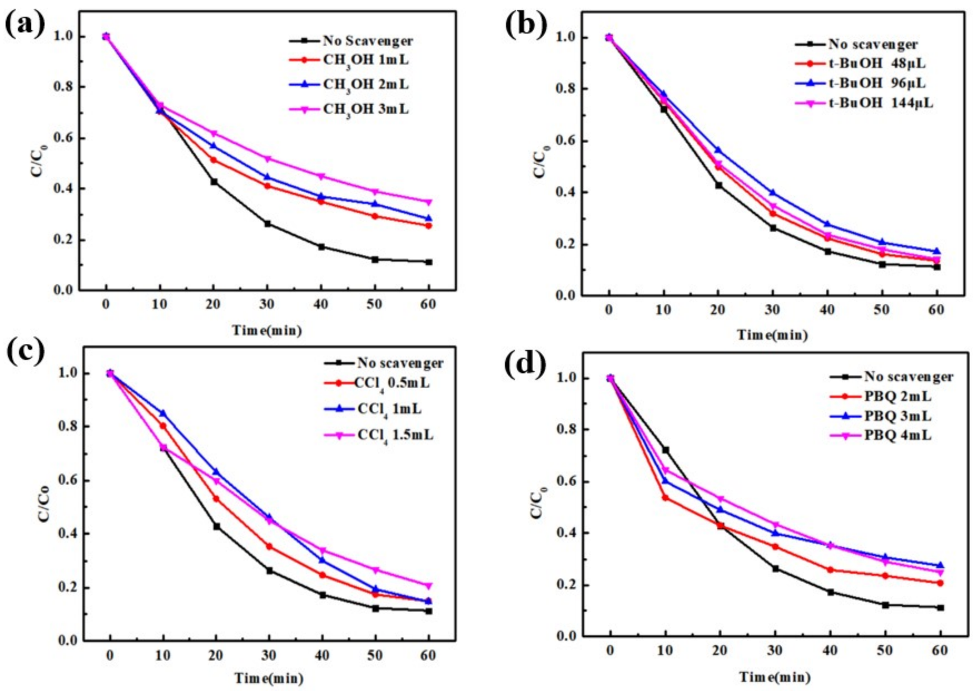


Fig. S6 The radical trapping test for the photocatalysts.

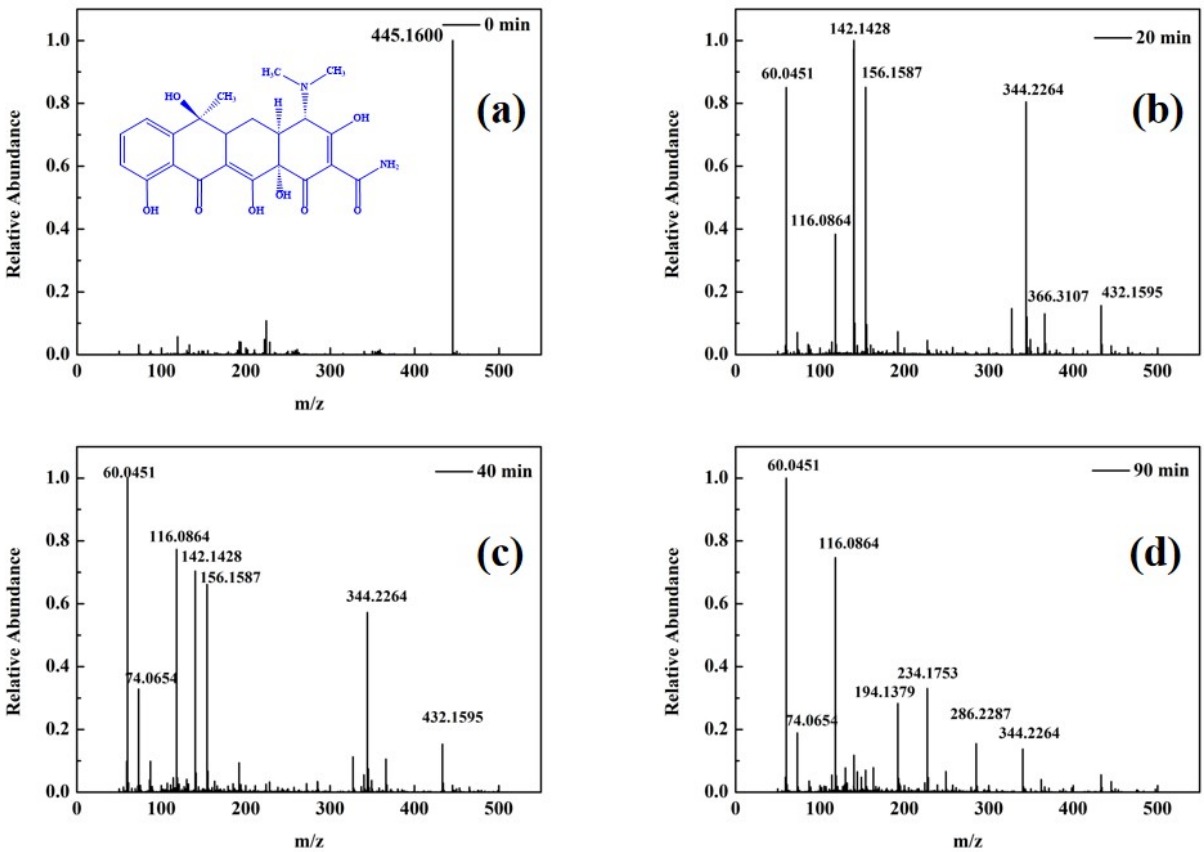


Fig.S7 Variations in the relative intensity of intermediate products of TC with different reaction time, as obtained in the LC-MS spectra.

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