Supporting Information

Z-Scheme Heterojunction of SnS_2/Bi_2WO_6 for Photoreduction of CO_2 to 100% Alcohol Products by Promoting the Separation of Photogenerated Charges

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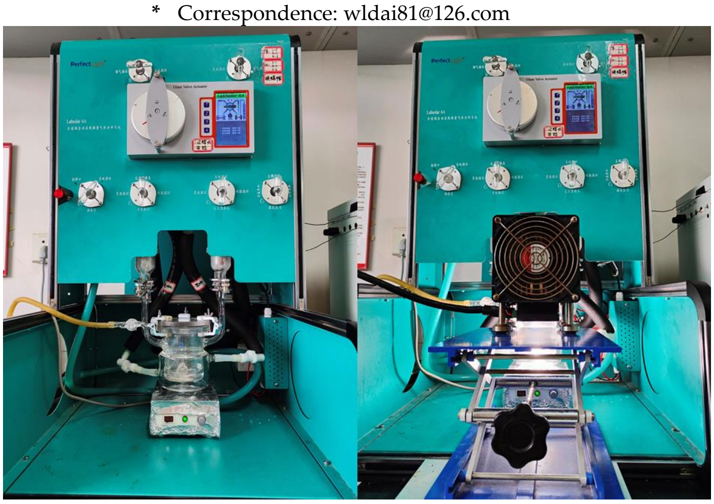


Figure S1 Reaction device diagram.

The reaction device in this work is shown in Figure S1. In the photocatalytic reaction, high-purity CO_2 gas is continuously bubbling into the reactor from the gas inlet. The reactor is connected to condensed water and the temperature is kept at 4 °C.

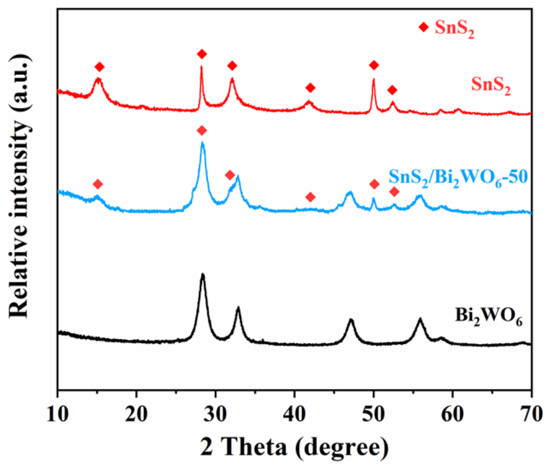


Figure S2 XRD spectra of SnS_2/Bi_2WO_6-50.

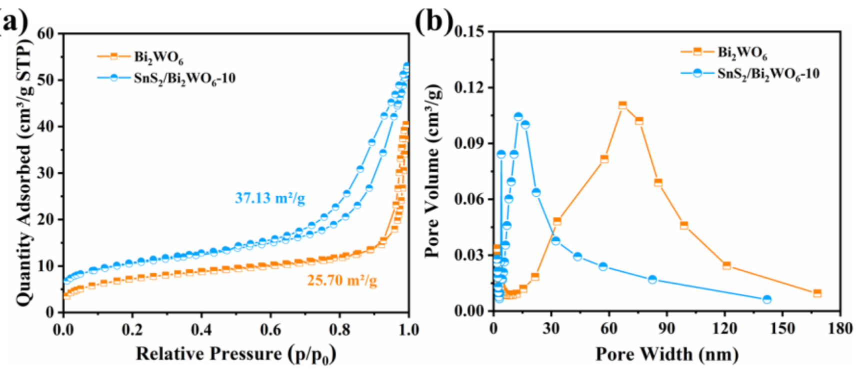


Figure S3 (a) N_2 adsorption-desorption isotherms, and (b) pore size distribution profiles of Bi_2WO_6 and SnS_2/Bi_2WO_6-10.

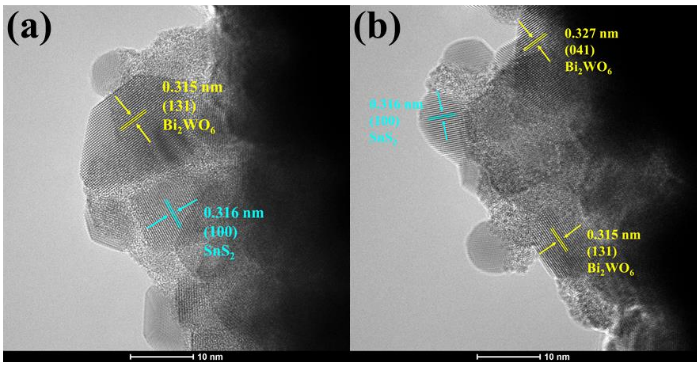
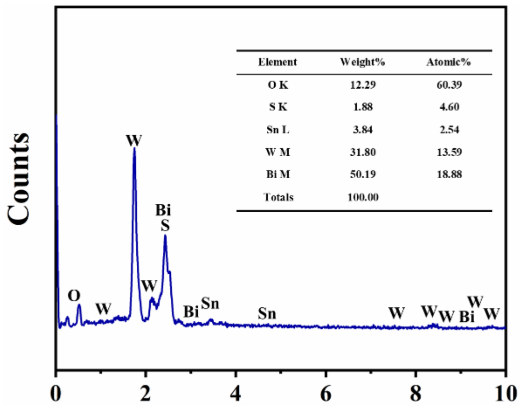


Figure S4 HRTEM spectra of SnS_2/Bi_2WO_6-10.



Element	Weight%	Atomic%
O K	12.29	60.39
S K	1.88	4.60
Sn L	3.84	2.54
W M	31.80	13.59
Bi M	50.19	18.88
Totals	100.00	

Figure S5 EDS spectrum of SnS_2/Bi_2WO_6-10.

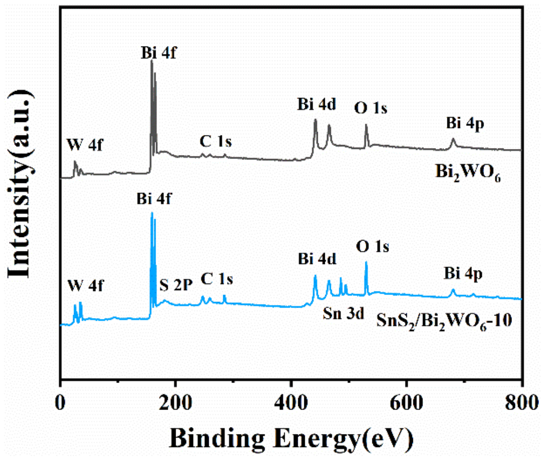


Figure S6 XPS survey spectra of Bi_2WO_6 and SnS_2/Bi_2WO_6-10.

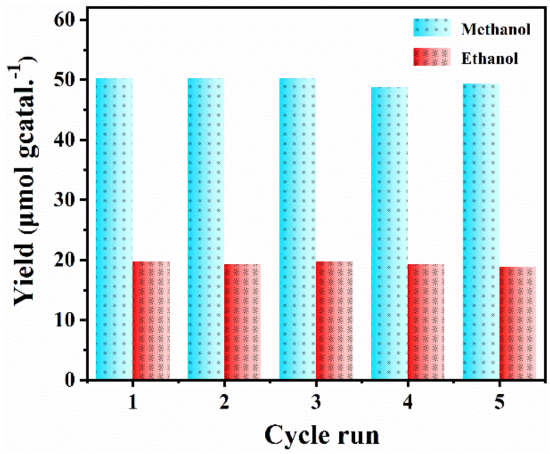


Figure S7 Cycling tests with catalyst SnS_2/Bi_2WO_6-10 for 4 h irradiation.

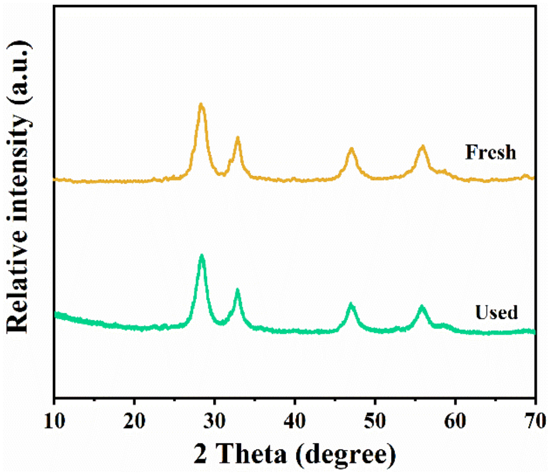


Figure S8 XRD patterns before and after recycling.

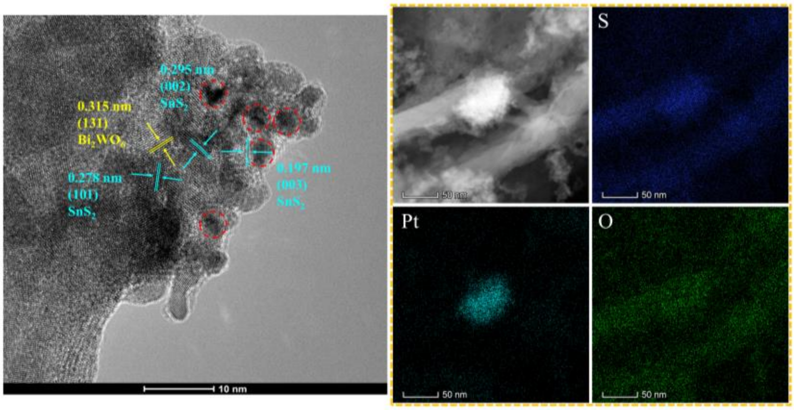


Figure S9 HRTEM spectra of 1%Pt-SnS_2/Bi_2WO_6-10.

Table S1 The comparison of CO_2 photoreduction performance

Photocatalyst	Light sources	Main products	Formation rate (μmol g^{-1} h^{-1})	Ref.
Bi_2WO_6/SnS_2	$\lambda \geq 420$ nm	CH_3OH C_2H_5OH	12.55 4.93	This work
Bi_2MoO_6	$\lambda \geq 420$ nm	CH_3OH	6.2	29
10% MoS_2/TiO_2	350 W Xe lamp	CH_4 CH_3OH	2.86 2.55	30
$CuIn_2S_4$–0.33/ TiO_2	300 W Xe lamp	CH_4	1.14	31

Ag–Mn–N/TiO_2	300 W Xe arc lamp	CH_3OH	0.53	32
PPy/Bi_2WO_6	300 W Xe lamp	CH_3OH	14.1	33
Pd/Gd$(OH)_3$	500 W high-pressure Xe lamp	CH_3OH	0.74	34
CeO_2-TiO_2	500 W Xe lamp	CH_3OH	6.3	35