

Electronic Supplementary Information (ESI)

Synthesis of hexagonal and cubic ZnIn₂S₄ nanosheets for the photocatalytic reduction of CO₂ with methanol

Jingshuai Chen,^{ab} Feng Xin,^{*ab} Xiaohong Yin,^{*c} Tianyu Xiang^{ab} and Yuwen Wang^{ab}

^a School of Chemical Engineering and Technology, Tianjin University, Collaborative Innovation

Center of Chemical Science and Engineering (Tianjin), Tianjin 300072, P. R. China. Fax: +86 22

27892359; Tel: +86 22 27409533; E-mail: xinf@tju.edu.cn (F. Xin).

^b Collaborative Innovation Center of Chemical Science and Engineering (Tianjin), Tianjin, 300072, P.

R. China.

^c School of Chemistry and Chemical Engineering, Tianjin University of Technology, Tianjin 300384, P.

R. China. E-mail: yinxiaohong@tjut.edu.cn

Experimental Details

Synthesis of ZnIn_2S_4 microspheres: In a typical synthesis procedure, $\text{Zn}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ (0.150 g), $\text{In}(\text{NO}_3)_3 \cdot 4.5\text{H}_2\text{O}$ (0.391 g), citric acid (CA, 0.1 g) and thiourea (TU, 0.308 g) were dissolved in 40 mL of deionized water and transferred to a 70 mL Teflon liner. The Teflon liner was sealed in the stainless steel autoclave and heated at 180°C for 18 h. After being cooled to room temperature, the yellow precipitate was collected by centrifugation and washed with ethanol and the distilled water for three times, respectively. And then it was dried at 60°C to obtain the ZnIn_2S_4 microspheres.

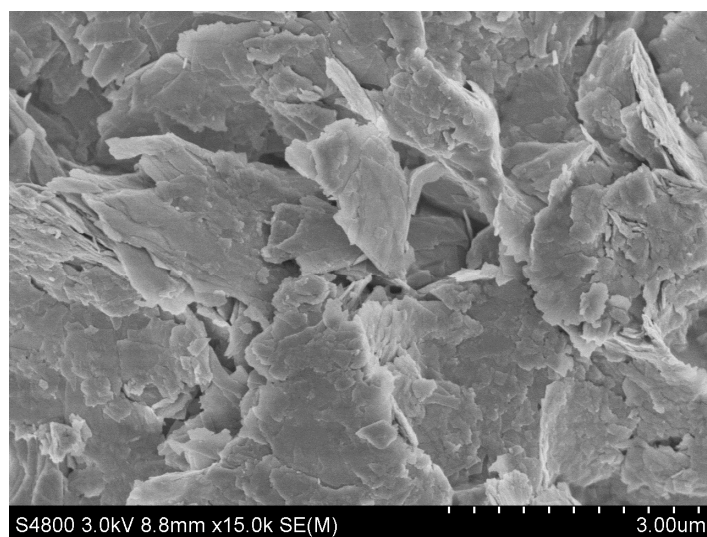


Figure S1. SEM image of the ZnIn_2S_4 samples obtained via hydrothermal method.

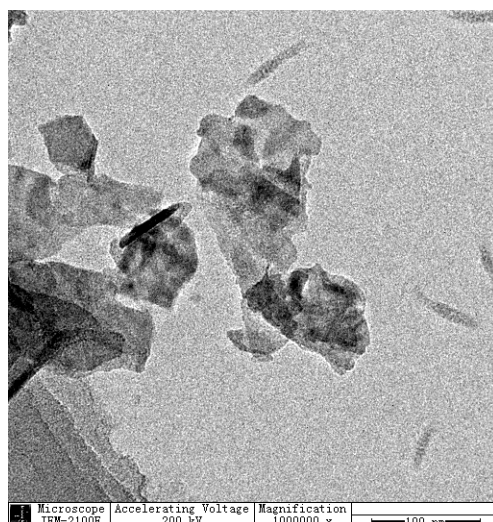


Figure S2. TEM image of the hexagonal ZnIn₂S₄ nanosheets.

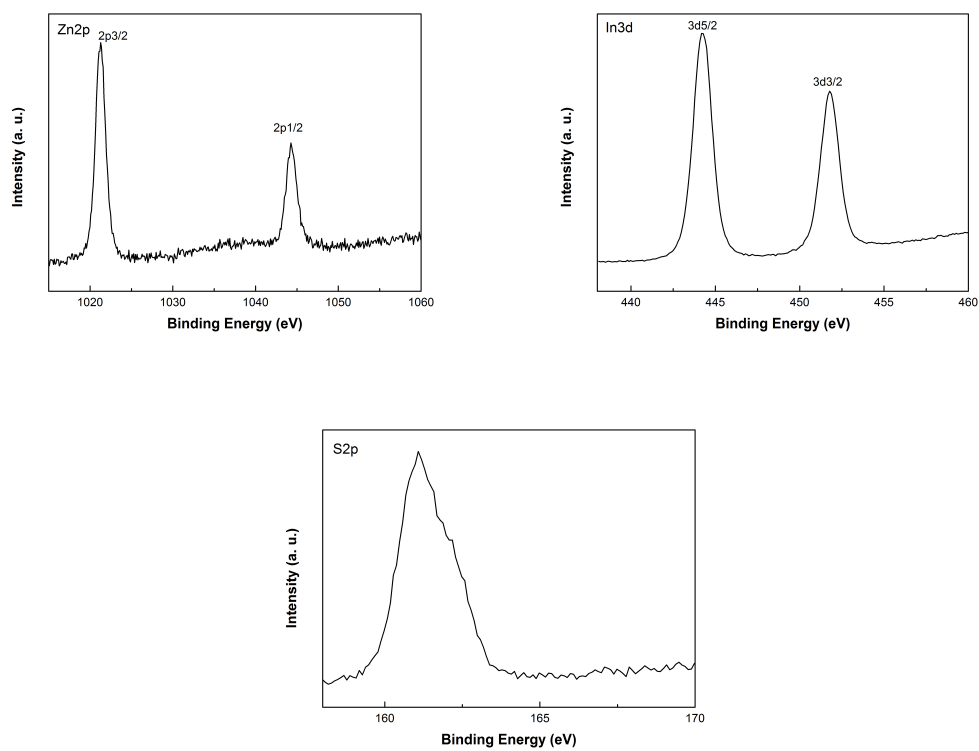


Figure S3. XPS spectra of the hexagonal ZnIn₂S₄ nanosheets: high-resolution In3d, Zn2p, and S2p spectra.

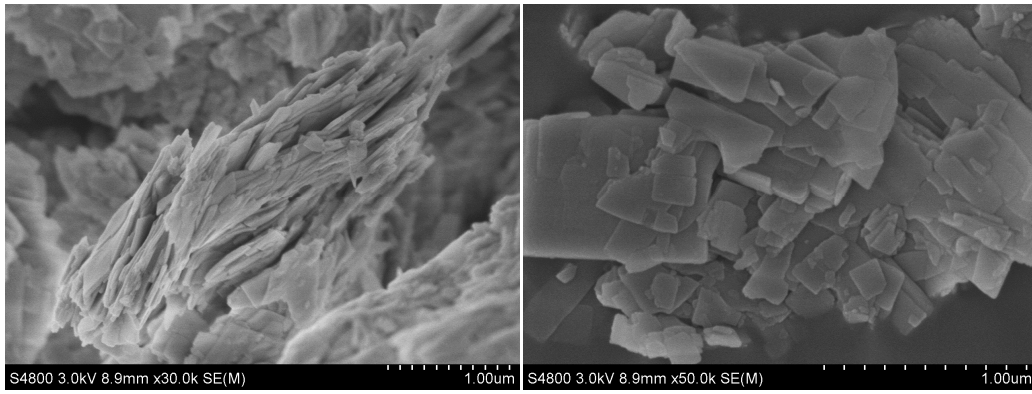


Figure S4. SEM image of ZnIn_2S_4 -DETA precursor suggesting a sheet-like structure.

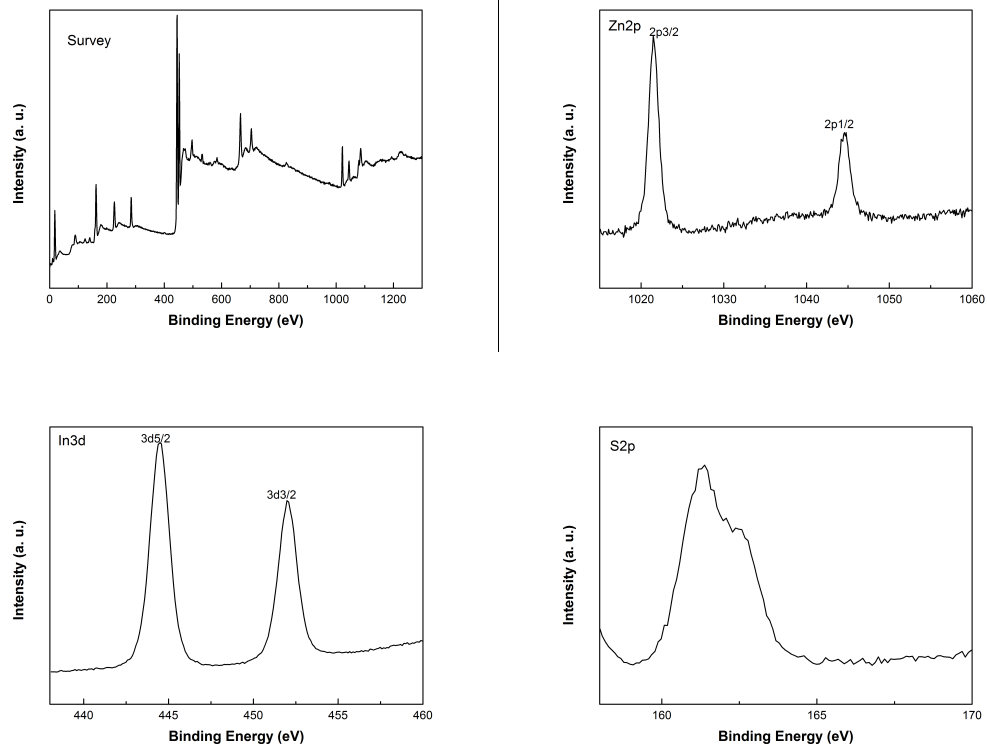


Figure S5. XPS spectra of the cubic ZnIn_2S_4 nanosheets.

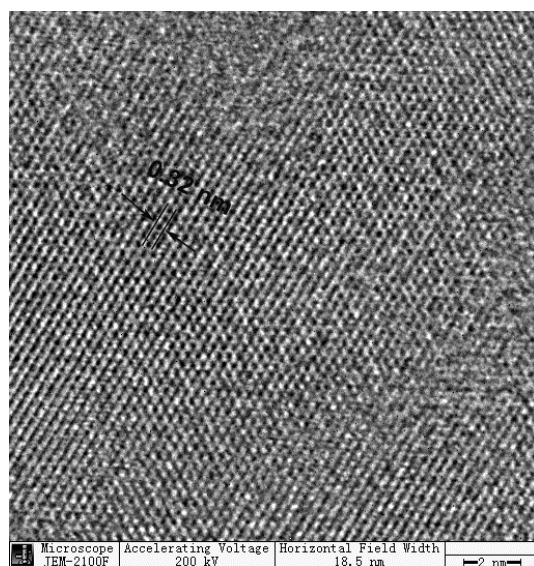


Figure S6. HRTEM image of cubic ZnIn_2S_4 nanosheets.

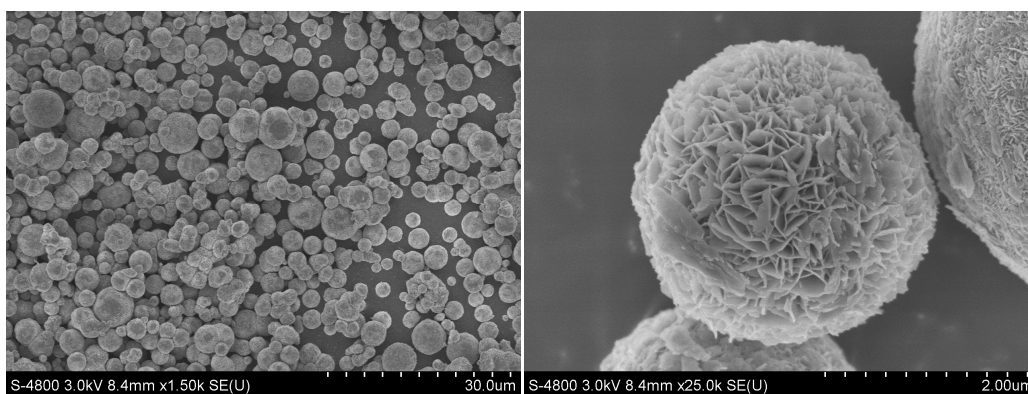


Figure S7. SEM image of ZnIn_2S_4 microspheres.

Tab. S1 The BET result of as-prepared samples.

Sample	Hexagonal ZnIn_2S_4	Cubic ZnIn_2S_4	Microspheres ZnIn_2S_4
$S_{\text{BET}}/\text{m}^2 \text{ g}^{-1}$	28.65	25.84	42.16

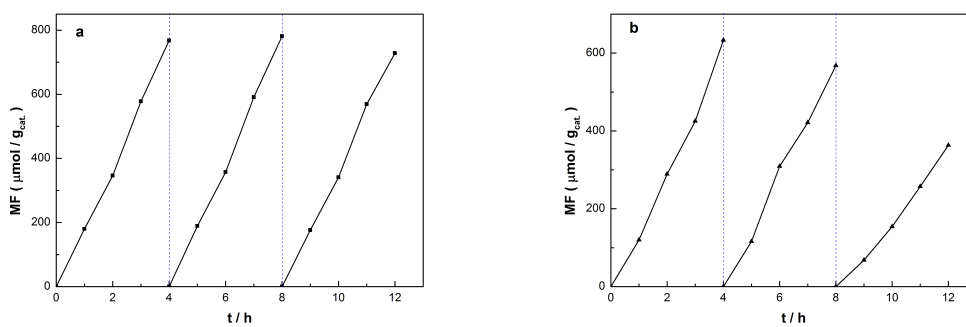


Figure S8. Time course of photocatalytic MF production over hexagonal (a) and cubic (b) ZnIn_2S_4 nanosheets.

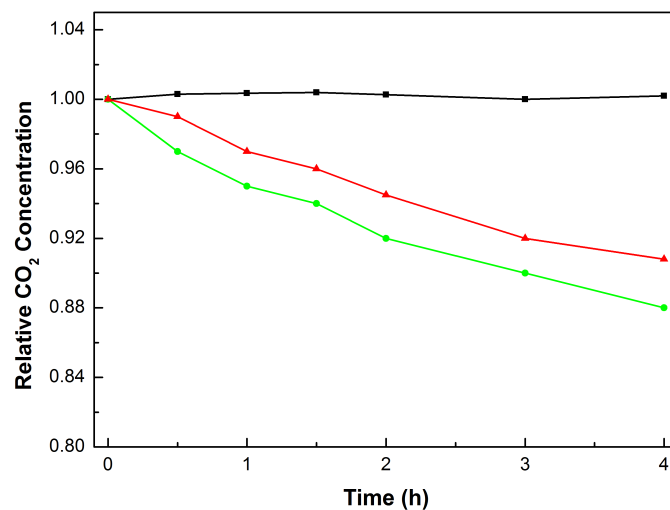


Figure S9. Relative concentration of CO_2 (the peak at 2343 cm^{-1}) as a function of time using hexagonal ZnIn_2S_4 nanosheets in the dark (black), using cubic ZnIn_2S_4 nanosheets under light irradiation (red), and using hexagonal ZnIn_2S_4 nanosheets under light irradiation (green).