Supplementary Information

Self-assembly ultrathin Cu_2MoS_4 nanobelts for high efficient visible light-driven degradation of methyl orange

Ke Zhang[⊥], Wenxing Chen[⊥], Yunxiang Lin, Haiping Chen, Yasir A. Haleem, Chuanqiang Wu, Fei Ye, Tianxing Wang, Li Song*

National Synchrotron Radiation Laboratory, University of Science and Technology of China, Hefei, Anhui 230029, China

[⊥]These authors contributed equally to this work.

*Corresponding author: song2012@ustc.edu.cn

Supplemental Methods

Synthesis of Cu_2O nanospheres. The Cu_2O nanospheres was synthesixed by a modified method.[1] Typically, 0.171 g of $CuCl_2 \cdot H_2O$ and 3.333 g of poly (vinyl pyrrolidone) (PVP) were dissolved in 100 mL of deionized water; an aqueous solution of NaOH (2.0 M, 10.0 mL) and aqueous ascorbic acid solution (0.6 M, 10.0 mL) were then successively added dropwise with intense magnetic stirring. After 1 h, a turbid yellow liquid formed. All previous procedures were carried out at room temperature. The product was collected by centrifugation and subsequently washed with deionized water and absolute ethanol several times; it was finally dried at 60 °C under vacuum for several hours

Synthesis of Cu_2MoS_4 nanosheets. Cu_2MoS_4 with sheet-like morphology was synthesized by using a hydrothermal method in our previous work.[2] Here, in order to obtain self-assembled belt-like samples, 30 mg sodium molybdate ($Na_2MoO_4 \cdot 2H_2O$) and 60 mg thioacetamide (C_2H_5NS) were firstly dissolved in 20 mL ethylene glycol, and then 20 mg (as-synthesized) Cu_2O powder was added and dispersed in the mixed solution by sonication for 5min. After

stirring for 5 min, the mixture turned its color from yellow to dark brown. Then, the mixture was transferred into a 45 mL Teflon-lined stainless steel autoclave and maintained at 190~210 °C for 24 h. The final products were washed with deionized water and ethanol for several times to remove any possible ions, and then dried at 60 °C under vacuum for a couple of hours.

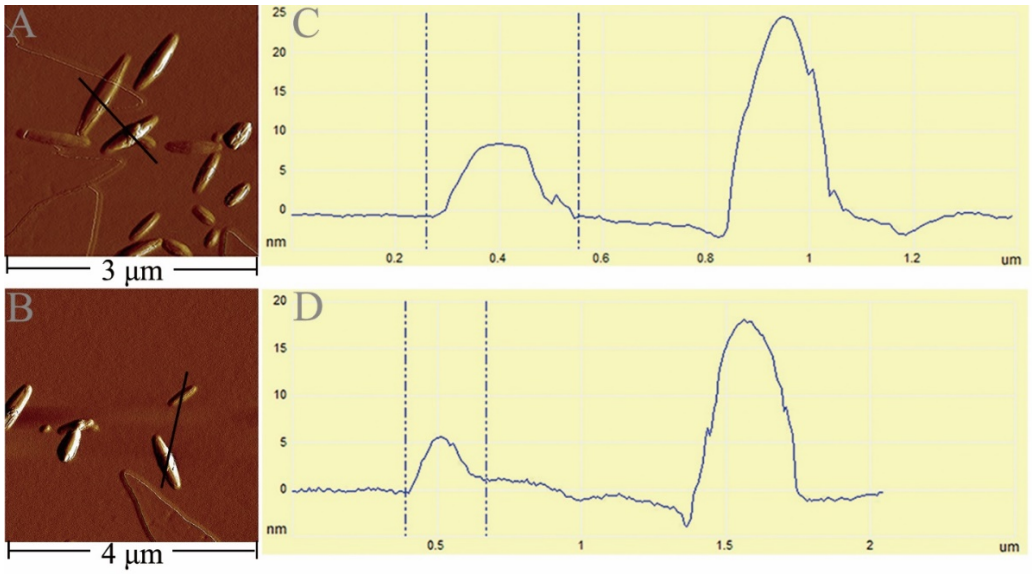

Figure S1. AFM images of (A, B) Cu_2MoS_4 nanobelt; profile analyses along the line (C, D)

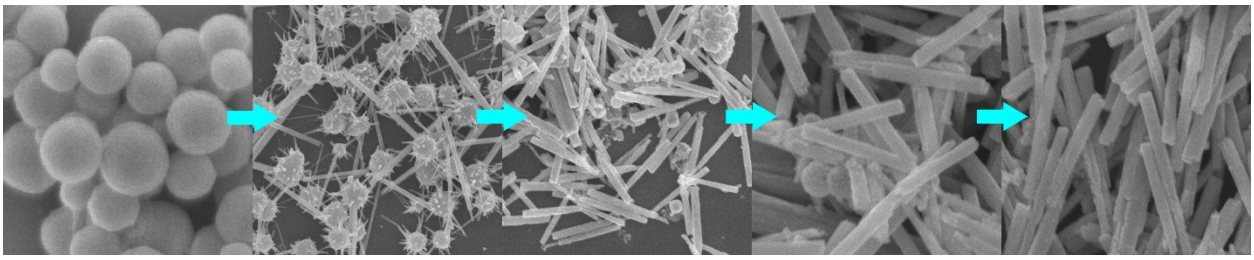

Figure S2. SEM images of samples at different reaction times 0 h, 3 h, 6h, 9 h, 12h.

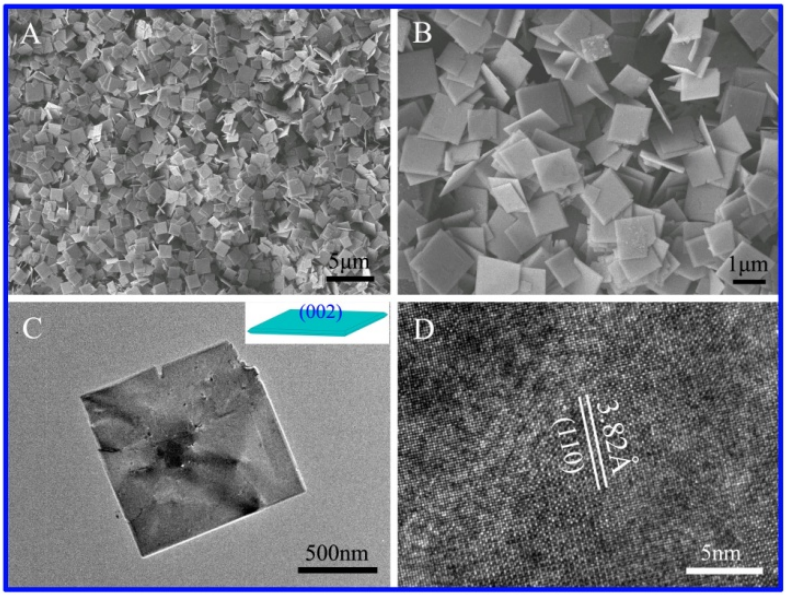

Figure S3. A, B) SEM images of Cu_2MoS_4 nanosheet at different magnifications; C) TEM image of an individual horizontal Cu_2MoS_4 nanosheet, the inset is schematic diagram of the Cu_2MoS_4 nanosheet crystal structure with (002) faces dominated; D) typical HRTEM image of Cu_2MoS_4 nanosheet.

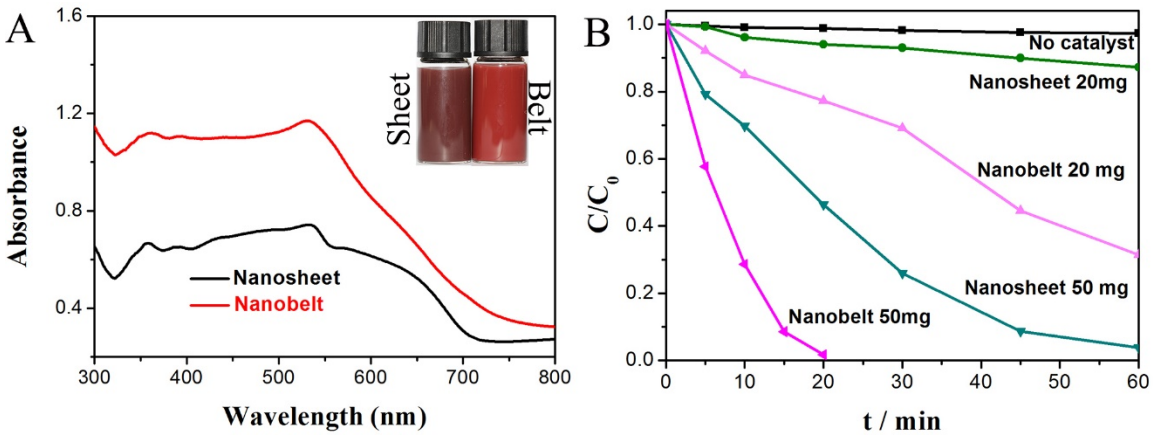

Figure S4. Diffuse reflectance absorption spectra of Cu_2MoS_4 nanosheet and nanobelt. The inset shows the photographs of the samples dispersed in ethanol. The bandgap value of Cu_2MoS_4 nanosheet and nanobelt are estimated as 1.75 eV and 1.71 eV, respectively. B) Photocatalytic activities of Cu_2MoS_4 samples for MO degradation under visible-light irradiation (λ >420 nm)

References

[1] D. F. Zhang, H. Zhang, L. Guo, K. Zheng, X. D. Han, Z. Zhang, *J. Mater. Chen. A*, **2009**, 19, 5220-5225.

[2] W. X. Chen, H. P. Zhu, H. T. Zhu, Q. Q. Gao, J. Luo, Y. Wang, S. Zhang, K. Zhang, C. M. Wang, Y.

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