Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A

Supporting Information:

Sonochemistry-assisted synthesis and optical properties of mesoporous ZnS nanomaterials

*Yun-Pei Zhu,[a,#] Jie Li,[a,#] Tian-Yi Ma,[a] Yu-Ping Liu,[b] Gaohui Du[c] and Zhong-Yong Yuan[*a]*

[a] *Key Laboratory of Advanced Energy Materials Chemistry (Ministry of Education), Synergetic Innovation Center of Chemical Science and Engineering (Tianjin), College of Chemistry, Nankai University, Tianjin 300071, China. Fax: +86 22 23502604; Tel: +86 22 23509610; E-mail: zyyuan@nankai.edu.cn*
[b] *Research Center for Analytical Sciences, College of Chemistry, Nankai University, Tianjin 300071, China*
[c] *Institute of Physical Chemistry, Zhejiang Normal University, Jinhua 321004, China*
[#] *These authors have made equal contributions to this work.*

Table S1 Summary of the physicochemical properties and photodegradation rate constant of the synthesized s-ZnS materials in ethanol system after various duration of ultrasonic irradiation.

Ultrasonic time /min	Crystallite size /nm	S_{BET} /cm^2 g^{-1}	V_{pore} /cm^3 g^{-1}	D_{DFT} /nm	k /min^{-1}
0 min	7.2	160	0.42	4.9	0.0138
1 min	5.9	197	0.41	3.6	0.0154
3 min	4.5	226	0.36	5.9	0.0188
5 min	3.8	263	0.31	5.1	0.0245
20 min	3.8	258	0.32	5.1	0.0242

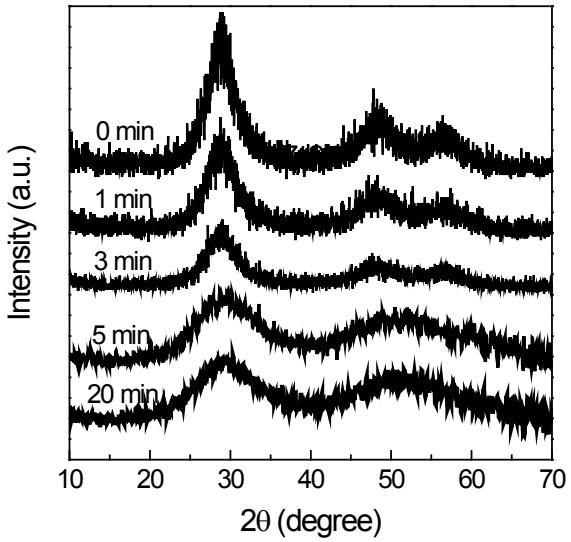

Fig. S1 XRD patterns of the ZnS nanomaterials synthesized in the ethanol solutions with the different ultrasonic irradiation time.

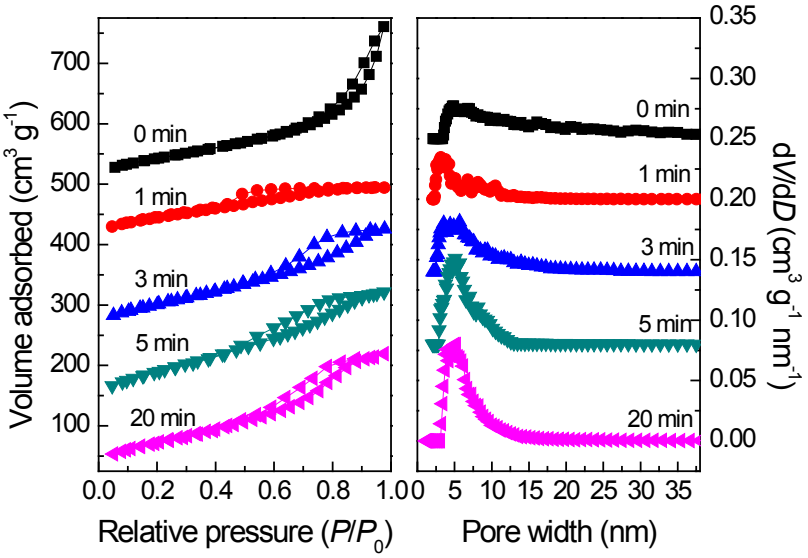

Fig. S2 N_2 sorption isotherms (left) and the corresponding pore size distribution curves (right) of the s-ZnS nanomaterials synthesized in the ethanol solutions with the different ultrasonic irradiation time. The volume adsorbed was shifted by 500, 380, 240 and 120, and d*V*/d*D* value was shifted by 0.25, 0.20, 0.14, and 0.08 for the curves of the s-ZnS samples after 0, 1, 3, 5 and 20 min ultrasonic treatment, respectively.

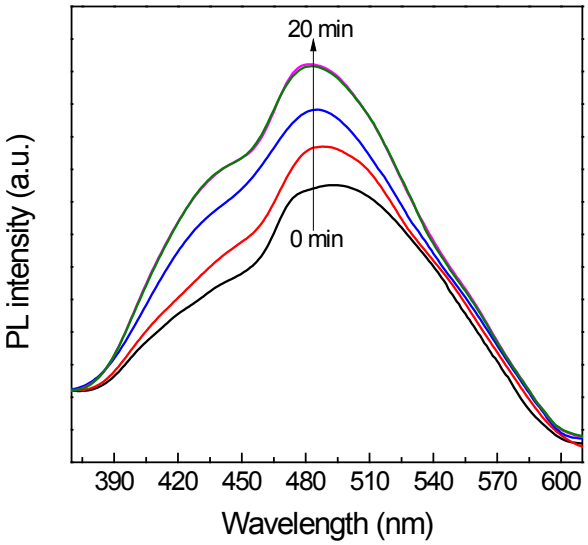

Fig. S3 Time-dependent PL emission spectra of the ZnS materials synthesized in ethanol system with the different ultrasonic irradiation time (0, 1, 3, 5, 20 min), showing ultrasonic-time-dependent increase of emission intensity.

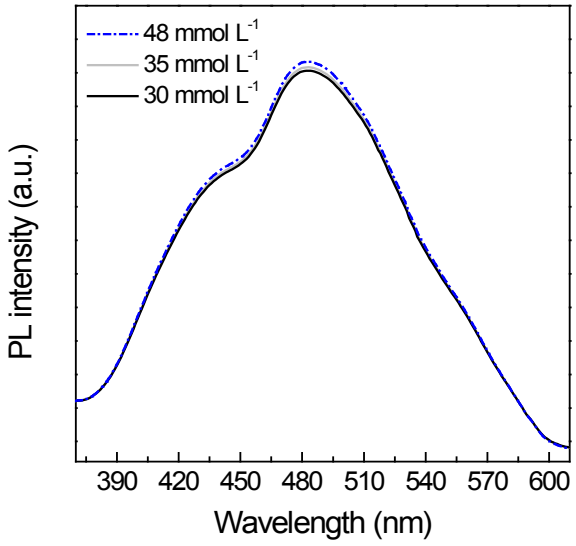

Fig. S4 PL emission spectra of the ZnS materials synthesized in the ethanol after 5 min sonication. Initial solution volume and concentration: $Zn(NO_3)_2$ (30 ml): 30, 35 and 48 mmol L^{-1}, Na_2S (30ml): 30 mmol L^{-1}.

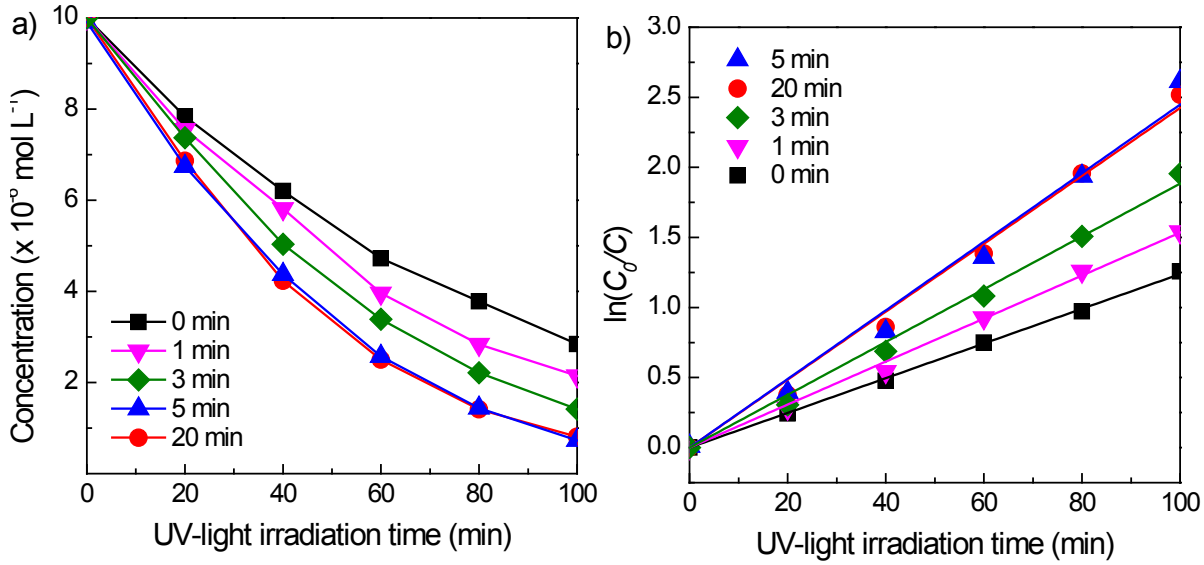

Fig. S5 (a) Photoactivities of the ZnS materials synthesized in ethanol system with the different ultrasonic irradiation time for RhB degradation under UV-light irradiation. (b) Plots of $\ln(C_0/C)$ versus the irradiation time, showing the fitting results using the pseudo-first-order reaction.