

**Mesoporous ZnS hierarchical nanostructures: facile synthesis,  
growth mechanism and application in gas sensing**

**Ruimin Xing,<sup>a</sup> Yan Xue,<sup>b</sup> Xiaoqiang Liu,<sup>a</sup> Baoshun Liu,<sup>c</sup> Baoji Miao,<sup>d</sup> Wenzhe Kang,<sup>a</sup> Shanhu Liu <sup>\*a</sup>**

*<sup>a</sup> Institute of Molecular and Crystal Engineering, College of Chemistry and Chemical Engineering, Henan University, Kaifeng 475001, P.R. China;*

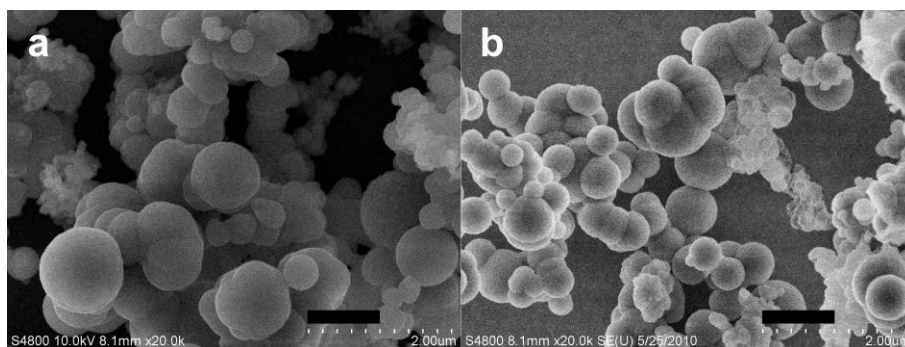
*<sup>b</sup> Xinxiang University, Xinxiang 453003, P.R. China;*

*<sup>c</sup> State Key Laboratory of Silicate Materials for Architectures, Wuhan University of Technology, Wuhan City, Hubei Province 430070, China*

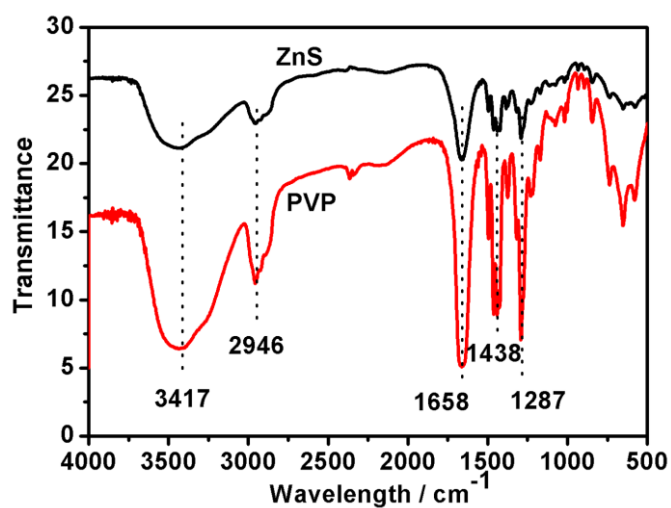
*<sup>d</sup> School of materials science and engineering, Henan university of technology, Zhengzhou, P.R.China.*

*\* To whom correspondence should be addressed.*

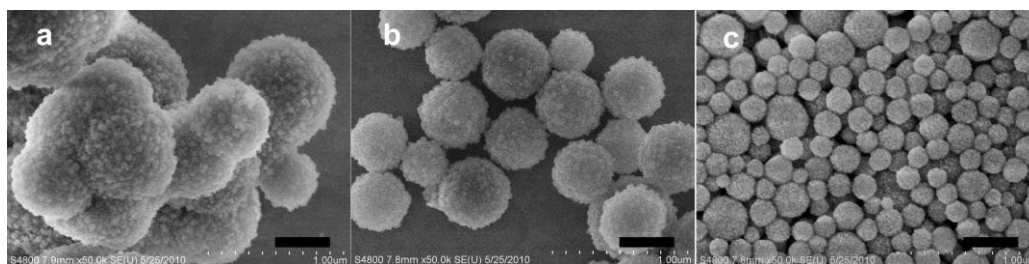
*E-mail: shanhuliu@henu.edu.cn; Tel.: +86-378-3881589;*



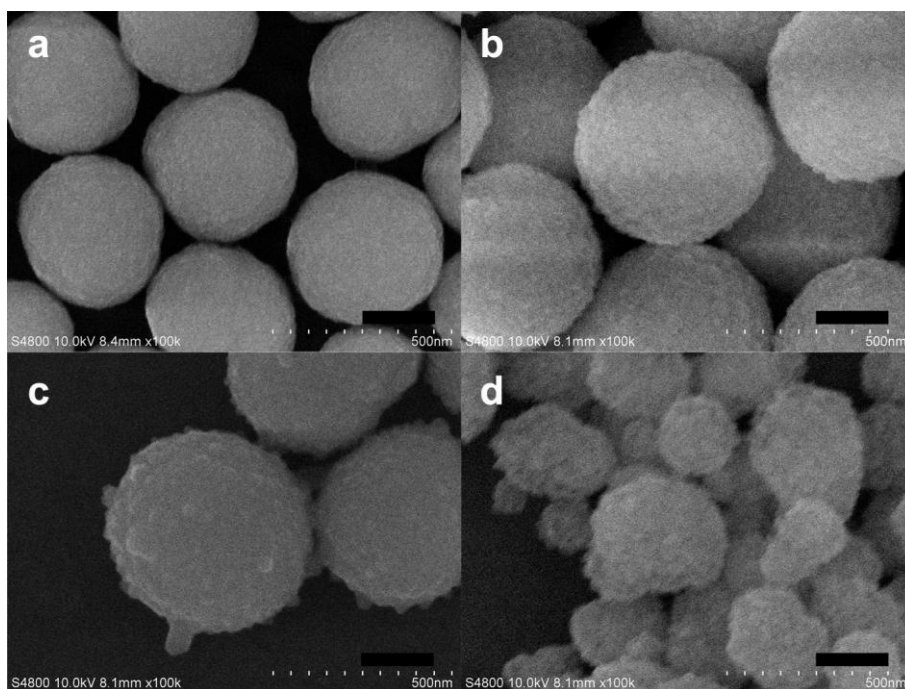
**Fig. S1** SEM images of the ZnS nanostructures obtained in the presence of 1 ml PDDA (a) and 1 g CTAB (b). All the scale bars are 1  $\mu\text{m}$ .



**Fig. S2** IR spectra of ZnS MHNSs and PVP.

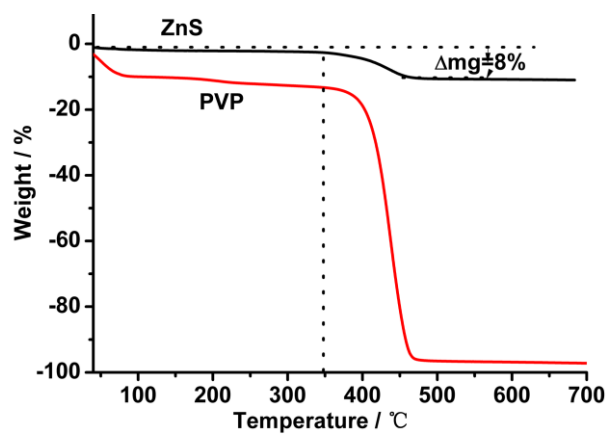


**Fig. S3** SEM images of ZnS nanostructures prepared with different resulting concentration of PVP: (a) 0 mg/mL, (b) 25 mg/mL, and (c) 150 mg/mL. All the scale bars are 400 nm.



**Fig. S4** SEM images of ZnS nanostructures obtained for different reaction time:

(a) 1 h, (b) 6 h, (c) 9 h, and (d) 24 h. All the scale bars are 200 nm.



**Fig. S5** TGA curves of ZnS MHNSs and PVP.