# Supporting Information

## Sonochemistry synthesis and enhanced photocatalytic $H_2$-production activity of nanocrystals embedded in CdS/ZnS/$In_2S_3$ microspheres

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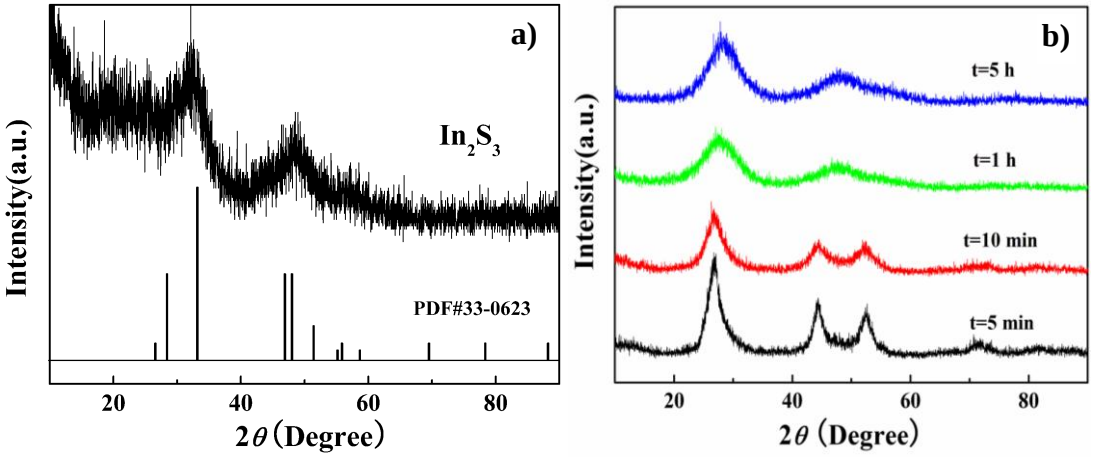


Fig. S1 XRD patterns of the samples for a) $In_2S_3$, b) different reaction time.

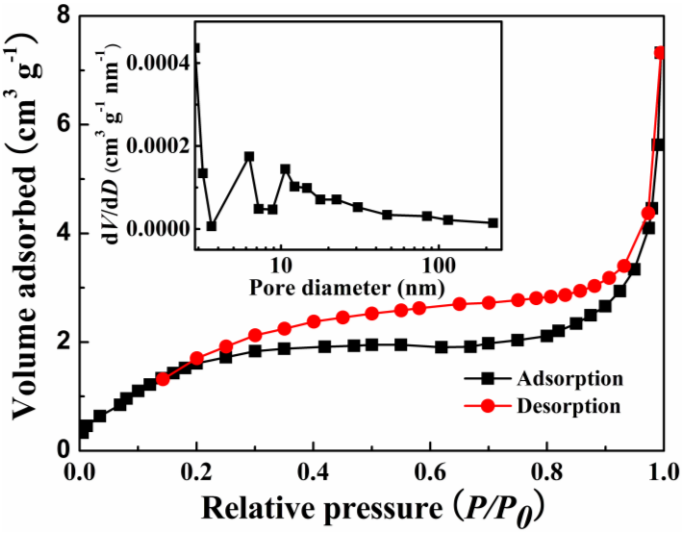


Fig. S2 $N_2$ adsorption-desorption isotherm and Brunauer-Emmett-Teller (BET) pore-size distribution plot of CdS/ZnS/$In_2S_3$.

As shown in Fig. S2, there were two steps on the $N_2$ adsorption-desorption isotherm. The compounds exhibited a hysteresis loop that could be classified as type IV, demonstrating the existence of porous porosity. The BET surface areas of the CdS/ZnS/$In_2S_3$ compounds (75% CdS) were 7.5676 $m^2$ $g^{-1}$, while the pore volumes were 0.011254 $cm^3$ $g^{-1}$.[S1] The pore size distribution curve was calculated from the adsorption branch of a nitrogen isotherm by the BJH method using the Halsey equation. It could be seen that the pore sizes of the sample concentrate in a range of 4-11 nm. The result supports the fact that the microspheres have a nanoporous structure.

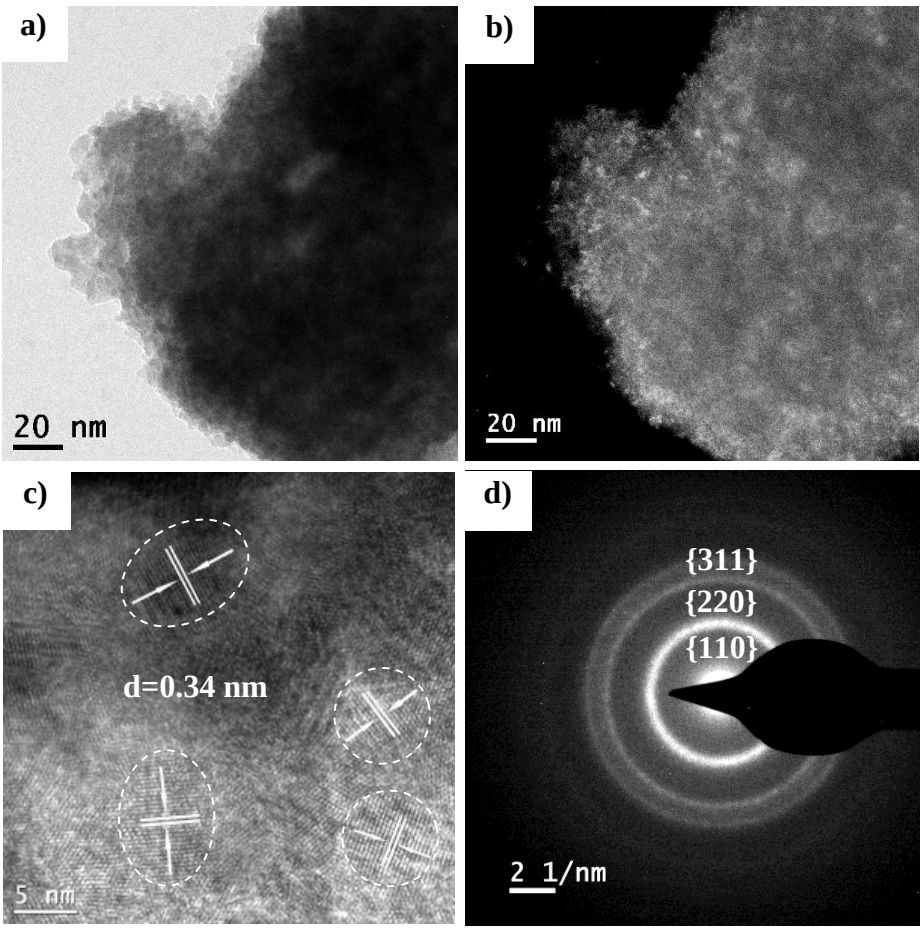


Fig. S3 TEM images of self-assembled $CdS/In_2S_3$ microspheres prepared by sonochemistry method: a) TEM image, b) DF-STEM image, c) HRTEM image and d) SAED pattern of sample.

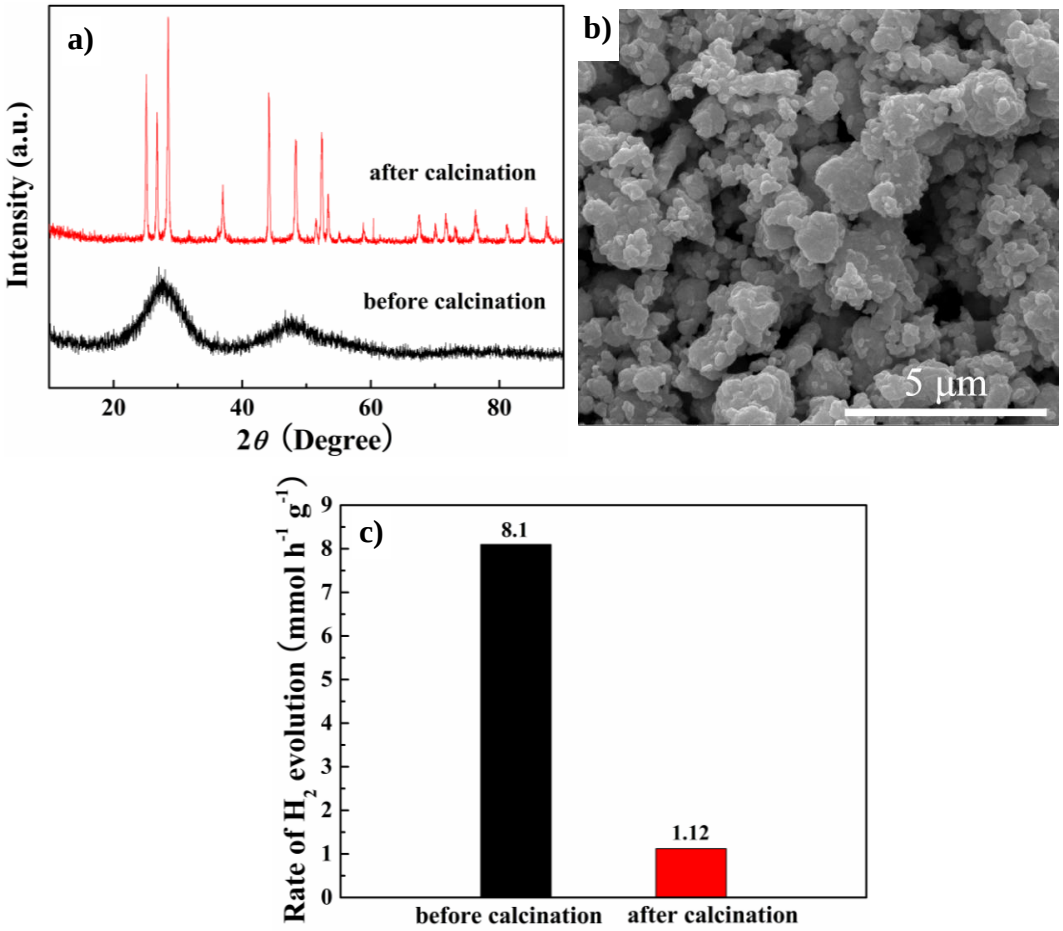


Fig. S4 a) XRD patterns of CdS/ZnS/$In_2S_3$ before and after calcination, b) FESEM image of CdS/ZnS/$In_2S_3$ after calcination and c) amounts of $H_2$ evolution before and after calcination.

**References**

(S1)Y. Hata, H. Purwanto, S. Hosokai, J. Hayashi, Y. Kashiwaya and T. Akiyama, *Energ. Fuel.* **2009,** *23*, 1128.