

Electronic Supplementary Information (ESI) Available

Phase investigation on zinc tin composite crystallites

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The synthesis of the cubic crystallites is similar to Ref. 1 as follows: the zinc acetate ($\text{ZnAc}_2 \cdot 2\text{H}_2\text{O}$, 0.02 M, 15 mL), tin tetrachloride ($\text{SnCl}_4 \cdot 5\text{H}_2\text{O}$, 0.02 M, 15 mL), sodium hydroxide (NaOH, 0.2 M, 15 mL) were dissolved in deionized water at room temperature under magnetic stirring vigorously until a uniform suspension was formed (A molar ratio of $\text{Zn}^{2+} / \text{Sn}^{4+} / \text{Na}^+$ was 1 : 1 : 10). The final mixture was transferred to a teflon-lined stainless steel autoclave and a hydrothermal reaction proceeded at 130 °C for 6 h. The synthesis of the octahedral crystallites is refer to Ref. 2 as follows: a solution of SnCl_4 in water (0.5 M, 5 mL) was added to a solution of ZnAc_2 (0.5 M, 5 mL) at room temperature with vigorous agitation. Then a solution of hexadecyl trimethyl ammonium bromide (CTAB, 0.15 M) and a solution of NaOH were added to the mixture. The final mixture was transferred to a beaker and heated to 85 °C for 6 h. Both cubic and octahedral products were collected by centrifugation and washed repeatedly with anhydrous ethanol and distilled water, and dried in air at 80 °C for 12 h before characterization and study.

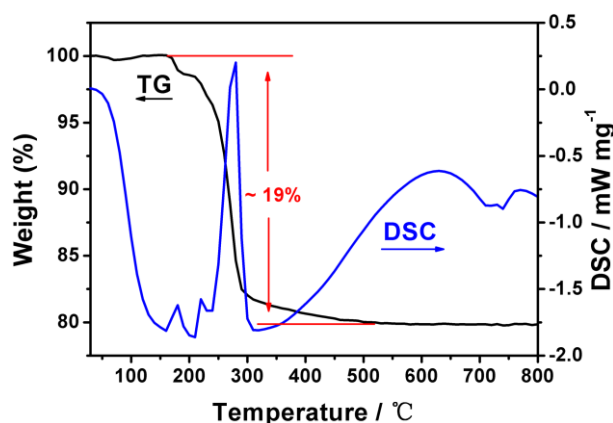


Fig. S1 TG/DSC curves of as-obtained octahedral crystallites in air.

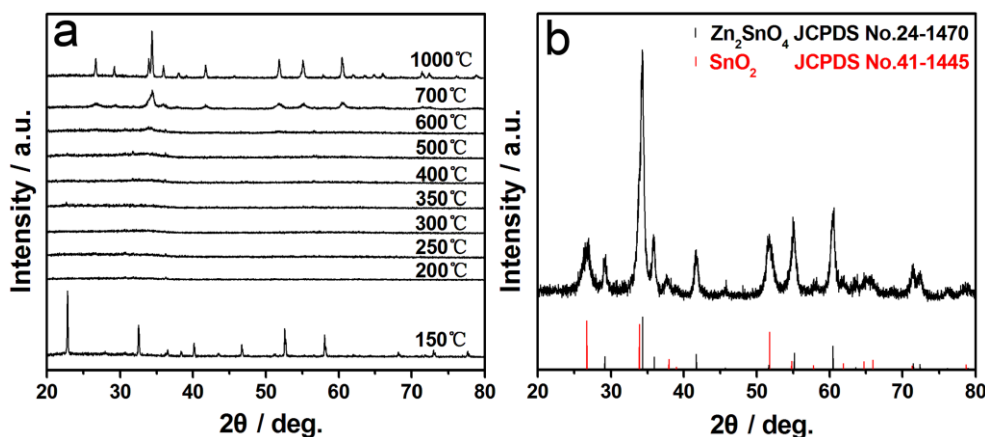


Fig. S2 XRD patterns of octahedral crystallites annealed in air (a) at different temperature, (b) at 700 °C with the standard XRD patterns of Zn_2SnO_4 (JCPDS No. 24-1470) and SnO_2 (JCPDS No. 41-1445).

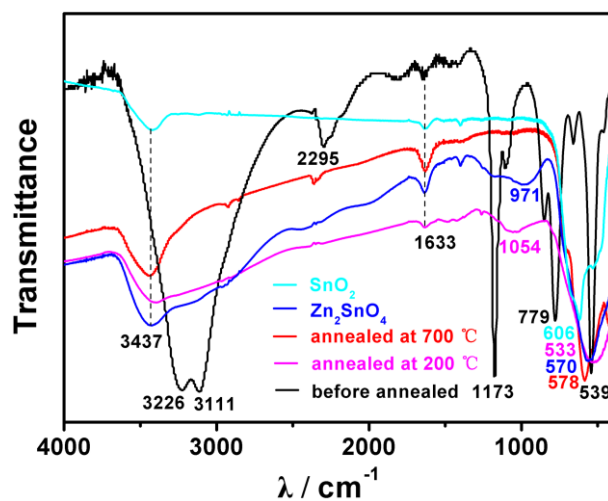


Fig. S3 FTIR spectra of vacuum oven dried octahedral crystallites before being annealed, annealed at 200 °C, annealed at 700 °C, pure Zn_2SnO_4 and SnO_2 .

References

- 1 G. Ma, R. Zou, L. Jiang, Z. Zhang, Y. Xue, L. Yu, G. Song, W. Liand and J. Hu, *CrystEngComm*, 2012, **14**, 2172–2179.
- 2 B. Geng, C. Fang, F. Zhan and N. Yu, *small*, 2008, **4**, No. 9, 1337–1343.