Electronic Supplementary Information (ESI)

Facile synthesis of novel hierarchical hollow ZnO microspheres

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Experiment section

1. Preparation

All the regents were purchased from Sinopharm Chemical Reagent Co. and used as received without further purification. ZnO was prepared by the solvothermal route using ethanol as solvent. The samples prepared by various parameters, such as the reaction time and the concentration of zinc acetate dihydrate (ZAD), were carried out. In a typical procedure, 1 g zinc acetate dihydrate was dissolved in anhydrous ethanol (30.8 mL) to get a transparent solution. 0.5 mL formic acid was mixed with the solution, and white precipitation of zinc formate dihydrate (ZFD) was instantly appeared. The as-prepared suspension was sealed within a Teflon-lined autoclave (40 mL) filling with about 80% of its capacity and heated at 150 °C under a solvothermal condition for 6 h. The solid products were collected by centrifugation, washed with ethanol several times, and then dried in air at 80 °C for 12 h.

2. Characterization

Powder X-ray diffraction (XRD) was used to characterize the samples. Data were collected on a X'Pert PRO X-ray diffractometer with Cu Kα radiation (λ=1.54178 Å) at a beam current of 40 mA. The morphologies and size distribution of the samples were investigated using a Hitachi S-4800 field-emission scanning electron microscope (FE-SEM) with cold field emitter. Transmission electron microscopy (TEM) was used to verify the morphology and investigate the crystallographic characteristics of the samples. TEM studies were carried out on a Philips CM200 with accelerating voltage of 160 kV.

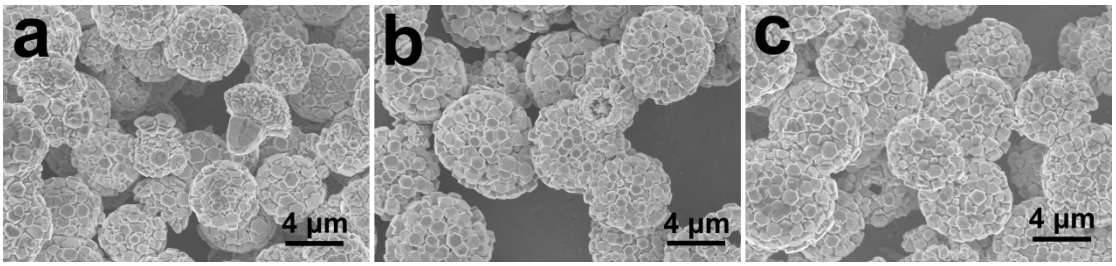

Figure S1. FE-SEM images of the samples prepared with various concentration of zinc acetate dihydrate: (a) 0.07 M, (b) 0.21 M, (c) 0.28 M.

Fig. S1 shows the FE-SEM images of the samples prepared with various concentration of zinc acetate dihydrate. In Fig. S1a, mushroom-shaped structures are found as a fragment of the microspheres, suggesting that the microspheres have core/shell structures. In Fig. S1b-c, no obvious change is detected in the samples prepared with 0.21 M and 0.28 M ZAD. The average diameters of the samples prepared with the ZAD concentration of 0.07 M, 0.14 M, 0.21 M and 0.28 M are 5 μm, 5.5 μm, 6 μm and 6 μm, respectively.

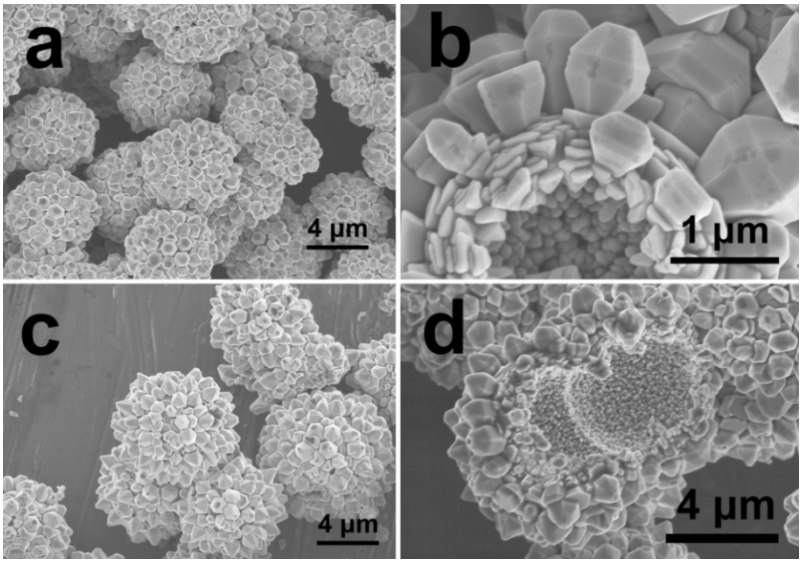

Figure S2. FE-SEM images of the samples prepared for (a) 18 h (low magnification), (b) 18 h (high magnification), (c and d) 36 h.

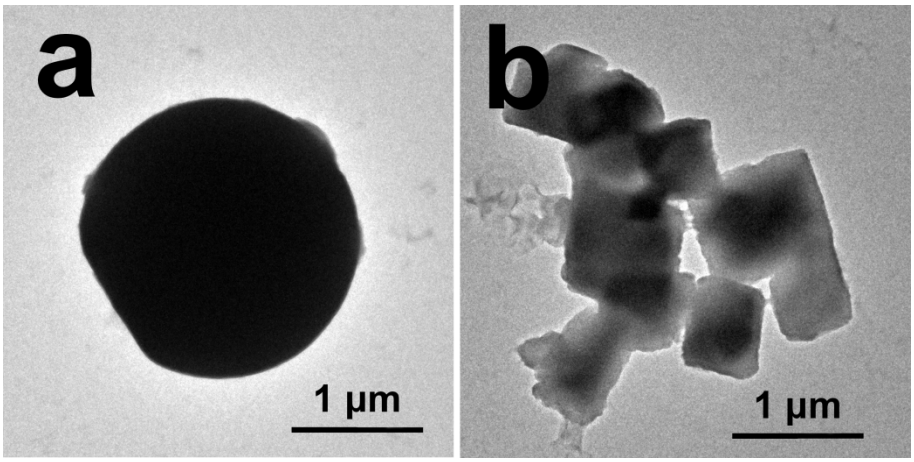

Figure S3. TEM images of the sample prepared for 1 h.