Construction of hollow tellurium hierarchical architecture via a

trisodium citrate assisted self-sacrificed template eroding

mechanism

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Experimental Section

All of the reagents were analytical grade and used as received. In a typical synthesis, 0.5 mmol Na_2TeO_3 , and 0.3 g of trisodium citrate were added in 45 mL formamide in a 50-mL roundbottomed flask at room temperature. After vigorous stirring for 5 min, the mixture was microwave-heated to 200 °C and held at this temperature for 30 min (step 1). The microwave oven used was a focused multi-mode microwave synthesis system (Sineo MAS-II, Shanghai, China), which was equipped with a water cooled condenser outside the microwave cavity and in-situ magnetic stirring system. After microwave heating, the obtained mixture was cooled to room temperature naturally. The product was separated by centrifugation, washed with deionized water and absolute ethanol several times, and then dried at 60 °C in a vacuum.

For the synthesis of Bi_2Te_3 or Ag_2Te , 0.75 mmol of $Bi(NO_3)_3 \cdot 5H_2O$ or 0.5 mmol AgNO₃ was added into the above round-bottomed flask after step 1. Then the mixture was further microwaveheated at temperature of 190 °C for 10 min. Hierarchical Bi_2Te_3 nanosaws or rough Ag_2Te nanowires was obtained after the same cooling, centrifuging, washing and drying procedures in turn.

Powder X-ray diffraction (XRD) measurement of the samples was performed with a Rigaku-D/MAX-2550PC diffractometer using Cu K_{α} radiation at a speed of 10° min⁻¹. Morphology observation of the samples was performed on a FEI Quanta 200F field emission scanning electron microscopy (FESEM). Transmission electron microscopy (TEM), high-resolution TEM (HRTEM) and selected area electron diffraction (SAED) images were obtained on a FEI Tecnai G2 S-Twin transmission electron microscope operating at an accelerating voltage of 300 kV.

Experimental Results Section:



Fig. S1 XRD pattern of Te hierarchical ball/tube nanostructure prepared by microwave-assisted solution method at 200 °C for 30 min in the presence of 0.3 g trisodium citrate. Inset: the crystal structure of Te.



Fig. S2 EDS spectrum taken in the area marked by the red rectangle in Figure 2a of the manuscript.



Fig. S3 XRD pattern of Te prepared by microwave-assisted solution method at 200 °C for 30 min in the presence of 0.8 g trisodium citrate.



Fig. S4 TEM image of Te prepared by microwave-assisted solution method at 200 °C for 30 min in the presence of 0.3 g·trisodium citrate.



Fig. S5 Morphologies of the samples obtained by microwave-assisted solution method at 200 °C for 30 min with different assisted condition: (a) 0.3 g NaOH; (b) 1.5 mL hydrazine hydrate , (c) 1.5 mL ethanediamine, (d) 1.5 mL ethanediamine and 0.1 g PVP (M_w≈10000).



Fig. S6 TEM image of Te prepared by microwave-assisted solution method at 200 °C for 30 min in the presence of 1.5 mL ethanediamine and 0.1 g PVP ($M_w \approx 10000$).



Fig. S7 Characterization of hierarchical Bi₂Te₃ prepared using the obtained hollow hierarchical Te template: (a) FESEM image, (b) TEM image, (c) XRD pattern



Fig. S8 Characterization of rough Ag₂Te nanowires synthesized using the obtained hollow hierarchical Te template: (a) FESEM image, (b) XRD pattern