

Electronic Supplementary Information (ESI) for
**Facile hydrothermal synthesis and formation mechanisms of Bi₂Te₃,
Sb₂Te₃ and Bi₂Te₃-Sb₂Te₃ nanowires**

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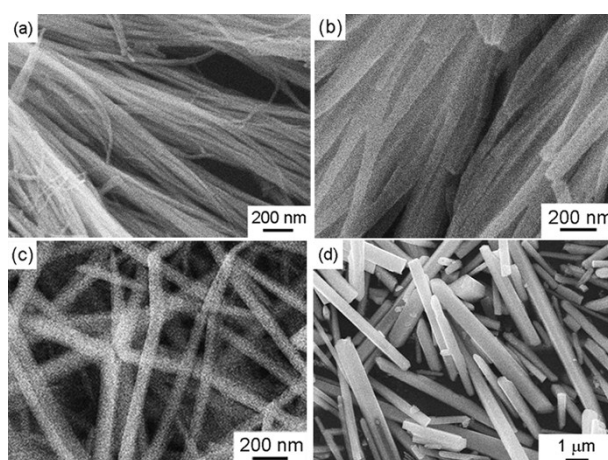


Fig. S1 SEM images of Te samples prepared under (a) 0.2 M HCl, (b) no pH additive, (c) 0.2 M NaOH and (d) 0.6 M NaOH.

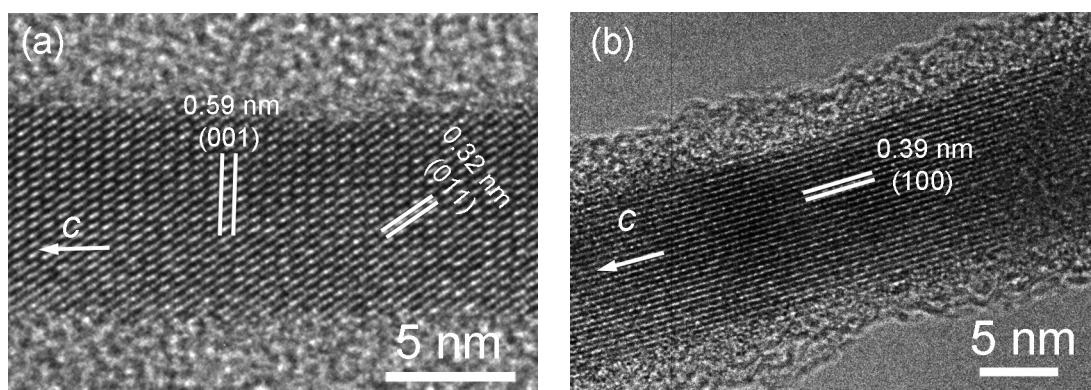


Fig. S2 HRTEM images of Te nanowires with different diffraction fringers, all of which show the wire axes parallel to c direction.

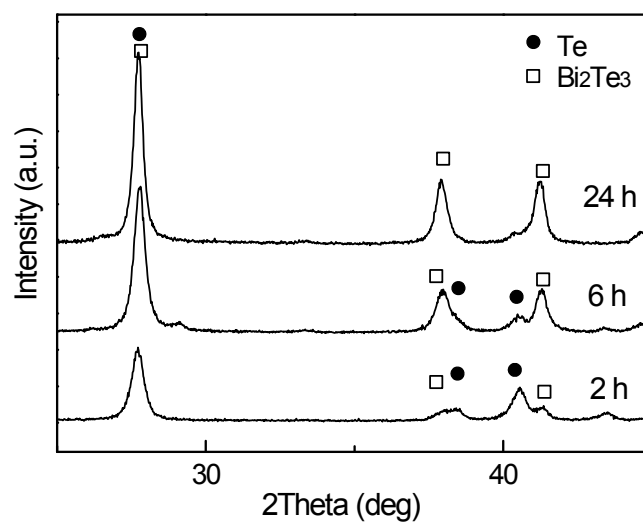


Fig. S3 XRD patterns of Bi_2Te_3 samples prepared at $180\text{ }^\circ\text{C}$ for 2 h, 6 h, and 24 h, respectively. It shows that Te nanowires are initially formed and they act as templates for the formation of Bi_2Te_3 nanowires.

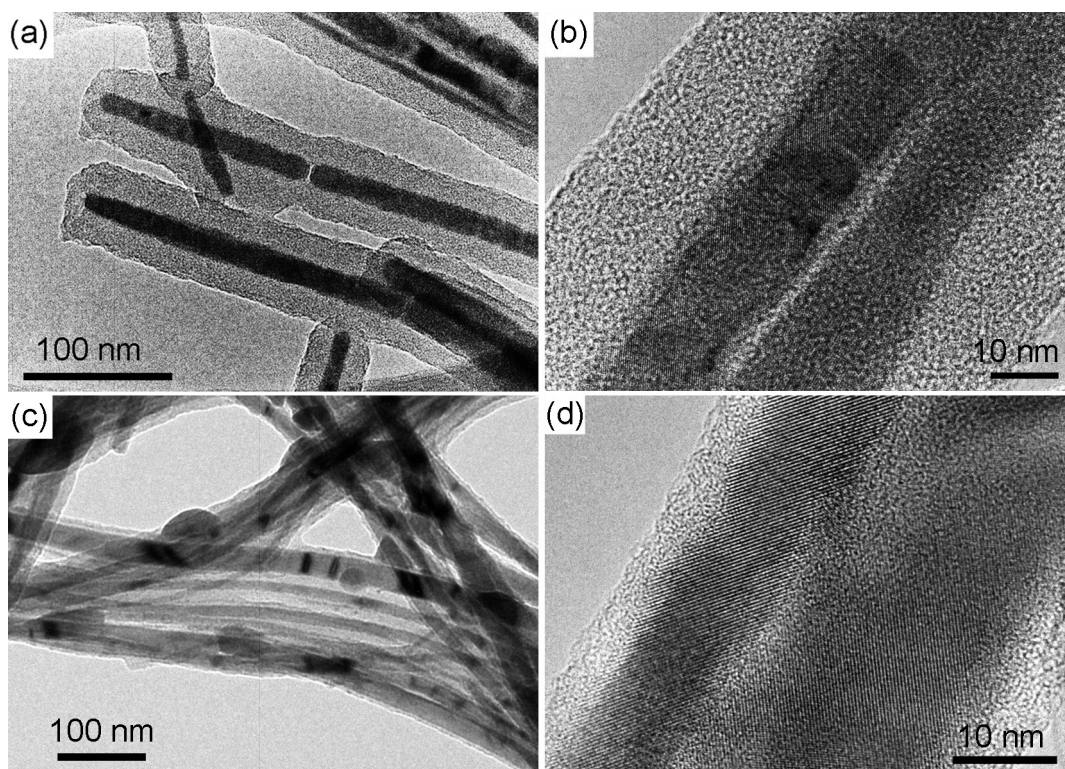


Fig. S4 (a,b) TEM images of as-prepared Bi_2Te_3 nanowires coated with a thicker amorphous layer. (c,d) TEM images of the Bi_2Te_3 nanowires after washed with N,N-Dimethylformamide (DMF), indicating that the amorphous layer is partially removed.

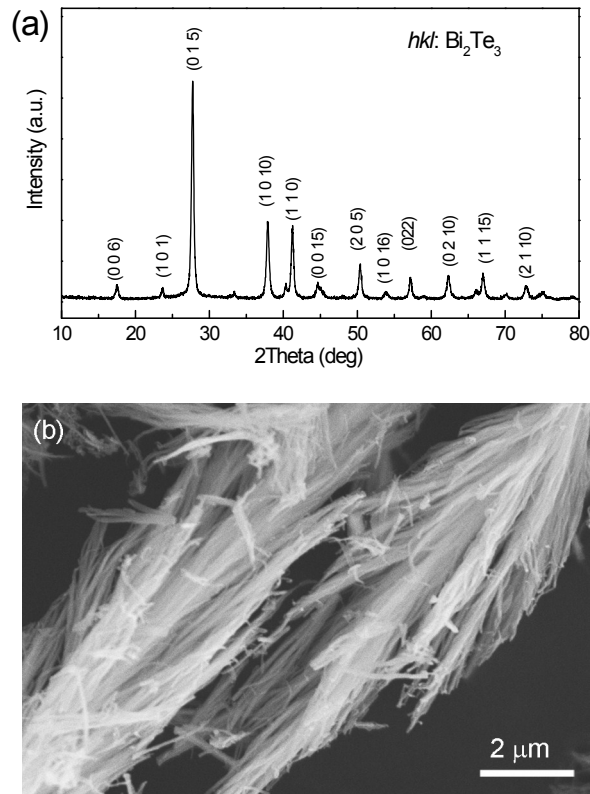


Fig. S5 (a) XRD pattern of Bi_2Te_3 nanowires prepared under 0.2 M HCl without EDTA at 180 °C for 24 h, showing pure Bi_2Te_3 can be obtained. (b) SEM image of the as-prepared Bi_2Te_3 sample. It shows that Bi_2Te_3 nanowires can be also obtained without EDTA under acidic condition indicating the role of surfactant EDTA for directing the special morphology is limited.

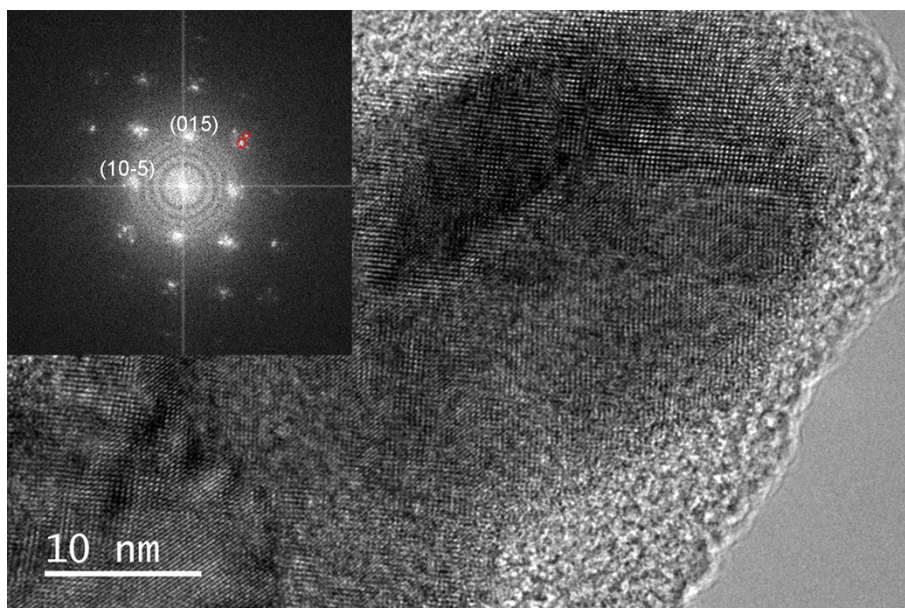


Fig S6 HRTEM image of $\text{Bi}_2\text{Te}_3\text{-Sb}_2\text{Te}_3$ nanowire and the fast Fourier transform (FFT) of the lattice-resolved image. It indicates that there are lattice fluctuations in the structure.

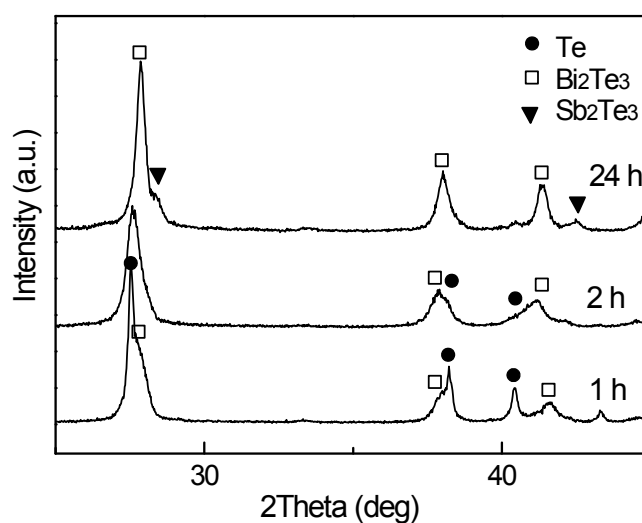


Fig. S7 XRD patterns of $\text{Bi}_2\text{Te}_3\text{-Sb}_2\text{Te}_3$ samples prepared by two steps hydrothermal synthesis. After the first step synthesis of Te nanowires at 150 °C for 12 h under acidic condition of 0.2 M HCl, precursors of 0.125 mmol BiCl_3 and 0.125 mmol SbCl_3 and 0.192 g NaOH were added in the autoclave for the second step synthesis at 220 °C. The reaction times for the second step were 1 h, 2 h, and 24 h, respectively. It shows that the formation of Bi_2Te_3 precedes to Sb_2Te_3 .