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Supporting Information

Bi_2Te_3 Nanoplates and Nanoflowers: Synthesized by Hydrothermal Process and Their Enhanced ZT Properties

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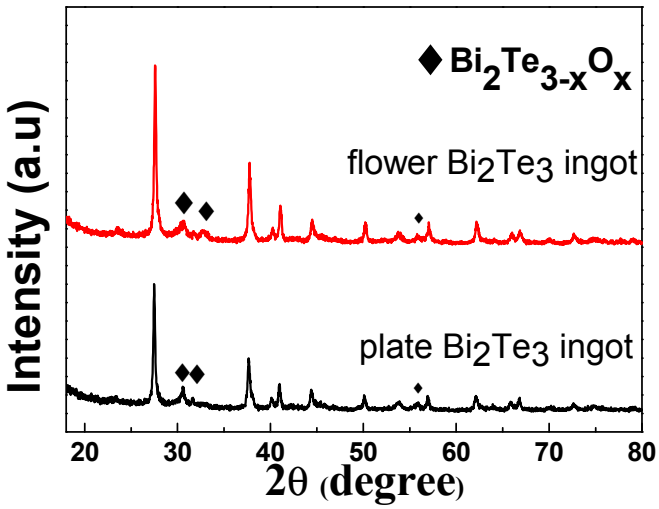

Fig. S1 Pellet XRD pattern of plate-like and flower-like Bi_2Te_3. The peaks marked with an rhombus are from bimuth oxide telluride.

XRD patterns collected after sintering at 400 ^{o}C for 10 min exhibit sharpening of the Bragg peaks, suggesting some nanoparticle growth via sintering, and new peaks associated with the formation of a very small amount of oxide impurity. However, the material still remains almost entirely rhombohedral Bi_2Te_3.

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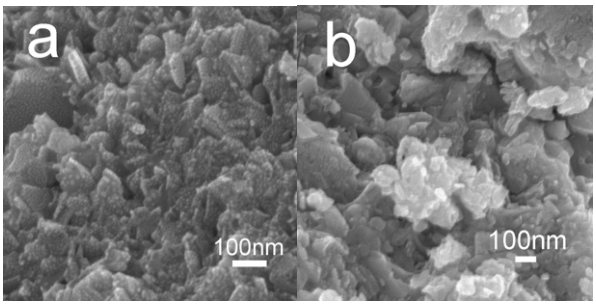

Fig. S2 FESEM images of pellet Bi_2Te_3: (a) plate, (b) flower.

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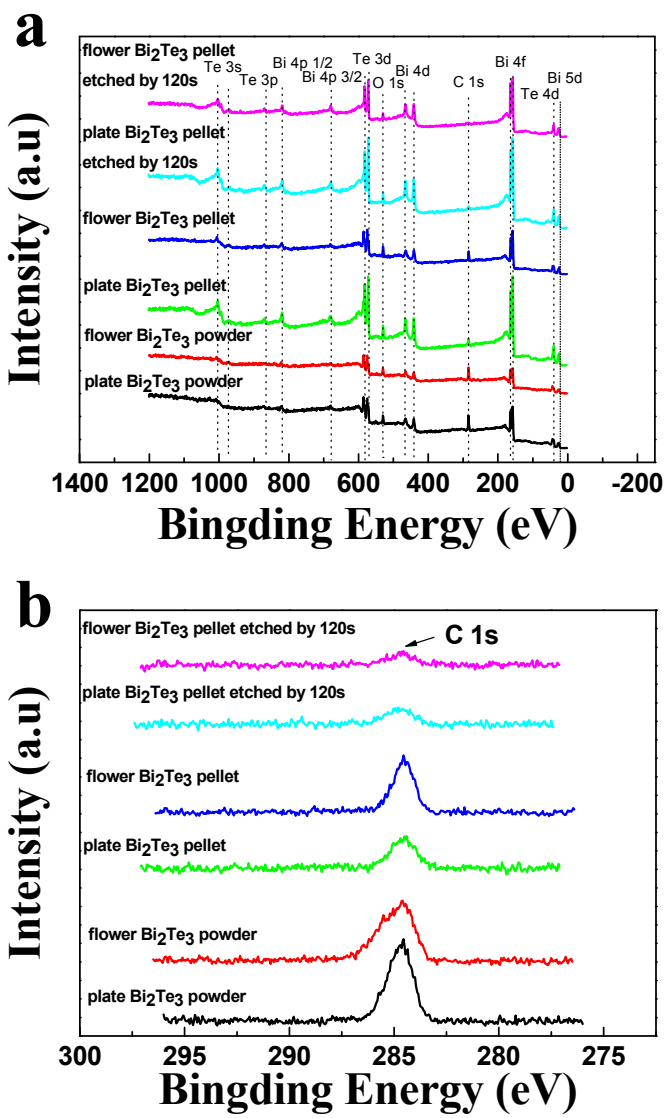

Fig. S3 XPS data of powder and pellet bismuth telluride nanoparticles: a) survey scan, b) high resolution scan of the C 1s region.

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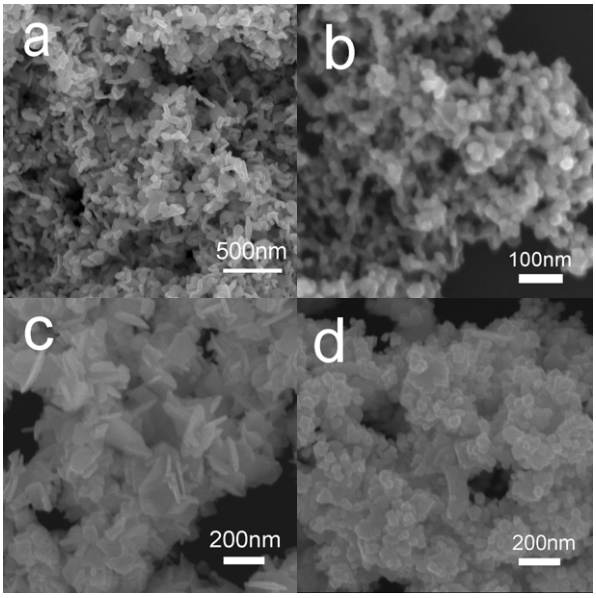

Fig. S4 FESEM images of the samples prepared under different additives: (a) tartaric acid, (b) citric acid, (c) disodium ethylenediamine tetraacetic acid, (d) ethylene diamine tetraacetic acid tetrasodium.

When the reactions are carried out in the presence of other additives(0.0566 g), such as tartaric acid, citric acid, disodium ethylene diamine tetraacetic acid, and ethylene diamine tetraacetic acid tetrasodium, similar results of ill-defined morphology are observed(Fig. S4).

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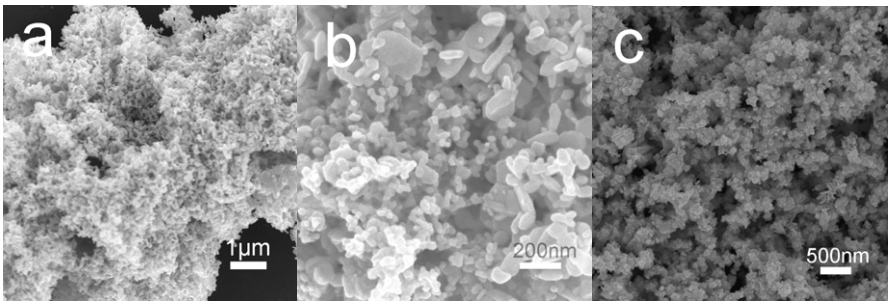

Fig. S5 (a) Low- and (b) high-magnification FESEM images of the as-obtained Bi_2Te_3 products without EDTA, (c) 0.1g EDTA.

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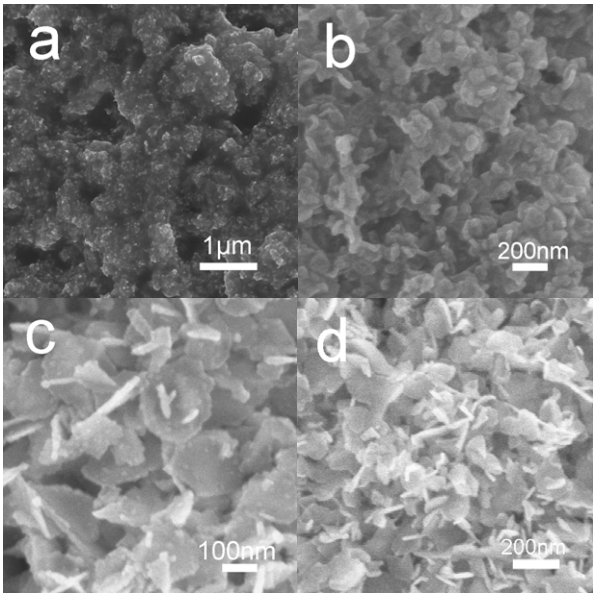

Fig. S6 FESEM images of Bi_2Te_3 plates at 180 ^{o}C obtained at different times: (a) 10 min, (b) 20 min, (c) 30 min, (d) 60 min.

When the reaction time is 10 min (Fig. S6a), at the early stage, only a little amount of gelatinous product with rugged surfaces are obtained. When the reaction time is increased to 20 min, a large amount of black solid products are generated. The obtained samples were not well-developed, and it seemed that they were in the initial stage of the growth. When the reaction time increased to 30 min (Fig. S6c), the initial product mainly consisted of quasi-platelets. Such plate-shaped structures were about 100 nm in width and 10 nm in thickness. When the reaction time is lengthened to 40 min (Fig. S6d), relative complete and regular plate-like spheres are generated. While further prolonging the hydrothermal time to 48 h, perfect thin nanoplates are formed. Such a time-consuming crystal growth process should be related to the slow reaction process.

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Table S1. Element ratio of Bi_2Te_3 powder and pellets analyzed by ICP-OES.

	Plate Bi_2Te_3 powder	Flower Bi_2Te_3 powder	Plate Bi_2Te_3 pellet	Flower Bi_2Te_3 pellet
Bi/ Te mol %	0.8258	0.9382	0.8522	0.9635

The quantitative elemental analysis of our samples shows the abundance of bismuth. Furthermore the ratio of Bi/Te rises when the powder were pressed in high pressure. Because, the Te atoms in external layer of five layer Bi_2Te_3 structure were easily detached.