Supplementary Material
for

Minute-made, high efficiency nanostructured Bi_2Te_3 via high-throughput green solution chemical synthesis

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Table S1. Survey of the synthesis methods, reaction conditions, morphology and size of Bi_2Te_3

Composition	Morphology	Synthesis Method	Temperature and Time	Dimensions	Reference
Bi_2Te_3	Nanotubes	Ultrasonic-assisted hydrothermal	180°C,48 h	50-1000 nm	[1]
Ag, Sb, Sn Doped Bi_2Te_3	Nanoparticles	Ultrasonic-assisted hydrothermal	200°C, 3 h	28-40 nm	[2]
Bi_2Te_3	Nanoparticles	Ultrasonic-assisted hydrothermal	70°C, 16 h, 20 h and 40 h	10-20 nm	[3]
Bi_2Te_3	Thin film	MOCVD	450°C	-	[4]
Bi_2Te_3/Sb_2Te_3	2D superlattice and thin films	MOCVD	350°C	-	[5]
Bi_2Te_3	Nanowires and nanoribbons	VLS	275 - 290°C	50nm-13µm	[6]
Bi_2Te_3	Nanoparticles	Microemulsion	-	10 nm	[7]
Bi_2Te_3	Nanoparticles and nanorods	Refluxing hydrothermal	100°C, 2-24 h	15-100 nm	[8]
Bi_2Te_3	Nanowires	Electrodeposition	RT	40-250 nm	[9]
Bi_2Te_3	Nanoparticles	Co-precipitation	RT	60-90 nm	[10]
Bi_2Te_3	Nanoparticles	co-precipitation	400°C 2h	80 nm	[11]
Bi_2Te_3	Nanosheets, nanorags, nano sheet-rod and nanorods	Solvothermal DMF, pyridine, acetone, ethano	100–180°C, 10–50 h	10 nm-10 µm	[12]

Composition	Morphology	Synthesis Method	Temperature and Time	Dimensions	Reference
Bi_2Te_3	Nanoparticles and nanowire	Solvothermal DMF	150°C, 24 h	15 nm-1μm	[13]
Bi_2Te_3	Nanoparticles and nanorod	Solvothermal DMF	100–180°C, 10–50 h	10-150 nm	[14]
Bi_2Te_3	Nanoparticles and nanoplates	Solvothermal Water, ethylene glycol	60°C, 120°C and 180°C, 16 h	30 nm	[15]
Bi_2Te_3	Nanoplates	Thermolysis Oleic acid	210°C, 24 h	30-200 nm	[16]
Bi_2Te_3	Nanoflower	Solvothermal water and ethanol	180°C, 8 h	30 nm-2 μm	[17]
Bi_2Te_3	Nanoparticles	Hydrothermal	100°C, 48 h	10 nm	[18]
Bi_2Te_3	Nanotubes	Hydrothermal	150°C, 24 h	30 nm-1μm	[19]
Bi_2Te_3	Nanosheets and nanoplates	Hydrothermal	120°C, 12 h	50-500 nm	[20]
Bi_2Te_3	Nanowires	Hydrothermal	65°C, 48 h	15 nm-1μm	[21]
Bi_2Te_3	Nanoplates, nanorods, and nanotubes	Hydrothermal	150°C, 180°C and 210°C, 24 h	20 nm-2 μm	[22]
Bi_2Te_3	Nanorods and nanoflakes	MW-assisted polyol method	0.5–6 h	20-400 nm	[23]
$Bi_{0.5}Sb_{1.5}Te_3$	Nanoplates	Hydrothermal	150°C, 24 h	30 nm- μm	[24]
Bi_2Te_3/ Sb_2Te_3	Nanoplates	Refluxing Water , ammonia	90°C, 18 h	13-80 nm	[25]
Bi_2Te_3	Nanowire	Hydrothermal	65°C for 72 h	Diameter: 15–20 nm Length: 1 μm	[26]
Bi_2Te_3	Nanorods and nanoflakes	MW-assisted polyol method	0.5–6 h	NR Width:20–50 nm NR length: 200–400 nm NF length: 90 to 150 nm	[23]
$Bi_{0.5}Sb_{1.5}Te_3$	Nanoplates	Hydrothermal	150°C, 24 h	Length: 100nm - μm Thickness: 30 nm to 100 nm	[24]
$Bi_{2-x}Sb_xTe_3$	Nanoplates	MW-assisted Polyol method	220 °C, 2 mins	Length: 50 - 500 nm Thickness: 50 nm	[27]

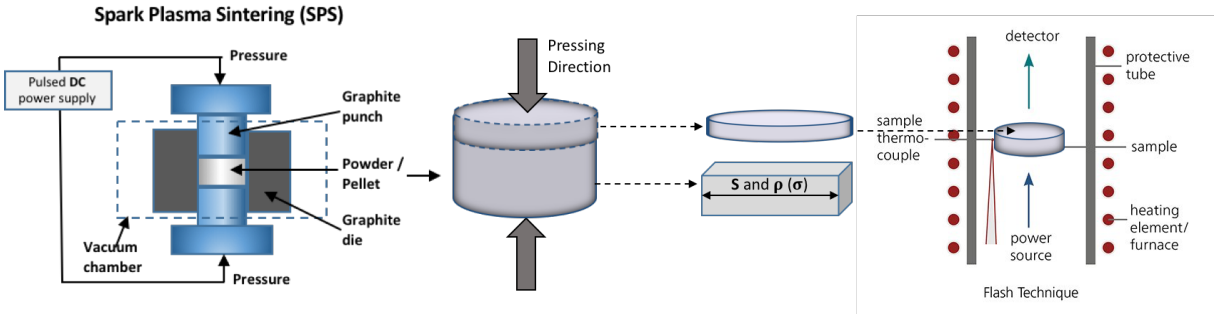

Figure S1: Schematic of Spark Plasma Sintering (SPS) process, sample geometry for thermal diffusivity, using Laser Flash technique, and power factor measurements.

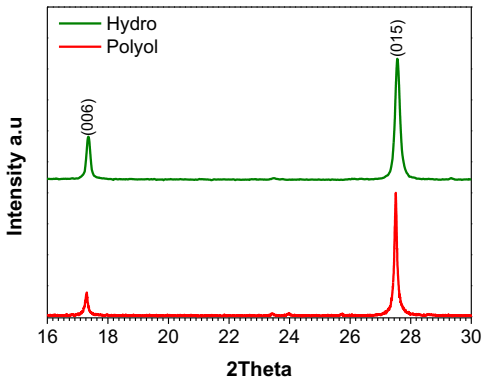

Figure S2: XRPD patterns showing a close up of the peaks with Miller indices of (006) and (015) for both the samples after SPS process. The relative peak intensity ratio (I_{006} / I_{015}) is a good indicative of texturing within the material, and was estimated as 0.38 for the Hydro-Bi_2Te_3 sample, and 0.19 for the Polyol-Bi_2Te_3 sample.

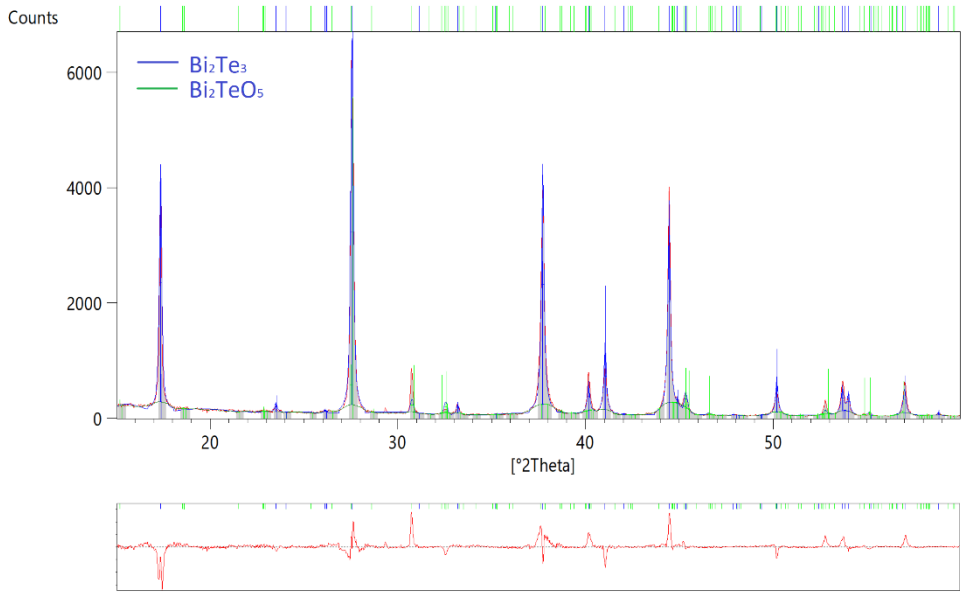

Figure S3: Rietveld refinement for Hydro-Bi_2Te_3 sample after SPS sintering. Quantification based on the Rietveld refinement yielded about 5.8% Bi_2TeO_5 phase.

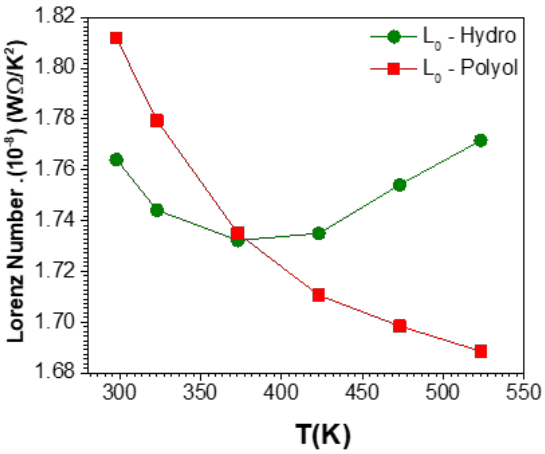

Figure S4: Lorenz Number, Lo, estimated for Bi_2Te_3 samples using parabolic band model.

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