Supporting information

Impurity Band Engineering and Hierarchical Defect Scattering Enable High zT in Co-Doped $AgSbTe_2$

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1. Table S1 shows the elemental distribution of 3 regions in Figure 4e

Table S1 EDS Elemental Quantitative Analysis at region 1, 2, and 3 of $AgSb_{0.97}Co_{0.03}Te_2$ sample in Figure 4e.

Region	Composition	Ag %	Sb %	Te %	Co %
1	$Co_{2.60}Sb_2Te_{3.64}$	0	24.28	44.15	31.56
2	$Ag_{4.71}Sb_{0.05}Co_{0.04}Te_3$	60.36	0.70	38.41	0.53
3	$Ag_{1.04}Sb_{0.93}Co_{0.036}Te_2$	26.25	23.35	50.31	0.09

2. Figure S1 shows the TEM image and related EDS map of $AgSb_{0.97}Co_{0.03}Te_2$ sample, which confirms that cobalt was doped into the matrix and their Sb-rich and Ag-rich secondary phases.

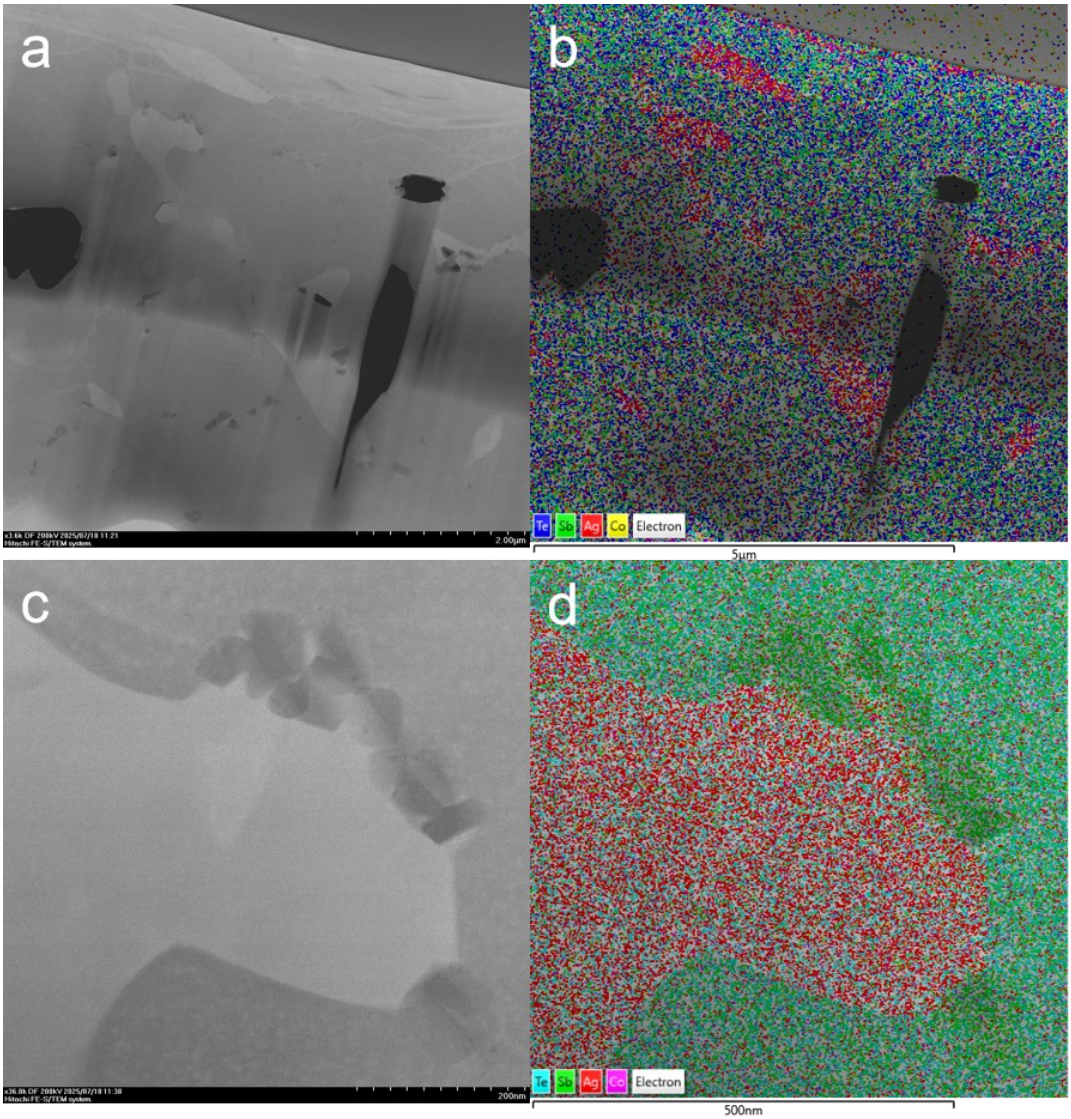

Figure S1 TEM images of $AgSb_{0.97}Co_{0.03}Te_2$ and their relative EDS maps.

3. Figure S2 shows the TEM images of defects in $AgSb_{0.97}Co_{0.03}Te_2$ sample.

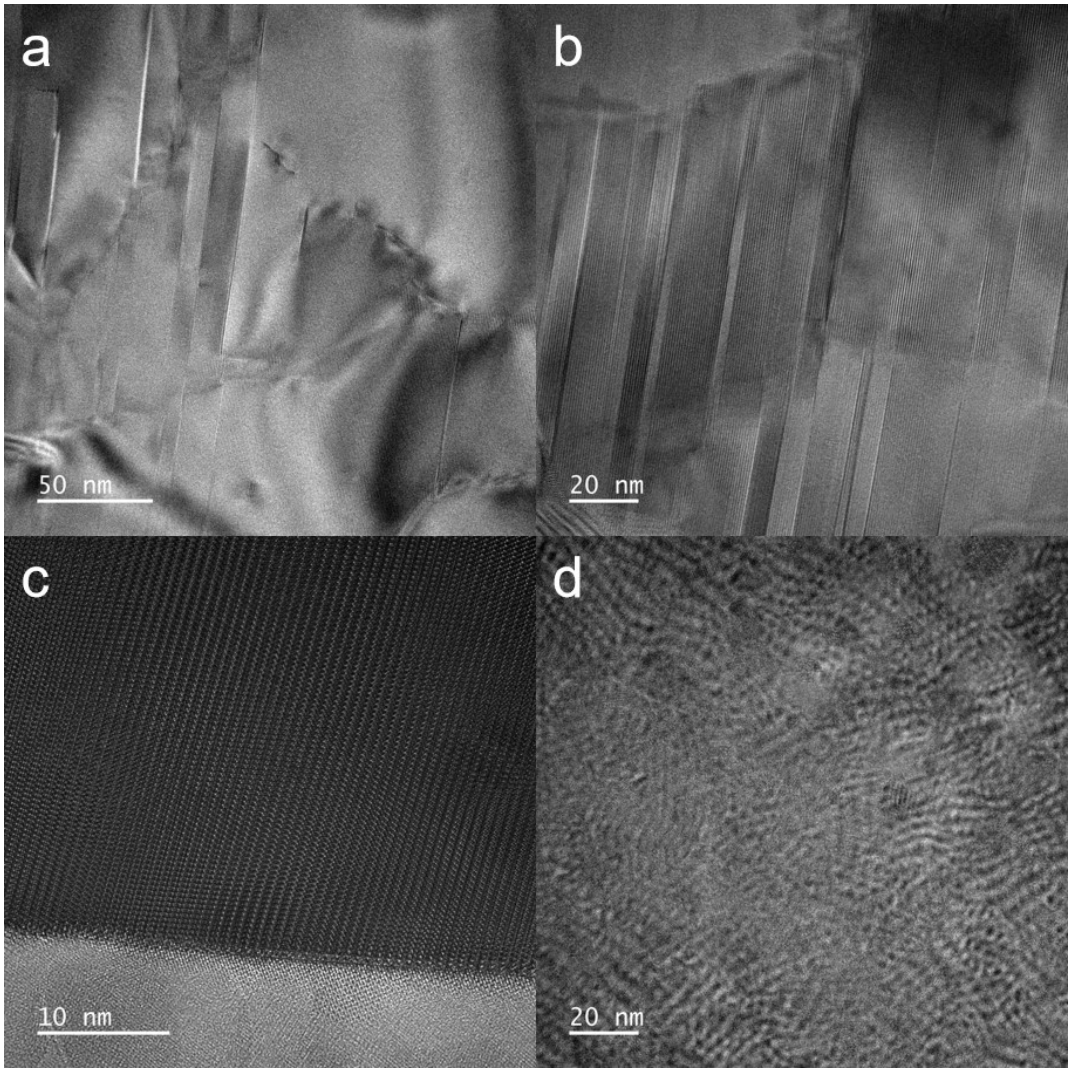

Figure S2 TEM images of defects in $AgSb_{0.97}Co_{0.03}Te_2$ sample.

4. Figure S3 shows the calculated weighted moility of $AgSb_{0.97}Co_{0.03}Te_2$ sample.

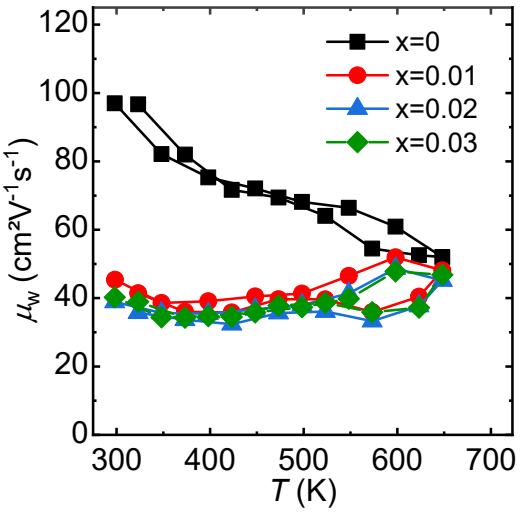

Figure S3 calculated weighted moility of $AgSb_{0.97}Co_{0.03}Te_2$ sample.

5. Figure S4 and Table S2 shows the Rietveld refinement of the XRD pattern of $AgSbTe_2$ with CoTe2 (a) and $CoSb_{0.5}Te_{1.5}$ (b) secondary phase.

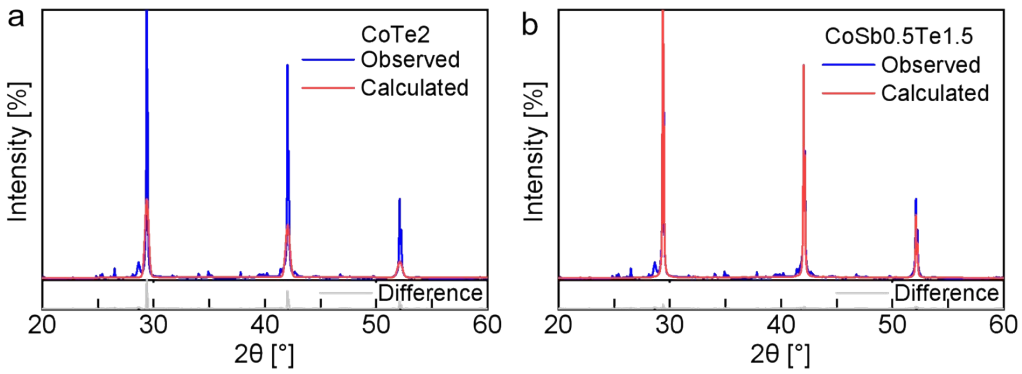

Figure S4 Rietveld refinement of the XRD pattern of $AgSbTe_2$ with CoTe2 (a) and $CoSb_{0.5}Te_{1.5}$ secondary phase

Table S2 Parameter of $CoTe_2$ and $CoSb_{0.5}Te_{1.5}$ phase from Rietveld refinement

Parameter	$CoTe_2$	$CoSb_{0.5}Te_{1.5}$
a (Å)	5.273	5.268
b (Å)	3.817	3.883
c (Å)	6.229	6.160
V (Å³)	125.4	126.0