

Supporting Information

Doubling the ZT record of TiS_2 -based thermoelectrics by incorporation of ionized impurity scattering

Yifeng Wang,^{a,b,†} Lin Pan,^{a,b*} ChaoLi,^d Ruoming Tian,^c RongHuang,^d XiaohuiHu,^{a,b} Changchun Chen,^{a,b} Ningzhong Bao,^{e,f,g} Kunihiro Koumoto,^{c,h,i} and Chunhua Lu^{a,b,†}

^a College of Materials Science and Engineering, Nanjing Tech University, Nanjing 210009, China

^b Jiangsu Collaborative Innovation Center for Advanced Inorganic Function Composites, Nanjing Tech University, Nanjing 210009, China

^c Toyota Physical and Chemical Research Institute, Nagakute 480-1192, Japan.

^d Key Laboratory of Polar Materials and Devices, Ministry of Education, East China Normal University, Shanghai 200062, China

^e State Key Laboratory of Material-Oriented Chemical Engineering, Nanjing Tech University, Nanjing 210009, China

^f College of Chemistry and Chemical Engineering, Nanjing Tech University, Nanjing 210009, China

^g Jiangnan Graphene Research Institute, Changzhou 213159, China

^h Department of Applied Physics, College of Applied Science, Kyung Hee University, Yong-in 17104, Korea

ⁱ Centre of Nanotechnology, King Abdulaziz University, Jeddah 21589, Saudi Arabia

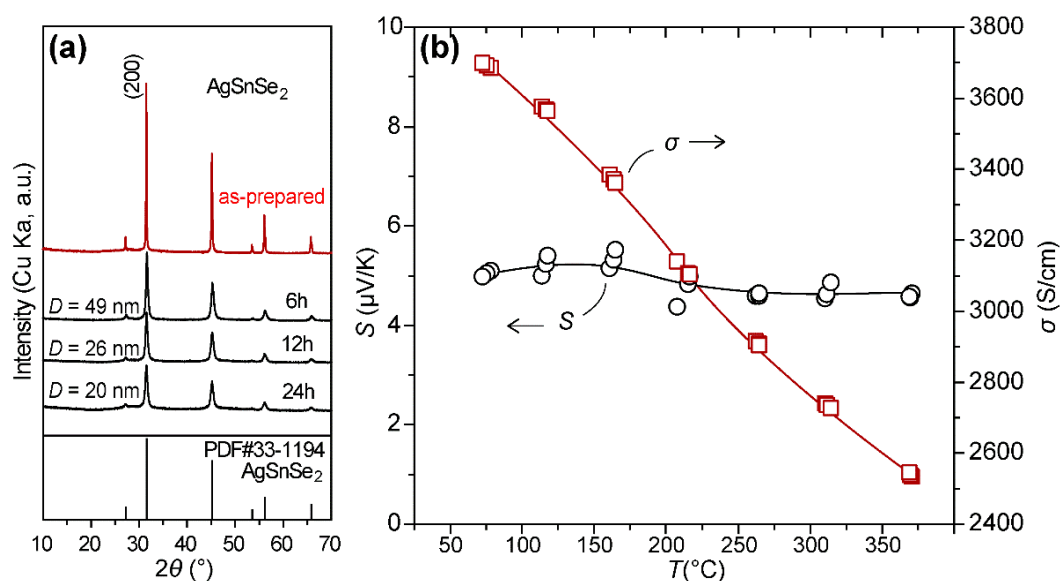


Fig. S1 (a) Powder XRD patterns for AgSnSe_2 after ball-milling for 0~24 h, with crystallite size D estimated with the Scherrer formula. (b) Seebeck coefficient (S) and electrical conductivity (σ) of the AgSnSe_2 ceramic sample.

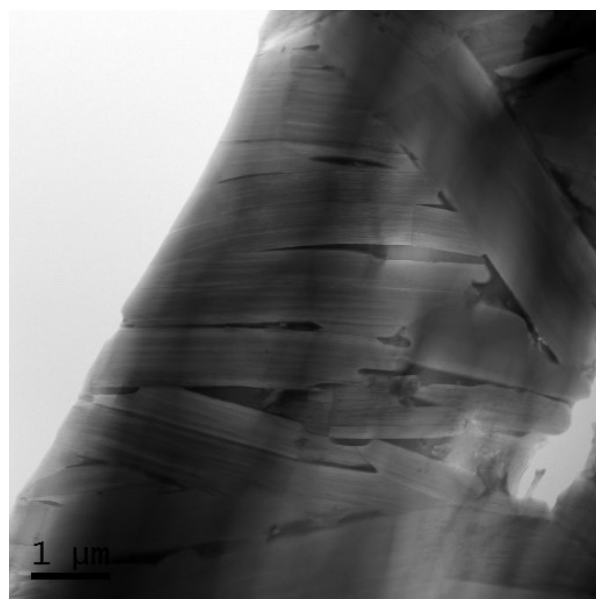


Fig. S2 A bright-field TEM image for the TiS_2 -3% AgSnSe_2 sample, where lamellar shaped TiS_2 crystals can be seen.

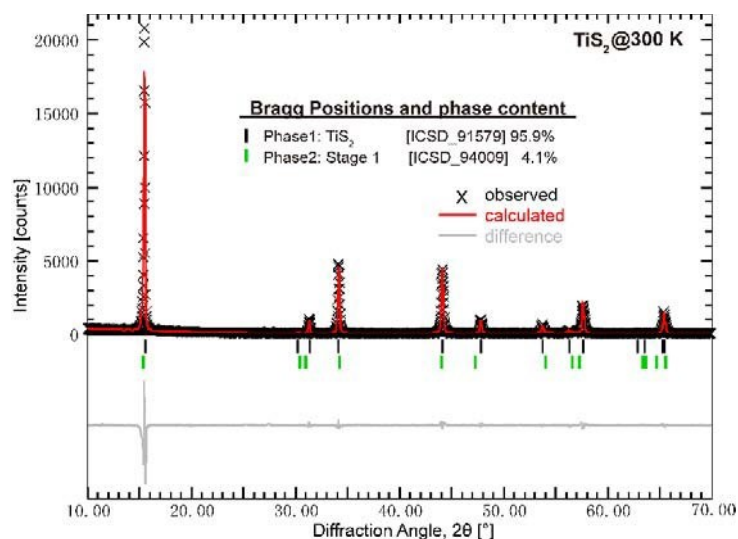


Fig. S3 Rietveld refinement result using the XRD data for pristine TiS₂ sample.

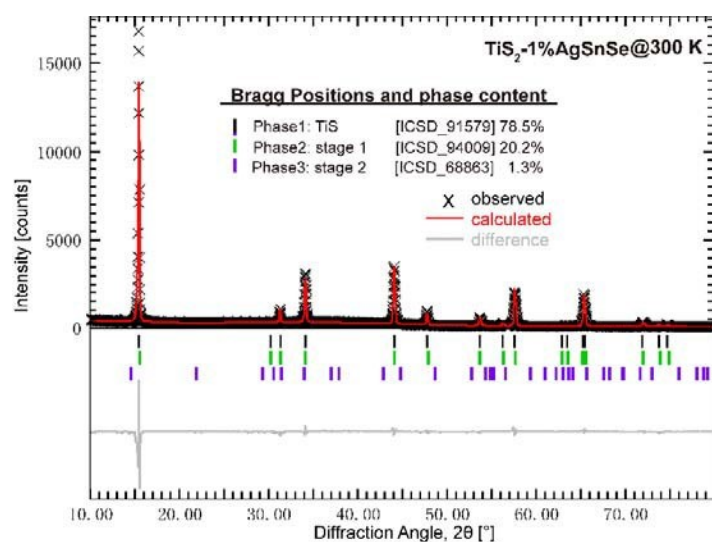


Fig. S4 Rietveld refinement result using the XRD data for TiS₂-1%AgSnSe₂ sample.

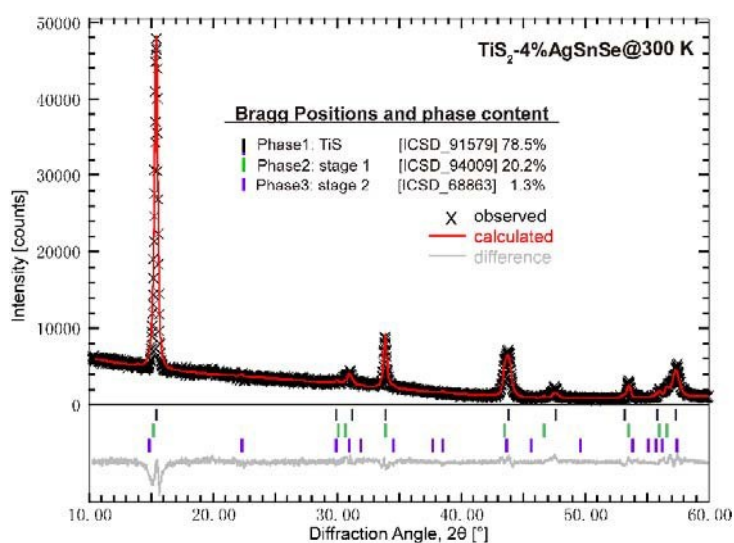


Fig. S5 Rietveld refinement result using the XRD data for TiS₂-4%AgSnSe₂ sample.

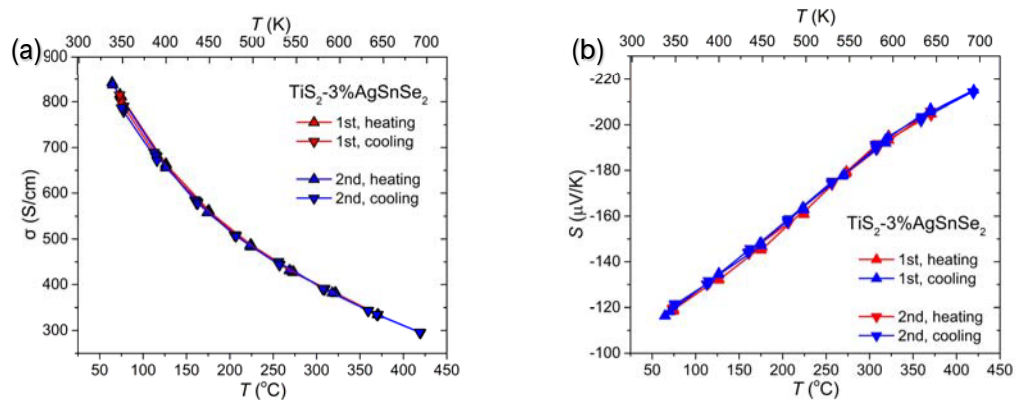


Fig. S6 Seebeck coefficient (a) and electrical conductivity (b) collected during the heating and cooling processes twice on the $\text{TiS}_2\text{-3\%AgSnSe}_2$ sample, which show a robust reversibility against the temperature cycles.