Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Lead-free SnTe-based Thermoelectrics： Enhancement of Thermoelectric Performance by Doping with Gd/Ag

Li Juan Zhang,[a] Jian Li Wang,[a] Zhen Xiang Cheng,[a] Qiao Sun,[a,b] Zhen Li,[*, a,b] and Shi Xue Dou[a]

[a] Institute for Superconducting and Electronic Materials, Australian Institute for Innovative Materials, University of Wollongong, Squires Way, North Wollongong, New South Wales 2500, Australia.

[b] School of Radiation Medicine and Radiation Protection, Medical College of Soochow University, Collaborative Innovation Center of Radiation Medicine of Jiangsu Higher Education Institutions, 199 Ren Ai Road, Suzhou Industrial Park, Suzhou 215123

Corresponding author: zhenli@suda.edu.cn; zhenl@uow.edu.au

Densities of all samples

Density	$Gd_xSn_{1-x}Te$				
	x=0	x=0.02	x=0.04	x=0.06	x=0.08
D_T, gcm^{-3}	6.482	6.515	6.548	6.581	6.614
D_S , gcm^{-3}	6.41	6.26	6.35	6.36	6.44
D_R , %	98	96	97	96	97

Density	$Ag_yGd_{0.06}Sn_{0.94}Te$							
	y=0	y=0.03	y=0.05	y=0.07	y=0.09	y=0.11	y=0.13	y=0.15
D_T, gcm^{-3}	6.581	6.331	6.181	6.280	6.374	6.465	6.552	6.635
D_S , gcm^{-3}	6.36	6.12	6.02	6.13	6.17	6.30	6.41	6.53
D_R , %	96	97	97	98	97	97	98	98

Table S1. Densities of all samples

STEM EDS spectrum image of $Gd_{0.06}Sn_{0.94}Te$

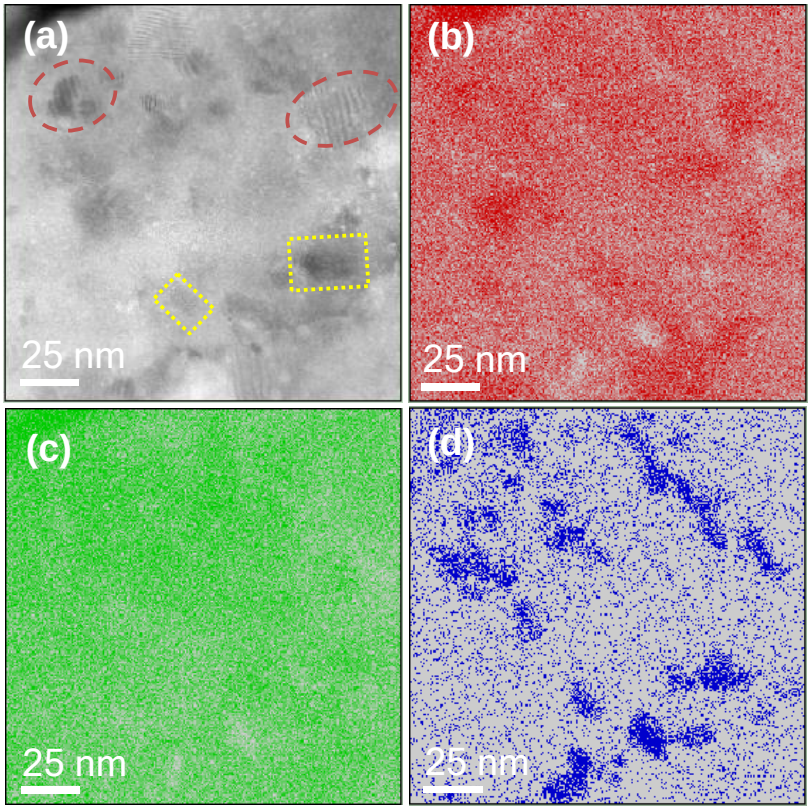

Figure S1. STEM EDS spectrum image of $Gd_{0.06}Sn_{0.94}Te$. (a) Low magnification STEM image shows two precipitates highlighted by red circles and yellow squires in the matrix; (b)-(e) corresponding EDS mapping for elements Sn, Te and Gd, respectively. A blacker in color in the elementary maps corresponds to higher concentrations.

Low magnification STEM image shows Moir épatterns in grain boundary

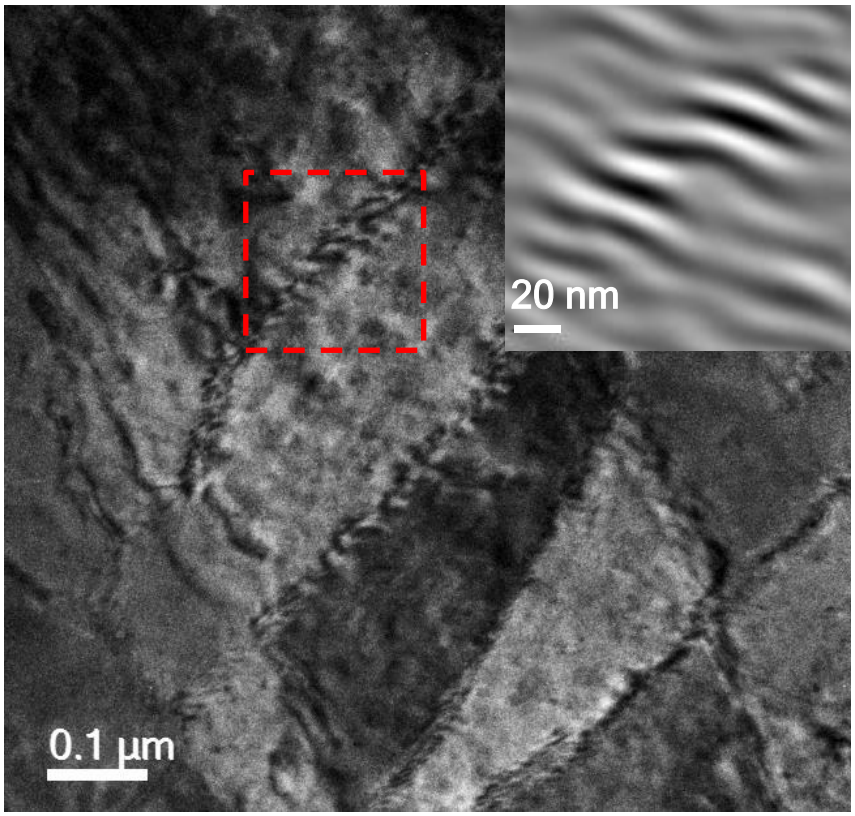

Figure S2. Low magnification STEM image shows Moir é patterns in grain boundary. The inserted is IFFT image of the dashed red rectangular.

Thermal diffusivity, Lorenz number and heat capacity as a function of temperature for $Gd_xSn_{1-x}Te$ (x = 0-0.08) samples

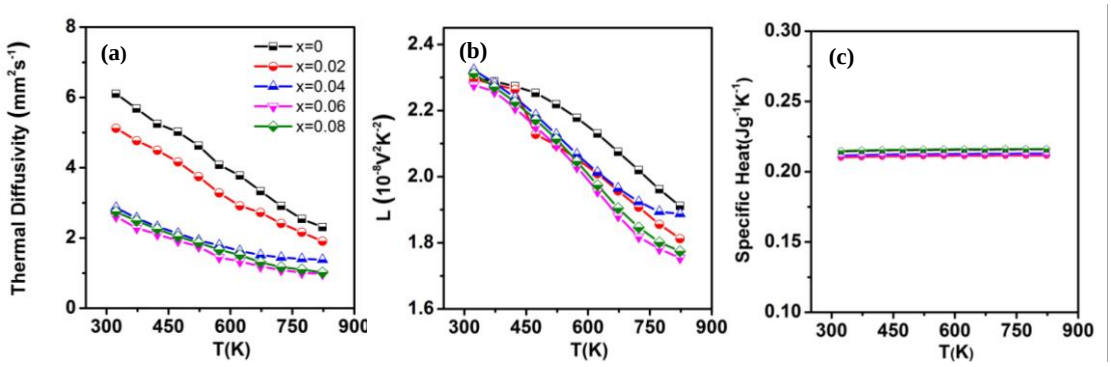

Figure S3. (a) Thermal diffusivity; (b) Lorenz number; (c) heat capacity as a function of temperature for $Gd_xSn_{1-x}Te$ (x = 0-0.08) samples.

Thermal diffusivity, Lorenz number and heat capacity as a function of temperature for $Ag_yGd_{0.06}Sn_{0.96}Te$ (x = 0-0.15) samples

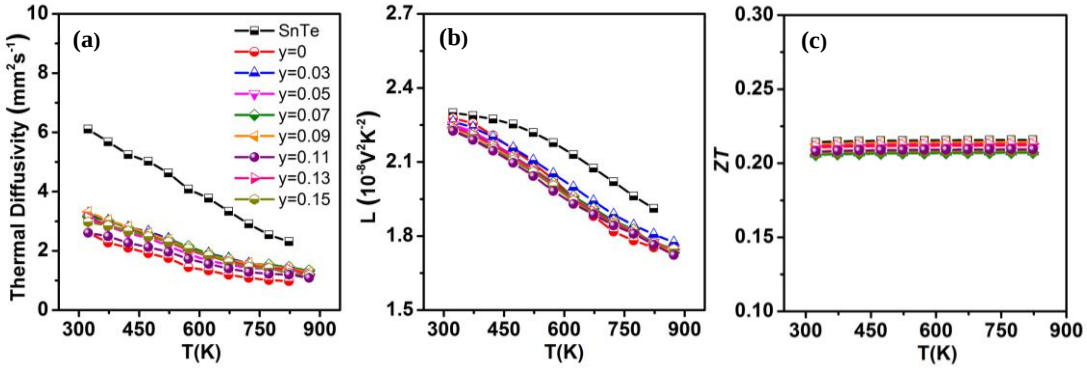

Figure S4. (a) Thermal diffusivity; (b) Lorenz number; (c) heat capacity as a function of temperature for $Ag_yGd_{0.06}Sn_{0.96}Te$ (x = 0-0.15) samples

STEM EDX spectrum image taken at the matrix and the nanoprecipitate of $Ag_{0.11}Gd_{0.06}Sn_{0.94}Te$

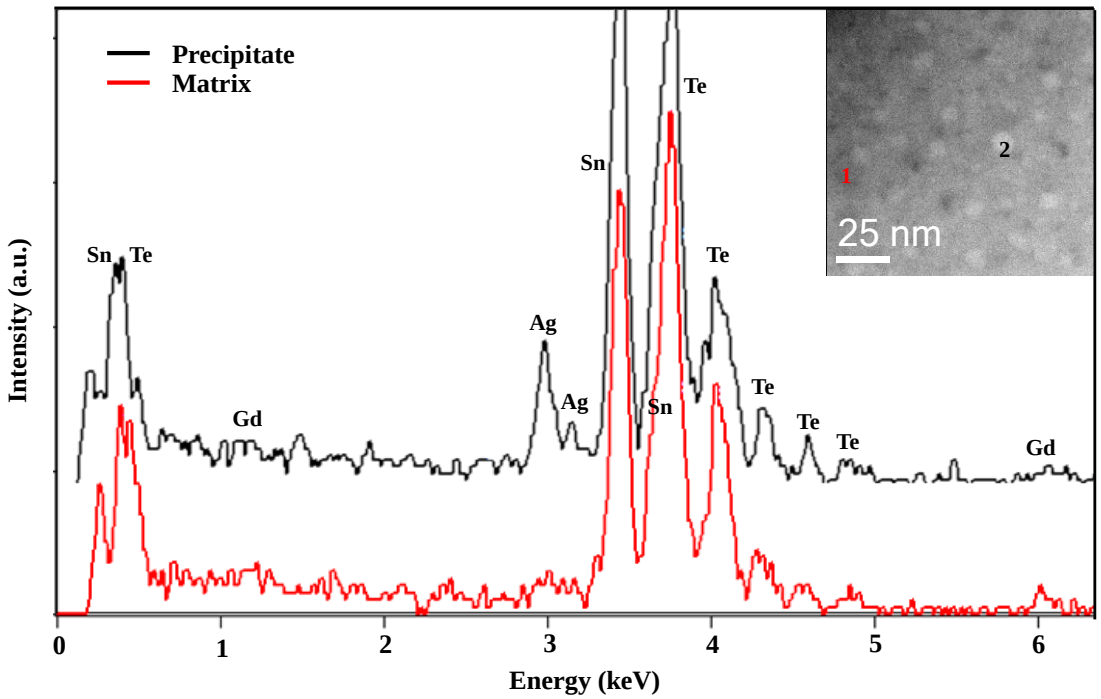

Figure S5. STEM EDX spectrum image taken at the matrix and the nanoprecipitate of $Ag_{0.11}Gd_{0.06}Sn_{0.94}Te$. The matrix is with Sn, Te and a little bit of Gd and Ag, while the precipitate is rich in Ag