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Electronic Supplementary Information

Kang Yin[a], Xianli Su[a*], Yonggao Yan[a], Ctirad Uher[b] and Xinfeng Tang[a*]

[a.] *State Key Laboratory of Advanced Technology for Materials Synthesis and Processing, Wuhan University of Technology, Wuhan 430070, P. R. China. Email: suxianli@whut.edu.cn, tangxf@whut.edu.cn*
[b.] *Department of Physics, University of Michigan, Ann Arbor, MI 48109, USA*

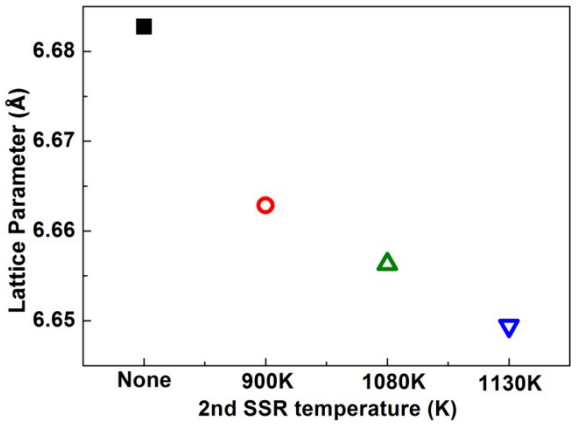

Figure SI1 Lattice parameters calculated from the data in Figure 1(b)

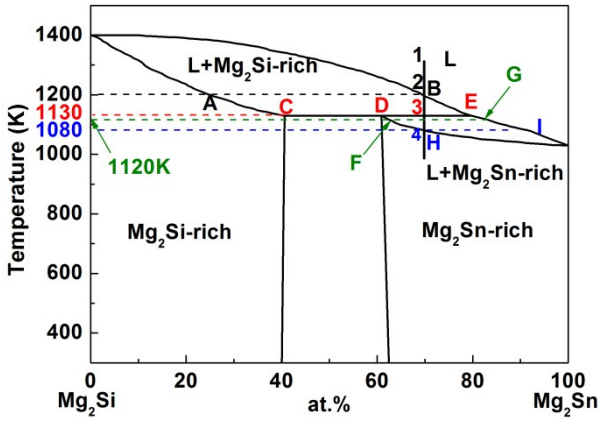

Figure SI2 Mg_2Si-Mg_2Sn pseudo-binary phase diagram, reported by E. N. Nikitin et al.[1]

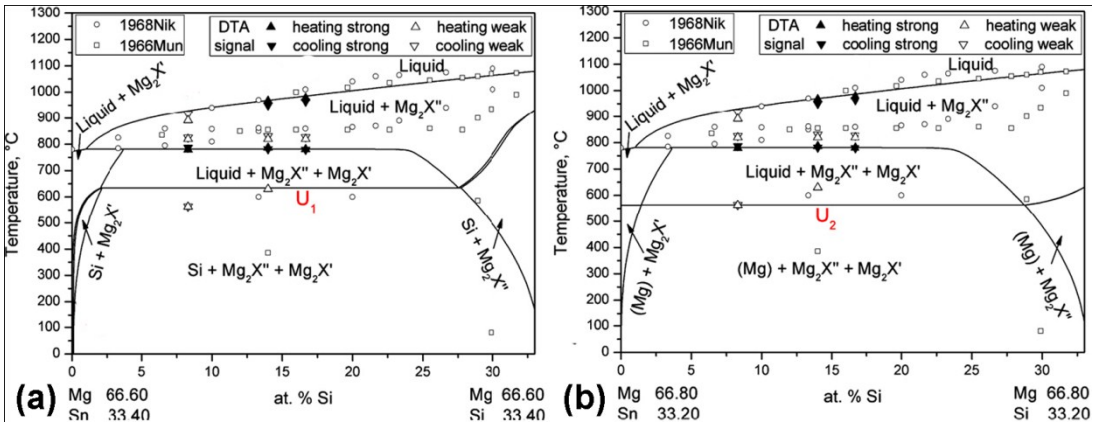

Figure SI3 The peritectic reaction (a) at 900 K (U_1); (b) at 837 K (U_2). Reprinted from A. Kozlov et al.[2]

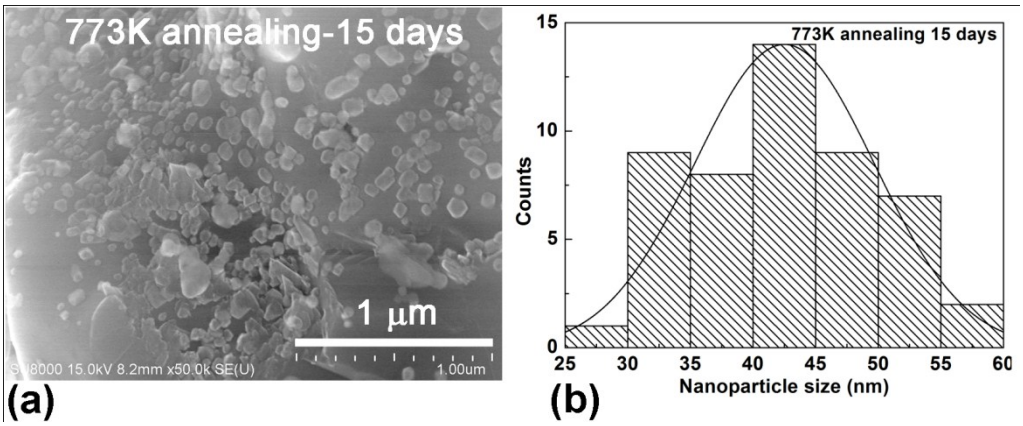

Figure SI4 (a) The microstructure, (b) the nanoparticle size distribution of the sintered ingot after annealing at 773 K for 15 days (with the 2nd solid state reaction step (SSR) quenched at 1130 K) .

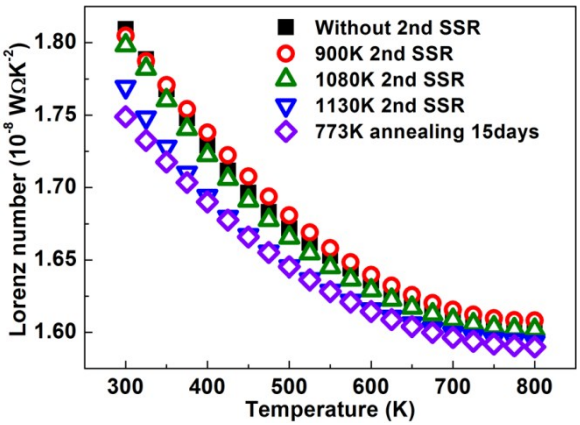

Figure SI5 Lorenz number of samples with different heat treatments.

Basic equations for calculating the Lorenz number and the reduced Fermi levels are listed below[3-5]:

$$S = \pm \frac{k_B}{e}\left[\eta_F - \frac{(r+5/2)F_{r+3/2}(\eta_F)}{(r+3/2)F_{r+1/2}(\eta_F)}\right] \quad (1)$$

$$\eta_F = E_F/(k_B T) \quad (2)$$

$$F_i(\eta_F) = \int_0^\infty \frac{x^i \, dx}{1+\exp(x-\eta_F)} \quad (3)$$

$$L = (\frac{k_B}{e})^2\left[\frac{3F_0(\eta_F)F_2(\eta_F) - 4F_1^2(\eta_F)}{F_0^2(\eta_F)}\right] \quad (4)$$

Here, η_F, $F_i(\eta_F)$, r, and k_B are the reduced Fermi level, the Fermi integral, the scattering factor, and the Boltzmann constant, respectively.

References

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