Electronic Supplementary Information (ESI)

Ultra-fast non-equilibrium synthesis and phase segregation in $In_xSn_{1-x}Te$ thermoelectric by SHS-PAS processing

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Sn-Te binary phase diagram

Fig.S1. Sn-Te binary phase diagram cited from Ref.43.

According to the phase diagram, the solubility of Te in Sn increases significantly with the increasing temperature. The reaction $Sn+Te \rightarrow SnTe$ releases more heat and more Te is dissolved in Sn, making the reaction self-propagating until the combustion wave-front passes through the entire material. The homogeneous range (HR) which shows the equilibrium phase boundaries of SnTe was determined by metallographic techniques and from the measurements of the concentration and sign of the electronic charge carriers⁴³.

43 R. Sharma and Y. Chang, Bull. Alloy Phase Diag., 1986, 7, 72-80.



Fig. S2. SEM images of SnTe produced by SHS processing. Lots of fluid-like inter-grain materials are displayed, indicating the rapid solidification of the molten phase of SnTe once the combustion front passed through



Fig. S3 Temperature dependent Lorenz numbers (L) for SnTe based compounds