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Improved thermoelectric performance of hot pressed nanostructured n-type SiGe bulk alloys

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Supplementary information

S1: Specific heat capacity data of the hot pressed SiGe alloys sample:

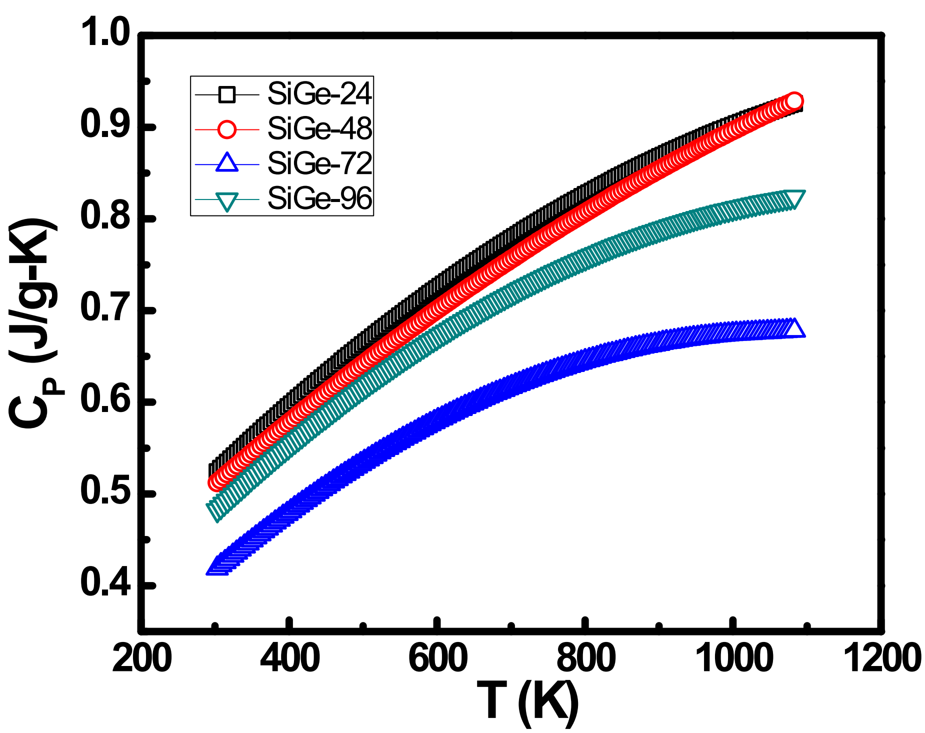

Figure S1: Temperature dependent specific heat (Cp) of the hot pressed SiGe alloys samples.

From Figure S1, it is interesting to note that although all samples has identical chemical composition but there Cp differs significantly over the entire temperature range. In order to explain why Cp systemically lowers down for the hot pressed samples prepared from the powder obtained at higher ball milling time, we propose the following: The specific heat of a material is basically the ability to absorb the thermal energy. On a microscopic scale each materials absorbs thermal energy according to the few degrees of freedom (such as translation, rotation vibration etc) available to it and it contributes to the specific heat. The specific heat has two contribution i.e. lattice and electronic. In the non-metallic solids, at high temperature the lattice contribution for specific heat dominates. Due to the presence of defects in the lattice (microstructure) of the material, some of these degrees of freedom are not available for storing the thermal energy, in such cases the specific heat will be lower as compared to ordered material with identical composition.

S2: Thermal diffusivity data of the hot pressed SiGe alloys sample:

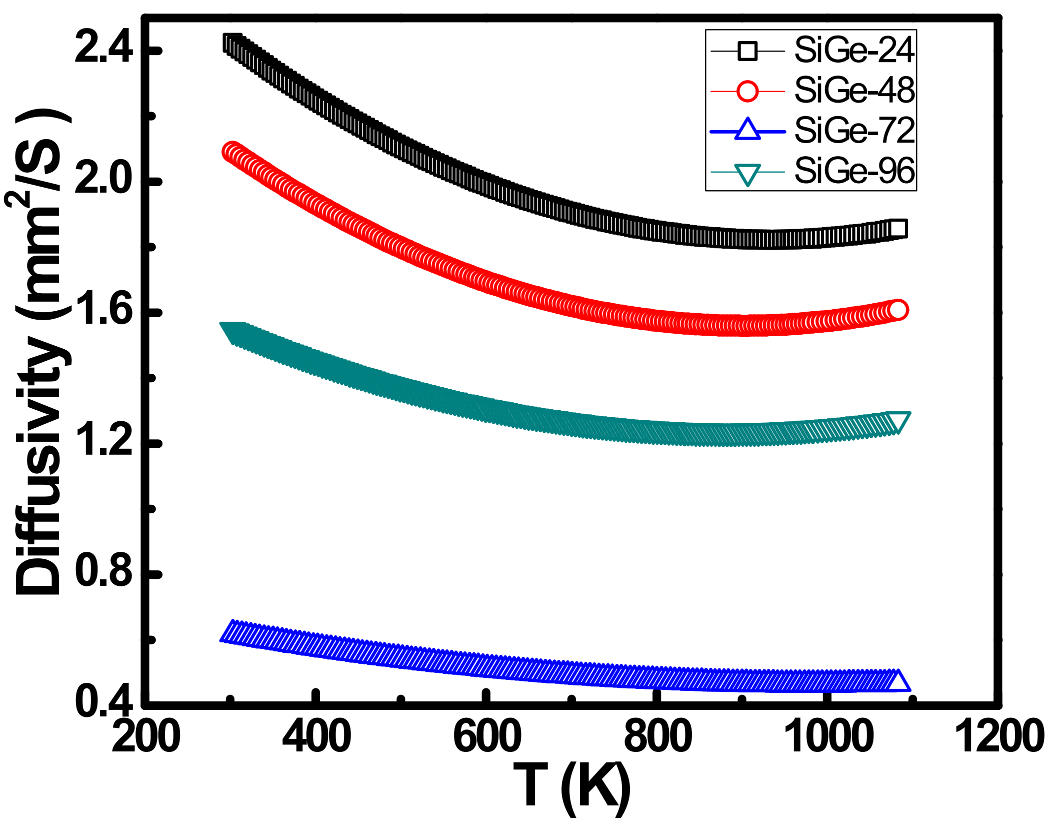

Figure S2: Temperature diffusivity (D) data of the hot pressed SiGe alloys samples.

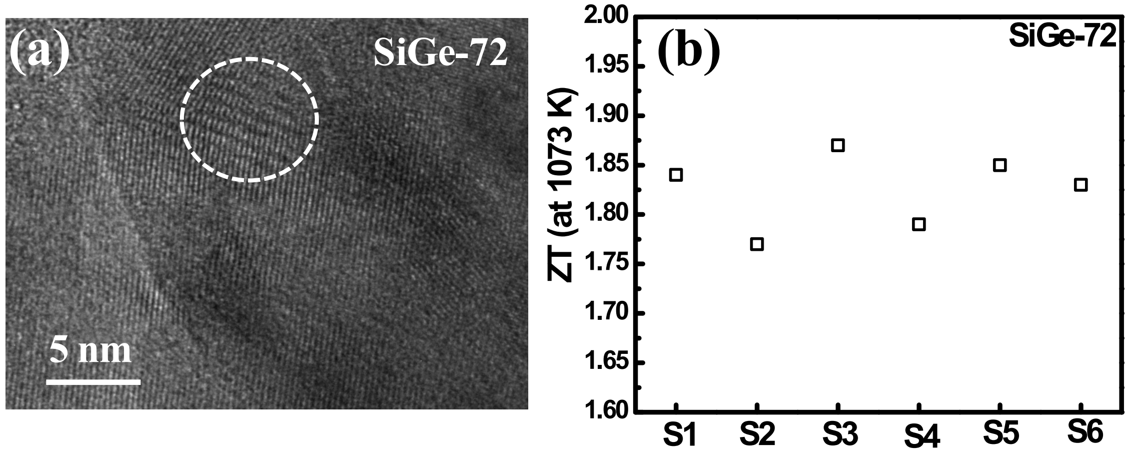

Figure S2: (a) TEM image of the SiGe-72 sample after annealing at 1000°C for 4 days. The region encircled with white dotted line shows the presence of dislocations in the sample. (b) ZT values (at maximum temperature ~ 1073 K) for the six numbers (S1-S6) of SiGe-72 samples prepared under same experimental condition.