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Reduction of thermal conductivity on n-type silicon germanium bulk alloy with nano-pores formation XIAOWEI WANG, Department of Physics, Boston College, HOHYUN LEE, Department of Mechanical Engineering, Massachusetts Institute of Technology, YUCHENG LAN, GAOHUA ZHU, GIRI JOSHI, DEZHI WANG, JIAN YANG, Department of Physics, Boston College, MILDRED DRESSELHAUS, Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology, GANG CHEN, Department of Mechanical Engineering, Massachusetts Institute of Technology, ZHIFENG REN, Department of Physics, Boston Colleg, GMZ ENERGY INC. TEAM — Silicon-Germanium (SiGe) alloys have been the main thermoelectric materials in power generation devices operating from 500. $^\circ$C to 1000 . $^\circ$C. The main challenge for enhancement of thermal performance of Si-Ge system is the reduction of thermal conductivity. Here we report that by creating nano-pores, the thermal conductivity can be reduced to around 2 $\mathrm{Wm^{-1}K^{-1}}$ with a little lower power factor. The nano-structured bulk alloy was made by first forming alloyed nano powders from commercial grade Si and Ge chunks with the dopant phosphorous (P) powder and sulfur powder and then by hot pressing the powders for their compaction. Followed by annealing at 1050 . $^\circ$C, nano pores were created inside the bulk disc. Our results showed that nano pores are very effective to scatter phonons, thus reduce the thermal conductivity.

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