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Thermoelectric properties of SiGe nanoparticle composites[1]
MING TANG, HOHYUN LEE, ASEGUN HENRY, Massachusetts Institute of Technology, RONGGUI YANG, University of Colorado at Boulder, DEZHI WANG, Boston College, JEAN-PIERRE FLEURIAL, PAWAN GOGNA, Jet Propulsion Laboratory, GANG CHEN, Massachusetts Institute of Technology, ZHIFENG REN, Boston College, MILDRED DRESSELHAUS, Massachusetts Institute of Technology — Prior theoretical and experimental proof of principle studies on quantum well superlattice and quantum wire samples have now evolved into studies on bulk samples containing nanostructured constituents prepared by chemical or physical approaches. We have shown that nanostructural composites exhibit nanostructures and properties that show great promise for thermoelectric applications, thus bringing together low-dimensional and bulk materials for thermoelectric applications. We demonstrate that we can achieve (1) a simultaneous increase in the power factor and a decrease in the thermal conductivity in the same nanocomposite sample and (2) lower values of the thermal conductivity in these nanocomposites as compared to alloy samples of the same chemical composition. The outlook for future research directions for nanocomposite thermoelectric materials is also discussed.

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