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**Thermoelectric Figure-of-Merit of Nanostructured Silicon with a Low Concentration of Germanium** GAOHUA ZHU, Boston College, HOHYUN LEE, MIT, YUCHENG LAN, XIAOWEI WANG, GIRI JOSHI, DEZHI WANG, JIAN YANG, Boston College, MILDRED DRESSELHAUS, GANG CHEN, MIT, ZHIFENG REN, Boston College, DEPARTMENT OF PHYSICS, BOSTON COLLEGE COLLABORATION, GMZ ENERGY, INC., NEWTON COLLABORATION, DEPARTMENT OF MECHANICAL ENGINEERING, MIT COLLABORATION, DEPARTMENT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE, MIT COLLABORATION, DEPARTMENT OF PHYSICS, MIT COLLABORATION — The thermoelectric properties of nanostructured silicon (Si) with a low concentration of germanium (Ge) are investigated. A low concentration of Ge leads to a significant cost reduction of the final product since Ge is at least 100 times more expensive than Si. By using only 5 atomic % Ge ($Si_{95}Ge_5$), we have achieved a thermoelectric figure-of-merit ($ZT$) of 0.95, similar to the $ZT$ in the large grained $Si_{80}Ge_{20}$ alloy that is three times more expensive, and is almost four times that of the large grained bulk Si. The enhancement in the thermoelectric $ZT$ for the nanostructured $Si_{95}Ge_5$ is mostly due to the reduced thermal conductivity caused by phonon scattering at the increased grain boundaries and the Ge alloying effect.

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