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Nanostructured materials design for thermoelectric applications
KEIVAN ESFARJANI, MONA ZEBARJADI, ALI SHAKOURI, University of California, Santa Cruz — Nanostructured materials have shown great promise for superior thermoelectric properties. Recently, our collaborators and us have been able to enhance thermoelectric properties of InGaAs by doping it with ErAs nanoparticles. Transport properties are dominated by scattering of electrons with nanoparticles, phonons and impurities. We can design the scattering potential of the former to maximize the power factor, P.is in fact an inverse problem, attempting to solve for the best nanoparticle scattering potential which maximizes P. Using a least square method, we find the potential which minimizes the difference between the actual scattering cross section and its target value. The target value is chosen so as to display energy filtering property. More generally, we also simply maximize the power factor with respect to the nanoparticle potential profile. A simple and fixed model is chosen for other scattering rates, as well as the dispersion relation for the bulk electrons.results between the two approaches will be compared in order to see the effect of electron filtering on the power factor enhancement.

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