

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Theory of enhancement of thermoelectric properties of materials with nanoinclusions. SERGEY FALEEV, FRANCOIS LEONARD, Sandia National Laboratories — Based on the idea of Schottky potential as an energy filter for the electrons, we developed a theory that explains the enhancement of the thermoelectric properties of semiconductor materials with metallic nanoinclusions. The Boltzmann transport equation with relaxation time approximation is used for description of both electron and phonon scattering. The theory has been applied to optimize the ZT factor for n-doped PbTe with metallic nanoinclusions. We found that the contribution of electron scattering to optimized ZT is important for high electron concentration ($n \sim 3 \times 10^{19} \text{ cm}^{-3}$), while at low concentrations ($n \sim 10^{17} \text{ cm}^{-3}$) enhancement of the ZT factor is primarily due to decrease of the phonon thermal conductivity.

Sergey Faleev
Sandia National Laboratories

Date submitted: 23 Nov 2007

Electronic form version 1.4