Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Efficient simulation of quasi-ballistic heat transport in nanostructured materials GIUSEPPE ROMANO, JEFFREY GROSSMAN, MIT — Modeling nanoscale heat transport is challenging because of the presence of phonon size effects, which cannot be captured by Fourier's law. Furthermore, accurate phonon transport calculations require the knowledge of phonon dispersion curves and scattering times, which are unknown for most promising thermoelectric materials. We introduce a model based on the Boltzmann Transport Equation that computes heat transport in nanostructured materials by only using the bulk thermal accumulation function, which is a material property that can be directly obtained by experiments. Furthermore, our model is computationally convenient compared with other frequency-dependent approaches. We apply this method to nanoporous Silicon and find good agreement with experiments. The presented method could be useful in the design of high-efficiency thermoelectric materials.

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Date submitted: 15 Nov 2013 Electronic form version 1.4