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Dear *Journal of Applied Physics* Editor:

We have responded to the helpful comments of the reviewer by making revisions to our manuscript. They are labeled in the document “jap\_vc\_jl\_060413\_Supplemental\_Material.pdf” as “REVISION #”.

Here are the detailed responses to the referee's comments:

**REVISION 1**

*1) the authors use "phonons" or "phonon-like" to indicate propagating modes: the use of "propagating modes/phonons" would be more precise and understandable.*

To be consistent, we removed the one use of the term “phonon-like” and replaced it with “propagating”. The term “propagating” is used commonly throughout the manuscript.

**REVISION 2**

*2) There is a serious problem of size convergence when calculating the thermal conductivity of bulk disordered solids. This is especially serious for silicon/germanium alloys as for example shown in Fig.2 of [He et al. Nano Lett. 11, 3608 (2011)], which suggest that a 1.7million atom cell is not sufficient to get the converged thermal conductivity of SiGe at room temperature. Also Skye and Schelling [Ref.44] admit that their calculations are far from size convergence. In general some consideration of size effects should be made, and possibly it should be pointed out that perturbation methods are an approximated way of circumvented such problems.*

We added a comment about the size effects the referee refers to and a reference to this paper. The paper appears as reference [71]. We have the following comment about the efficiency of the perturbative VC-ALD method:

“This system-size requirement highlights the efficiency of the VC-ALD method compared to VC-NMD, which is necessary when computationally-expensive DFT calculations are used.”

**REVISION 3**

*3) The description of ALD methods in Sec 2.1 is confusing.   
Eq. 1 is more general than "Single Mode Relaxation Time Approximation".   
In fact also when the Boltzmann Transport Equation is solved iteratively, Eq. 1 is used to compute the thermal conductivity, with the SC-BTE lifetimes.   
The difference between RTA-BTE and SC-BTE is that in the former case lifetimes are computed assuming that all phonons have the equilibrium population, while in the latter the effect of non-equilibrium phonon populations is accounted for by self-consistency.*

We modified our comment to clarify that the SC-BTE lifetimes can be used with Eq (1) to predict the thermal conductivity.

Sincerely,

A description...

Alan McGaughey