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Dear Victor Vakaryuk:

Thank your for organizing the second round of review of our manuscript BH12397, "Thermal Conductivity Accumulation in Amorphous Materials."

We are pleased that the First Referee appreciates our efforts to revise the manuscript. Our replies to the First Referee's additional comments are included in the attached rebuttal.

We are disappointed and confused by the Second Referee's response. While this referee originally wrote "*The topic is timely and the work extremely thorough. I think this work is publishable in PRB in a revised form after the authors have considered the following comments*," they have dismissed our revision efforts without providing any specifics. While the Second Referee contends that we did little to modify the manuscript, we disagree. We provided detailed responses to all of the comments of both referees in our original rebuttal and made many changes to the manuscript. Further discussion of this point is included in the attached rebuttal. We are concerned that, after originally being very positive, the Second Referee's strange dismissal of our work will bias them in a future review. Perhaps an additional referee would be helpful in assisting your decision-making process.

We look forward to your response.

Sincerely,

Alan McGaughey

Response to the Second Report of the Second Referee

1) Both referees made extensive recommendations to improve the quality of the research and presentation to make the paper suitable for publication in Physical Review B. The authors have chosen to essentially ignore most of those recommendations and make only very minor changes to the paper. In other words, the authors have not adequately addressed the concerns raised by the referees. Since I know it is the policy of Physical Review B to avoid multiple rounds of review, I recommend that the paper be rejected.

We are disappointed that the referee changed their opinion of our manuscript. Given that the referee did not provide any specific details in their report, we cannot directly reply to their concerns.

We would like to provide some statistics, however, concerning the original reports from both referees and our response to them. We feel these statistics demonstrate that we did not “essentially ignore” their recommendations
- Word count of referee reports: 882
- Word count of our responses: 2201

We responded in detail directly to the referee's recommendations.
- Number of referee comments: 6 + 11 = 17
- Number of referee comments that led to modifications of the manuscript:
4 + 9 = 13 (76%)
The 4 comments that did not lead to modifications of the manuscript are:
- Referee 1, Comment 1: This comment was general. We responded to the referee by summarizing the key findings of our work.
- Referee 1, Comment 5: Our response to this comment re-iterated what was already written in the manuscript concerning Eq. (25) and film-thickness effects.
- Referee 2, Comment 5: We believe that the work reported in our manuscript is focused on the evaluation of Eq. (1) and prediction of the thermal conductivity accumulation functions. As such, we do not believe that there is any extraneous content.
- Referee 2 Comment 7: We pointed the referee to the location in the manuscript where we report the densities of a-SiO_2 and a-Si.

Our responses to the referee recommendations led to the following major modifications to the manuscript:
- Ten changes to the text, which were highlighted in red. The number of words related to the modified text is 592.
- An almost entirely new Fig. 1, where new data about the structure of each material is included.
- Modification of Fig. 5.

- The removal of 10 references and the addition of 3 references. In the current version of the manuscript, based on suggestions from the First Referee, we further reduced the total number of references to from 110 to 85.

Response to First Referee

The authors have made reasonable effort in revising the manuscript along the lines suggested by both reviewers. However, I feel that the authors should do a little more before the paper is accepted for publication.

[1] The number of citations is still too large and can be reduced significantly. The authors are advised to use the minimum number of citations (either the most recent or the most relevant).

We appreciate the referee's concern. In the current version of the manuscript, we reduced the total number of references from 110 to 85 (plus two footnotes). Additionally, the number of times each reference is used throughout the manuscript has been reduced significantly.

We note that the page numbers that the referee mentions are not generally consistent with either the 1- or 2-column versions of the manuscript. We attempt to address the following comments to the best of our ability.

page 1: there is no need to cite all references in line 2, line 3,line 4, line 5, line 6, and line 11;

None of these lines have references in the 1 or 2 column format.

there is no need for so many reference in line 6 below Eq (2);

These references [4-8,15,18] all use some form of Eq. (2), which forms the basis for predicting the propagating contribution in our work. We feel that these references are highly relevant to our work.

is there any need for Ref 45 before Eq (4) and Ref 43 after Eq (4)? There is no need for Eq (4) itself (as it is found in all undergraduate text books).

We include Eq. (4) for completeness and for helping to understand where the classical expression for the specific heat comes from. Removing this equation will have a negligible effect on the length of the manuscript. We agree with the reviewer that the placement of Ref. 43 is inappropriate and not needed. This reference was removed at this location.

Eqs (5) and (6) can be fused into one equation. Is there any need for expressing the expressions in Eqs (7) and (8).

Thank you for this suggestion. We fused Eqs. (5) and (6) together in the revised manuscript. Eq. (7) is now inline with the text. Eq. (8) [now Eq. (6)] is necessary because we predict lifetimes and then fit the value of B.

Eq (11) is again provides a standard expression and there is no need for it in the manuscript (with a view to reducing the size of the manuscript).

While we agree that Eq. (11) [the new Eq. (9)] is a standard expression, including it allows us to easily discuss and specify the width of the unit step function used to broaden the DOS. The need to broaden delta functions comes up a number of times in the manuscript and it is most intuitive to start with the density of states. We note that removing Eq. (11) does not significantly reduce the length of the manuscript.

Why so many reference in the line before eq (12)?

We reduced the number of References in this section from 17 to 9.

page 12: reduce the number of citations in line 10 in section V.A.

We are unable to identify the location in the manuscript that the referee is indicating.

reduce the number of citations in the Summary section.

We removed all but the most necessary references in the Summary. There are now a total of six references in this section.

[2] In the previous review I advised the authors to change the phrase 'Umklapp scattering' with 'anharmonic scattering'. The defense by the authors is unfortunate and indicates that they do not wish to be corrected for their misconception. It is simply not good to copy mistakes made by previous authors, especially when a reviewer points it out.

We regret our use of the term “Umklapp-like” in attempting to address the referee’s previous comment. We modified the manuscript so that the term “anharmonic” scattering is now used.

[3] Why is the temperature part not indicated in Eq (8)? Note that Eq (4) does include temperature.

Temperature is not indicated in Eq. (8) [now Eq. (6)] because we perform all our calculations at a temperature of 300 K. The temperature effect is incorporated naturally into the B coefficient. A comment has been added below what is now Eq. (6).

The discussion following Eq (8) regarding divergence for n>2 is misleading. The authors should rephrase their statement. Also, they should only cite one reference for supporting their statement (rather than Refs 5,7,8).

We modified the discussion following Eq. (8) [now Eq. (6)] to read:

“Choosing n > 2 causes the thermal conductivity to diverge in the zero-frequency limit,...”

References 5, 7, and 8 all use boundary scattering to prevent their predicted thermal conductivities from diverging using Rayleigh scattering. We believe that using multiple citations strengthens our argument.