

Stability of the fcc phase in shocked nickel up to 332 GPa

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This manuscript has been previously reviewed at another journal. This document only contains information relating to versions considered at Nature Communications.

This file contains all reviewer reports in order by version, followed by all author rebuttals in order by version.

Version 0:

Reviewer comments:

Reviewer #1

(Remarks to the Author)

I appreciate the authors' efforts in addressing the concerns raised in the previous round of reviews. The manuscript has significantly improved in clarity, and the revisions have enhanced the readability of the text. The authors have carefully responded to most of the raised issues, making necessary modifications where appropriate.

The study remains a valuable contribution to understanding the behavior of Ni under extreme shock compression conditions. The experimental design is sound, and the data quality is high. Additionally, I also agree with Referee 2's suggestion to incorporate some references from the supplementary material into the main manuscript, as it would provide better context for the reader.

However, despite these improvements, my primary concern remains: the novelty of this study is still limited. While the results are interesting and well-executed, the key advancement lies primarily in the choice of material (Ni) and the peak stresses achieved. The experimental and analytical methods used here have been well-established in the field for many years. As such, I do not believe the manuscript meets the high novelty and broad impact criteria required for publication in Nature Communications.

That said, I do believe this work is well-suited for a journal such as Physical Review Letters or Geophysical Research Letters, where it would still make a meaningful contribution to the field. I encourage the authors to consider submitting to one of these venues, where the readership may be more aligned with the scope of this study.

I sincerely appreciate the effort the authors have put into refining their manuscript, and I hope my comments will be helpful in guiding them toward a successful publication elsewhere.

Reviewer #2

(Remarks to the Author)

The authors overall addressed my concerns. The manuscript can be published in Nature Communications.

One more comment: Figure 5 appears quite complex. I suggest simplifying the figure to highlight key information, such as the melting curves and Hugoniot curves of Ni, for better clarity and focus.

Reviewer #3

(Remarks to the Author)

The authors have addressed the concerns I raised previously. I recommend that the paper be published in Nature Communications.

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Reviewer #1:

I appreciate the authors' efforts in addressing the concerns raised in the previous round of reviews. The manuscript has significantly improved in clarity, and the revisions have enhanced the readability of the text. The authors have carefully responded to most of the raised issues, making necessary modifications where appropriate.

We thank the reviewer for their kind comments.

The study remains a valuable contribution to understanding the behavior of Ni under extreme shock compression conditions. The experimental design is sound, and the data quality is high. Additionally, I also agree with Referee 2's suggestion to incorporate some references from the supplementary material into the main manuscript, as it would provide better context for the reader.

We thank the reviewer for their suggestion to move some of the references from the supplementary into the main manuscript, which we have now done.

However, despite these improvements, my primary concern remains: the novelty of this study is still limited. While the results are interesting and well-executed, the key advancement lies primarily in the choice of material (Ni) and the peak stresses achieved. The experimental and analytical methods used here have been well-established in the field for many years. As such, I do not believe the manuscript meets the high novelty and broad impact criteria required for publication in Nature Communications.

We appreciate the reviewer's comments on the novelty and impact of the work, which we fully agree are important factors in deciding where the paper should be published. However, we would again point out that a full understanding of the melting behaviour and structural stability of nickel under these conditions is critically important for a more complete understanding of the earth's core. We also reiterate that our work takes the first experimental step toward resolving some rather starkly conflicting predictions of the nickel melt line.

That said, I do believe this work is well-suited for a journal such as Physical Review Letters or Geophysical Research Letters, where it would still make a meaningful contribution to the field. I encourage the authors to consider submitting to one of these venues, where the readership may be more aligned with the scope of this study.

I sincerely appreciate the effort the authors have put into refining their manuscript, and I hope my comments will be helpful in guiding them toward a successful publication elsewhere.

We thank the reviewer for their kind words, and for their careful review of our manuscript.

Reviewer #2:

The authors overall addressed my concerns. The manuscript can be published in Nature Communications.

We thank the reviewer for their earlier suggestions, which we believe have greatly improved the manuscript.

One more comment: Figure 5 appears quite complex. I suggest simplifying the figure to highlight key information, such as the melting curves and Hugoniot curves of Ni, for better clarity and focus.

We have revisited this figure and have attempted to simplify it as much as possible.

Reviewer #3:

The authors have addressed the concerns I raised previously. I recommend that the paper be published in Nature Communications.

We thank the reviewer for their careful reading of the manuscript, and for their helpful suggestions throughout the review process.