Review of: "A Description of the Melting of Ice With the Modified Clapeyron–Clausius Equation"

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Potential competing interests: No potential competing interests to declare.

Your incorporation of compressibility into the modified Clapeyron-Clausius equation represents a significant theoretical advancement. However, the empirical foundation for negative compressibility in water and ice, as presented in Table 1 from [14], requires rigorous scrutiny. Can you provide a more comprehensive discussion of the methodologies and potential sources of error in these measurements to validate their reliability?

The theoretical framework for the modified equation, particularly equation (4), demands a deeper exploration of its derivation and underlying assumptions. The introduction of compressibility terms necessitates a robust mathematical justification. Could you elucidate the derivation process in detail, highlighting any assumptions and their physical significance?

While the experimental data support negative compressibility, the broader implications for phase transition theory remain unclear. How do these findings impact our understanding of phase behavior in other anomalous materials, and what theoretical challenges arise from incorporating negative compressibility into established models?

Your work suggests a marked improvement in the predictive accuracy of phase transitions involving substances with negative thermal expansion. However, the comparative analysis between the traditional and modified Clapeyron-Clausius equations is insufficient. Could you provide a detailed, quantitative comparison across a range of materials to substantiate the superiority of your model?

The reported negative compressibility values for water and ice are critical yet counterintuitive. A thorough discussion of the experimental techniques used to obtain these values is essential. Can you detail the methodologies, calibration procedures, and potential limitations to ensure these results are not artifacts of experimental conditions?

The interplay between negative thermal expansion and compressibility in your modified equation raises significant theoretical questions. How do these two factors interact under varying thermodynamic conditions, and what are the implications for other phase transitions beyond the melting of ice?

Your findings indicate that the modified equation can describe the melting of ice accurately when negative compressibility is considered. However, the theoretical implications of this result for broader phase transition models are not fully addressed. How does this new understanding alter our conceptual framework for phase transitions, and what new theoretical developments are necessary?

The application of your modified Clapeyron-Clausius equation to other substances with anomalous properties is a promising avenue for future research. Have you identified specific materials or conditions where this equation could be tested next, and what preliminary results, if any, have you observed?

The experimental validation of negative compressibility is pivotal to your argument. However, reproducibility and robustness of these findings across different experimental setups and conditions are crucial. Have you conducted or planned any follow-up experiments to verify these results independently?

Your conclusion highlights the need for further investigation into the applicability of the modified equation to other substances. Can you outline a detailed research plan, including specific materials, experimental methods, and theoretical approaches, to systematically explore the broader applicability of your model?