Reviewer Report for SOLMAT-D-25-00052

Title: *Comparative Performance Analysis of MAXI3 and FAXI3 Perovskite Solar Cells with X=Pb, Sn, and Ge Using SCAPS-1D*

Decision: *Reject*

The manuscript presents a comparative performance analysis of lead and lead-free perovskite solar cells using SCAPS-1D simulations. The study investigates the impact of absorber layer thickness, defect density, and working temperature on device efficiency. It claims to achieve an energy conversion efficiency (ECE) above 30% for certain configurations.

Due to the following major concerns, I strongly recommend rejecting the paper from further consideration for publication in SOLMAT:

- The study follows a conventional simulation approach, and the results do not present any new physics, materials, or device architecture that could contribute meaningfully to the field. The reported 30% efficiency from simulations is highly optimistic and lacks proper validation. The study appears to rely on running simulations and presenting the results in tabular and graphical forms without meaningful analysis. Figures and tables depict basic data trends without in-depth interpretation, making the study descriptive rather than analytical. The comparison lacks a critical evaluation of why certain materials perform better or worse beyond numerical trends.
- The findings closely resemble existing literature, and there is no clear indication of novel scientific insights. Instead, it merely compares the performance of the studied solar cells with different active materials.
- SOLMAT expects significant advancements in solar materials research. This work does not introduce any new experimental verification, synthesis method, or innovative simulation approach that would be impactful for the journal's readership.
- The study primarily relies on adjusting common simulation parameters (e.g., thickness, defect density) rather than providing deep scientific analysis. Besides, many SCAPS-1D studies report such efficiencies due to idealized assumptions, making the results unrealistic for practical applications.
- No experimental validation or real-world relevance is discussed, making the paper appear more suitable for a conference proceeding rather than a high-impact journal like SOLMAT.

Overall, due to the lack of novelty, limited scientific impact, and the superficial nature of the analysis, I strongly recommend rejecting this manuscript. The authors should consider submitting it to a conference or a lower-impact journal focused on simulation studies.