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Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Aly Mohamed Tawfik Aly Elakshar

PhD Program: Physics

Title of Thesis: Single-walled carbon nanotubes in top cell for perovskite-silicon tandems

Supervisor: Professor Albert Nasibulin

Name of the Reviewer: Maoshuai He

I confirm the absence of any conflict of interest (Alternatively, Reviewer can formulate a possible conflict)	**Date: 11-11-2024**

The purpose of this report is to obtain an independent review from the members of PhD defense Jury before the thesis defense. The members of PhD defense Jury are asked to submit signed copy of the report at least 30 days prior the thesis defense. The Reviewers are asked to bring a copy of the completed report to the thesis defense and to discuss the contents of each report with each other before the thesis defense.

If the reviewers have any queries about the thesis which they wish to raise in advance, please contact the Chair of the Jury.

Reviewer's Report

Reviewers report should contain the following items:

- Brief evaluation of the thesis quality and overall structure of the dissertation.
- The relevance of the topic of dissertation work to its actual content
- The relevance of the methods used in the dissertation
- The scientific significance of the results obtained and their compliance with the international level and current state of the art
- The relevance of the obtained results to applications (if applicable)
- The quality of publications
- The summary of issues to be addressed before/during the thesis defense

For the doctoral thesis entitled "SINGLE-WALLED CARBON NANOTUBES IN TOP CELL FOR PEROVSKITE–SILICON TANDEMS" by ALY MOHAMED TAWFIK ALY ELAKSHAR, I give the judgment as expert based on the following: The research project is very well structured, ideas are clear and the writing is concise and argumentative. The literature review is comprehensive, and the importance of the research, from both a theoretical and an applied perspective, is successfully discussed.

The thesis topic belongs to the material science, which is of great importance in realizing the potential applications of single-walled carbon nanotube as effective electrodes for perovskite solar cells. First, the PhD candidate proposed to prepare SWCNT films and study their properties using different electrical and optical methods. Second, SWCNTs are applied to fabricate back electrodes for perovskite absorber, their electrical and optical properties from the perspective of top cell. Finally, they are in perovskite silicon tandem in four terminal configurations. Compared with the current state of scientific research, the works represent progress in different manners. The author could explain experimental and numerical results accurately. The candidate thus has the ability to master new scientific problems independently.

Overall, the thesis fulfills the requirements for a PhD dissertation. I therefore recommend the acceptance of the thesis to the Skolkovo Institute of Science and Technology after made the following minor revisions.

1. There are some typos in the thesis, the authors could pay more attention to the writing.
2. In the Chapter 2, review of articles should include a brief introduction of SWCNTs, like SWCNT structure and their previous applications in perovskite solar cells.
3. As the SWCNT properties are crucial for their applications, some basic characterization results of SWCNTs are suggested to present.

Provisional Recommendation

☑ *I recommend that the candidate should defend the thesis by means of a formal thesis defense*

☐ *I recommend that the candidate should defend the thesis by means of a formal thesis defense only after appropriate changes would be introduced in candidate's thesis according to the recommendations of the present report*

☐ *The thesis is not acceptable and I recommend that the candidate be exempt from the formal thesis defense*