Skoltech
Skolkovo Institute of Science and Technology

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Mikhail Bulavskiy

PhD Program: Materials Science and Engineering

Title of Thesis: Hybrid functional materials based on single-walled carbon nanotubes

Supervisor: Professor Albert Nasibulin
Co-supervisor: Assistant Professor Fedor Fedorov

Name of the Reviewer: Dmitry Lyubchenko

I confirm the absence of any conflict of interest (Alternatively, Reviewer can formulate a possible conflict)	 **Date: 21-11-2023**

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

The thesis is devoted to the hybrid functional materials based on single-walled carbon nanotubes. It is a very important topic for very wide range of applications of nanomaterials.

The thesis is well planned, structured, and written. Sufficient amount.

The goals are clear and potentially have a great impact to developing novel technology for supercaps.

The objectives to functional SWCNT and their structural changes in application to improve performance of supercaps is proposed and well discussed.

The results chemical doping of different SWCNTs are significant for future applications as supercaps.

Any other applications relevant to dissertation results then supercaps are not discussed.

The quality of publications sufficient.

The summary of issues to be addressed before the thesis defense:

I would recommend adding discussion of possible practical applications of final results of the thesis.

The language needs to be checked and corrected.

In the introduction section there are no references. Therefore, the question is: Are all the statements are well known?

Filling efficiency – more detailed explanation is needed.

I would recommend to add more discussion on diffusion mechanisms (p.37), what kind of diffusion, speed, etc. and what is the doping mechanism?

It is not clear for me what is the functionalization of SWCNTs, only doping or any other mechanisms are possible? The discussion is needed.

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*