

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Mikhail Bulavskiy

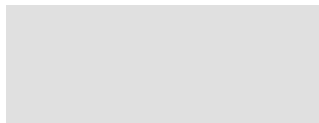
PhD Program: Materials Science and Engineering

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:

<p>I confirm the absence of any conflict of interest</p> <p>(Alternatively, Reviewer can formulate a possible conflict)</p>	<p>Associate Professor, Alexey Yashchenok, Skoltech</p>  <p>Date: 20-11-2023</p>
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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

The work performed by Mikhail Bulavskiy represents a large part of research study with the aim to address the valuable problems associated with the practical applications of as-synthesized single-walled carbon nanotubes (SWCNT). The topic of the thesis is relevant not only from the practical point of view, but also it involves fundamental aspect of the research field, such as structure of SWCNT under different conditions, the nature of interaction between SWCNT, metal ions, polymers and how the properties of SWCNT changes with respect to different composition of SWCNT films, as well as how these properties can be controlled. All these aspects are relevant, up to date and are in line with current trends and research worldwide. The obtained results are new and promising for practical applications. The work is well-organized with very good structure, have a plenty relevant scientific results supported by the use of modern and relevant techniques and approaches. Furthermore, the work contains theoretical calculations which are also support the experimental data. Additionally, the applicant has shown good publication activity in highly ranked journals. In summary, this work of high quality and I recommend the work to the thesis defense.

The following questions were raised when reading the thesis:

1. Chapter 3, Fig.1: There is a shift of peaks at 500°C to longer wavelength. Is any explanation of this, since at lower temperature values the position of the peaks remain the same?
2. Chapter 3, Fig.3b: The graph showed multiple peaks in RBM region, which can be responsible for different diameter of the tubes and also for the type of the tubes (metallic or semiconductor). Is vanishing a peak here can be attribute to decomposition of nanotubes or its attribute with another reason?
3. Is any information of how many nanotubes were filled with gold nanowires with respect to initial amount of gold?
4. How does gold nanotube filling relate to tube diameter? Can all tubes with different diameter be filled or is there a limit?
5. Fig. 13: Please check for the correct film name (right-hand side) in the schematic illustration.

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