

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Daniil Ilatovskii

PhD Program: Materials Science and Engineering

Title of Thesis: Rational design of single-walled carbon nanotube films for transparent electronics

Supervisor: Professor Albert Nasibulin

Co-supervisor: Assistant Professor Dmitry Krasnikov

Name of the Reviewer:

I confirm the absence of any conflict of interest (Alternatively, Reviewer can formulate a possible conflict)	Maoshuai He Date: 16-11-2023
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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

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 “RATIONAL DESIGN OF SINGLE-WALLED CARBON NANOTUBE FILMS FOR TRANSPARENT ELECTRONICS” by DANIIL A. ILATOVSKII, 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 films for transparent electronics. Firstly, the PhD candidate proposed the concept of photophoretic motion and selectively deposit SWCNT films by means of light irradiation. Secondly, V2O5 doping was applied to achieve stable transparent films under ambient conditions. In the third part, a “rational design” was proposed to achieve the theoretical performance of the transparent conductive films. 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. The excitation laser wavelengths of acquired Raman spectra should be presented in the captions of Figure 4.3, 4.4, etc.
2. In Figure 4.6, the UV-vis-NIR absorption spectrum of collected SWCNTs without light irradiation could be presented for comparison.
3. The reasons for the different (n,m) intensities shown in Table 1, could be discussed in more details.
4. In the last section, it is revealed that parallel SWCNT films consist of (4,4) SWCNTs exhibited a low R_{90} values. Have the authors considered the stability of the SWCNTs? Owing to the large curvature, SWCNTs with so small diameters are likely unstable under ambient conditions.

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