

## Jury Member Report – Doctor of Philosophy thesis.

**Name of Candidate:** Artem Grebenko

**PhD Program:** Physics

**Title of Thesis:** Carbon nanomaterials: synthesis and charge transport

**Supervisor:** Professor Albert Nasibulin

**Co-supervisor:** Dr. Dmitry Krasnikov

**Name of the Reviewer:** Maoshuai He

I confirm the absence of any conflict of interest  (Alternatively, Reviewer can formulate a possible conflict)	<b>Date: 19-05-2022</b>
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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 "CARBON NANOMATERIALS: SYNTHESIS AND CHARGE TRANSPORT" by Mr. Artem Grebenko, 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 nanotubes and graphene. The major contributions of the thesis can be divided into three parts. Firstly, a deep understanding of how to manufacture carbon nanomaterials grounded on Boudouard reaction is proposed; Second, charge transfers in both individual carbon nanomaterials and their ensembles are investigated; Third, the author develops novel lithographic procedures for carbon nanomaterial ensembles and carbon nanomaterials beyond graphitic carbon. The author presents new scientific findings in a comprehensible manner in the abovementioned areas. Compared with the current state of scientific research, the works represent progress in different manners. The author could explain experimental and numerical results accurately, which result in several publications in high impact journals. The candidate thus has the ability to master new scientific problems independently.

Overall, the thesis submitted by Mr. Artem Grebenko contributes to the field of carbon nanomaterial synthesis and charge transport, which fulfills the requirements for a PhD dissertation. I therefore recommend the acceptance of the thesis to the Skolkovo Institute of Science and Technology after making the following minor revisions.

1. In the table of contents, the first letter of all the words should be capitalized.
2. On page 13, "HipCO" is usually written as "HiPco" or "HiPCO".
3. The writing of key words should be standardized, for example, in "single-walled carbon nanotubes", a hyphen is needed between "single" and "walled"
4. On page 17, "arch-discharge" should be corrected as "arc-discharge".
5. Spaces should be added where needed.
6. On page 34, theta in XRD patterns should be written as " $\theta$ ".
7. On page 43, "Figure 107" should be "Figure 10".
8. On page 50, a full point is needed after  $100 \text{ cm}^{-1}$ .
9. The format of the references should be carefully checked, and the volume number of some citation, for example, reference 49, is missing.
10. Please double check the title of the thesis, it seems there exists some inconsistency.

#### **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*