

## Jury Member Report – Doctor of Philosophy thesis.

**Name of Candidate:** Daniil Ilatovskii

**PhD Program:** Materials Science and Engineering

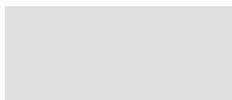
**Title of Thesis:** Rational design of single-walled carbon nanotube films for transparent electronics

**Supervisor:** Professor Albert Nasibulin

**Co-supervisor:** Assistant Professor Dmitry Krasnikov

**Name of the Reviewer:** Ying Tian

I confirm the absence of any conflict of interest



(Alternatively, Reviewer can formulate a possible conflict)

**Date: 14-11-2023**

*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

## Review of Dissertation

Author: Daniil A. ILATOVSKII, Skolkovo Institute of Science and Technology

Title of the dissertation: RATIONAL DESIGN OF SINGLE-WALLED CARBON NANOTUBE FILMS FOR TRANSPARENT ELECTRONICS

Pre-examiner: Ying TIAN, Professor, Department of Applied Physics, Dalian Maritime University, China

This dissertation presents the study of improving optoelectronic performance of SWCNT films during aerosol synthesis process by implementing a rational design approach at both deposition and post-deposition stages.

The significant progresses achieved in the dissertation are as follows.

1. A novel deposition technique was developed by utilizing light irradiation on basis of photophoretic motion of aerosol SWCNTs. The deposition efficiency of SWCNTs is about 10% and the SWCNT configurations could be tuned from individual to small bundles and networks.
2. A straightforward and effective method was established to coat SWCNTs with thickness-tunable V2O5 layer. The sheet resistance achieves  $160 \Omega \text{ sq}^{-1}$  (at T = 90%), which is among the top performers for metal-oxide doping of carbon nanotubes.
3. Based on the rational design principles, the pathway for future advancement of TCF materials has been examined.

The doctoral candidate has sufficiently contributed to those achievements, which proves the candidate's high ability. The dissertation is well written in terms of scope, logical, structure, use of literature in the field, as well as language.

### 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*