

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Ilya Novikov

PhD Program: Materials Science and Engineering

Title of Thesis: Assembling networks of single-walled carbon nanotubes for electronic and optical applications

Supervisor: Professor Albert Nasibulin, Skoltech

Co-supervisors:

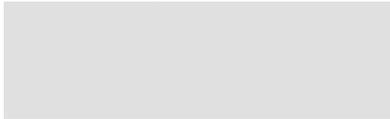
Professor Tanja Kallio, Aalto University

Assistant Professor Dmitry Krasnikov, Skoltech

Assistant Professor Fedor Fedorov, Skoltech

Name of the Reviewer: Dmitry Gorin

I confirm the absence of any conflict of interest



Date: 06-09-2023

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

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PhD thesis entitled "ASSEMBLING NETWORKS OF SINGLE-WALLED CARBON NANOTUBES FOR ELECTRONIC AND OPTICAL APPLICATIONS" is devoted to the aerosol CVD synthesis of SWCNTs and the development of SWCNT network-based thin films utilized as TCFs, as well as, to the improvement of SWCNT/polymer nanocomposite fabrication methods, where the main attention is paid to the interrelation between SWCNT network morphology, the conductivity of nanocomposites, and their performance in strain sensing and electromagnetic interference (EMI) shielding. This thesis is clearly written and well organized. It presents novel scientific results in the areas of materials sciences and engineering.

The PhD thesis contains 6 Chapters. The PhD thesis's structure is classic one. The Chapter 1 is an introduction. Chapter 2 presents a review, where the state of the art of this research area as well as research gaps were described. In Chapter 3, the methods of sample preparation and techniques of characterisation and sample measurement methods were presented. Chapter 4 considered the aerosol CVD synthesis of SWCNT films. Chapter 5 is related to the fabrication of SWCNT/polymer nanocomposites and their electrical and mechanical properties. This is the most important part of these PhD Thesis from my point of view. Chapter 6 contains the most important conclusions of this work. The bibliography list consists of 173 references. The quality of writing and print design is very high. Obtained results can be interesting for application in wearable electronics and biomedical research.

The main part of results of PhD thesis has been published in an high impact international journals in the field of this research including Applied Physics Letter (IF=4.1, NI journal), two articles in Carbon (IF=11.3), Chemical Engineering Journal (IF=16.7), and ACS Applied Materials and Interfaces (IF=10.4). Ilya is the first author in 2 publications out of 5.

The text of PhD thesis is solid and is presented in a cohesive way. However, I have few comments to be addressed to the author for improve the quality of this PhD thesis:

1. Page 39, Figure 3, I recommend to add an additional figure 3b from an article, where such type of dependences has been presented and please add the references to figure caption.
2. Page 62, Figure 8, Usually, we have one RBM peak. In Fugure 8 we see some peaks. Could you explain this peculiarity?
3. Page 82, Figure 13, b,e and Page 84, Figure 14, e. These experimental dependences have a maximum. What do you thnik about applicability of experimental design techniques to this type of study?
4. Page 111, table 5, I would like to ask about a physical explanation of the small magnitude of percolation thresholds for such type of nanocomposite. Did you compare your data with the early published ones for the similar SWNT containing composites?
5. Page 114-115, I recommend to add the reference on Ilya's articles to every statement that is presented in Chapter 6.

Provisional Recommendation

I recommend that the candidate should defend the thesis by means of a formal thesis defense