

## Jury Member Report – Doctor of Philosophy thesis.

**Name of Candidate:** Hassaan Ahmad Butt

**PhD Program:** Materials Science and Engineering

**Title of Thesis:** Carbon nanotube fibers as embedded electrodes for the dual-stage monitoring of multi-functional carbon nanotube nanocomposites

**Supervisor:** Professor Albert Nasibulin

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

**Name of the Reviewer:** Alexander Kvashnin

I confirm the absence of any conflict of interest  (Alternatively, Reviewer can formulate a possible conflict)	<b>Date: 22-11-2023</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**

Thesis by Hassaan Butt is devoted to application of carbon nanotubes to produce fibers allowing the monitoring of CNT nanocomposites made of multiwall or single wall NTs.

The thesis has a logical and clear structure, including an introduction, a literature review outlining the current state of the art in this research area, a description of the materials and methods utilized in the work, and a detailed presentation of the research results. The high standard of research is evident throughout the thesis.

The title of the thesis corresponds perfectly with its content, and the employed methods are fitting for this type of research.

The findings of the thesis highlight the potential for manufacturing nanocomposites on a large scale and offer the advantage of dual-stage in-situ monitoring. The research was conducted at an elevated

international standard, and the outcomes were published in highly esteemed international scientific journals.

There are minor issues that can be addressed to the figures related to measurements (Figures 22,23,24, 27,28). As there are similar measurements for different types of materials it would be much clearer if the the ordinate axis will use a consistent scale for all plots within the same measurement type to facilitate visual tracking of changes.

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**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*