Skoltech
Skolkovo Institute of Science and Technology

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: JI Puguang

I confirm the absence of any conflict of interest (Alternatively, Reviewer can formulate a possible conflict)	 **Date: 30-11-2023**

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

The PhD candidate, Hassaan Ahmad Butt, has submitted a thesis dealing with the structural health monitoring of carbon nanotube nanocomposites through embedded carbon nanotube fiber electrodes. The topic is recent and relevant in regards to the field and describes a novel method with a broad range of monitoring applications. The thesis is structured well, but can be improved by shifting some sections. The quality of the thesis is comparable to international PhD standards, which is confirmed by the 2 published and 2 submitted works in highly ranked journals. The further 2 publications related to this work, but not included in the thesis add to this claim. The techniques and methods used for evaluating the hypothesis of the thesis are what are usually found in published works. The scientific significance of the findings is high, with a strong protentional for industrialization as well as providing experimental findings to the field of nanocomposites. Although the thesis may be considered to be of high quality, this reviewer believes that there are certain aspects of the work that require improvement before final acceptance:

1. There are several images which are incorrectly numbered. This needs to be corrected.

2. Images were insets are provided are extremely difficult to make out. Please consider a solution for these.

3. Why were masterbatches selected for study rather than powder alternatives? Is this a property and performance-based decision?

4. Why was DIC used instead of physical extensometers during tensile testing?

5. Where do you see that possible improvements in the sensing performance can be made and how can performance be optimized or enhanced? This should be added into the relevant section of the thesis.

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*