

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Mohammad Owais

PhD Program: Materials Science and Engineering

Title of Thesis: Design and characterization of thermally conductive polymer nanocomposites with tunable electrical resistivity

Supervisor: Dr. Sergey Abaimov, Skoltech

Name of the Reviewer:

I confirm the absence of any conflict of interest	
AMKorsunsky (digitally signed)	Date: 02-09-2023
(Alternatively, Reviewer can formulate a possible conflict)	

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

Beginning the Abstract of an applied materials engineering Thesis with “heat dissipation conundrums” is similar to talking of “electromagnetic field enigmas” or “chemical reaction mysteries”. This is indicative of this piece of work: overstating the “science-like” nature of thesis should be avoided. Abstract is wordy: it should not extend beyond two pages and must deliver clear statement of novelty and achievement.

Regarding the emphasis on phonons as the principal means / mechanism of thermal conduction in polymers – I question the approach: most polymers have significant, in fact, dominant amorphous part which does not have crystal lattice – so there are no phonons there. Is this part ignored? Why? Also, polymer crystals display so much disorder, it is not clear how it is most helpful to approach the description of its structure. Fig.2 is a very bad illustration: there is no evidence of crystal lattice which is fundamental to the entire approach.

Although the Thesis claims to present “a comprehensive analysis of the experimental study” (sic!), the overall impression is that the approach adopted by the author falls between materials science and applied engineering, with neither paradigm being fulfilled to completion.

Overall, I feel that following multiple iterations and attempts at improvement of the Thesis, it is no longer worthwhile extending this process further – it is recommended for the candidate to be allowed to progress to defence of his PhD degree.

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