

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Natalia Katorova

PhD Program: Materials Science and Engineering

Title of Thesis: The effect of selected electrode-solution interactions on the potassium-ion battery electrochemical performance

Supervisor: Professor Keith Stevenson

Co-supervisor: Professor Artem Abakumov

Name of the Reviewer:

I confirm the absence of any conflict of interest (Alternatively, Reviewer can formulate a possible conflict)	Date: 24-09-2022
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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

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 thesis written by Ms. Natalia Katorova investigated cathode, anode, and electrolyte for potassium-ion batteries (KIBs). After careful reading, I can see the depth of study with sufficient scientific novelty. In particular, there is no doubt that Chapter 2 can be submitted as a review paper in the area of electrochemistry or material science such as *Journal of Power Sources* and *Journal of Material Chemistry A*, after minor correction. As an Editor of the *Journal of Power Sources*, I would like to invite the Chapter 2 as a review article for publication.

The in-depth investigation is highlighted with hard carbon anode and the surface analysis, which contain a lot of information on the surface layer and its utilization with ether solution. This enables the operation of the full cell, Prussian Blue Analogue cathode//Hard carbon anode in the ether solution, which is very impressive to see the feasibility of low cost KIBs.

The obtained data are brand-new findings supported by scientific evidence.

In summary, I am glad to say that the present work is sufficiently qualified to obtain the PhD degree, and I also agree that Ms. Natalia Katorova is able to progress scientific research projects independently.

Please carefully check typos.

K⁺-ion, K-ion, potassium-ion, and potassium ion were used in this thesis. It would be better to unify the wording.

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