

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Aliya Glagoleva

PhD Program: Materials Science and Engineering

Title of Thesis: Development of kW Scale Hydrogen Energy Storage System

Supervisor: Prof. Keith Stevenson

Co-advisor: Dr. Vasily Borzenko

Chair of PhD defense Jury: Prof. Alexei Buchachenko

Email: a.buchachenko@skoltech.ru

Date of Thesis Defense: 09 October 2018

Name of the Reviewer:

I confirm the absence of any conflict of interest

(Alternatively, Reviewer can formulate a possible conflict)

Signature:



Date: 03-09-2018

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 Doctoral Thesis of Aliya Glagoleva "development of kW scale hydrogen energy storage system" is well written in English and contains 6 chapters with high quality 64 figures, 17 tables, comprehensive references list and presented in 128 pages. State of the art is clearly described in Introduction part covering benefits of the use of energy storage systems, comparison between different technologies etc. The use of metal hydrides-based hydrogen storage technologies is properly analyzed. All the goals of the research were successfully reached, and major conclusions points main findings which are clearly beyond state of the art in comparison to existing solutions. The doctoral thesis has clear added value on international level in solving main technological challenge related to connection of non-stable renewables to local microgrids.

The presented work is mainly experimental on energy system level. Simulation activities on novel energy storage systems and hardware-in-the-loop test and economic evaluation of the proposed concept makes work under consideration highly credible.

The main practical benefit of this novel and original work is related to development and testing of experimental energy system which consist MH hydrogen energy storage H2Smart having of power of 1 kW which could be connected to non-stable renewable energy sources (real life example of PV in Batumai village).

The received results are well approved in high level publications in the journals with high impact factor.

The doctoral thesis is written well and could be considered as useful and excellent thesis work. Few minor comments could be valuable to improve it:

1. Talking about solid state hydrogen storage materials different dimensions were in use. For example, page 36: "...10 ÷ 13% (*mass*)"; but in the page 40 "...%wt", page 39 "...1 to 2% *by weight*". Would be useful to unify it.
2. Page 54 "...Fig. 2.9c" is mentioned. It must be properly checked.
3. References [123] and [141] were the same.

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