

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Anastasiia Merdalimova

PhD Program: Physics

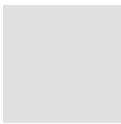
Title of Thesis: Optical sensors based on hollow-core microstructured optical waveguides: 2-in-1 multispectral refractometry and raman spectroscopy

Supervisor: Professor Dmitry Gorin

Co-supervisor: Associate Professor Alexey Yashchenok

Name of the Reviewer: Zeev Zalevsky

I confirm the absence of any conflict of interest



Date: 6-11-2023

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

Review of PhD thesis of Anastasia Merdalimova

The PhD thesis of Anastasia Merdalimova aims to explore hollow-core micro-structured optical waveguide (HC-MOW) opportunities for multifaceted characterization of complex fluids such as extracellular vesicles. The sensing with HC-MOW is done using combinations of several sensing modalities as multispectral refractometry and Raman spectroscopy by using surface enhanced Raman spectroscopy substrate fabrication and by deposition of the corresponding layer in the HC-MOW. The research work includes both fabrication phase as well as an extensive experimental validation.

The performed research is highly innovative scientifically as well as very applicable for the world of bio-medical sensing and diagnosis. As an outcome, the research includes publication of 5 peer reviewed papers, a review article, a book chapter, a patent application and 4 conference presentations.

The thesis itself is very clearly written and well structured. It includes very good literature search as well as an explanation of the scientific innovative step performed in respect to the existing state of the art.

I fully support approving the thesis as part of the PhD studies requirements. I have only minor comments that could be addressed and approved internally by the supervisor, without a need for an additional external review process.

Here are my comments:

- Not all abbreviations appear in the list of abbreviations.
- There are some small English mistakes such as using “than” instead of “then” etc.
- There is no section dealing with future perspectives for the research outcomes. It is recommended to add one.
- The thesis is heavily based on theoretical analysis and then experimental validation. There are no real numerical simulations. Such simulations could assist in the device optimization as well as in putting the obtained experimental outcome in a more comparable/controllable benchmark.
- The equations are not properly numbered. There are two equations numbered 2-1.
- Some of the figures, mainly those that were taken from other references, are of too low quality.

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