Skoltech
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Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Zhanna Kozyreva

PhD Program: Materials Science and Engineering

Title of Thesis: Fluorescent photoconvertible polymer microcapsules for cell labeling and tracking

Supervisor: Professor Gleb Sukhorukov

Name of the Reviewer: Pavlos Lagoudakis

I confirm the absence of any conflict of interest (Alternatively, Reviewer can formulate a possible conflict)	**Date: DD-MM-YYYY**

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

Mrs Zhanna KOZYREVA's thesis describes the development of trackable microparticles for bio-applications of cell labelling and tracking with the aim to introduce an alternative to the genetic modification approach and lipophilic dyes. The candidate utilised two methods for the fabrication of polymer photoconvertible capsules. One, using thermal treatment in polyvinyl alcoholgel and two, a regular layer-by-layer approach. A broad range of organic dyes were implemented in the fabrication methods and characterised as photoconvertible labels, by investigating their morphology, fluorescence, photostability, and photoconversion. Mrs Zhanna KOZYREVA's experimental results have been obtained from work carried out mostly at Skoltech.

General Assessment: The work described in the thesis is original and at the leading edge of international research in this field. It is notable that Mrs Zhanna Kozyreva has been involved in a wide range of studies and technologies spanning both the development and characterization of photoconvertible polymer microcapsules using a hydrothermal approach as well as a non-thermal treatment using dye-labelled polyallylamine hydrochloride. Furthermore, the candidate performed cell labelling and tracking experiments and the implications of the polymer microcapsules were analysed. All necessary concepts are introduced and developed at appropriate points in the text, and the bibliography provides references to the original literature. The thesis could become a valuable resource for ongoing research in this field.

Recommendation: In my opinion, the work is worthy of a PhD. The results obtained by Mrs Zhanna Kozyreva's represent an extensive body of original studies in a competitive and technologically-important field. The work has been published and presented at several international conferences. There are, naturally, some points that could be pursued during the defence if only to give an indication of the depth of understanding the candidate has of some of the more complex aspects of the problems studied during the thesis. I would anticipate that these would focus in particular some of more technical aspects of the various fabrication and characterisation methods, the motivation for undertaking these investigations within the context of the wider field, the possible applications involved, and the contribution of the candidate in the parts of the work presented in the thesis where several researchers have been involved. Overall, I would like to praise both the candidate and her supervisors on a comprehensive and important study.

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*