

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Timur Yagafarov


PhD Program: Physics

Title of Thesis: Polariton lasing in a dye-filled organic microcavities

Supervisor: Prof. Pavlos Lagoudakis

Date of Thesis Defense: 8 November 2019

Name of the Reviewer: Sakellaris Mailis

<p>I confirm the absence of any conflict of interest</p> <p>(Alternatively, Reviewer can formulate a possible conflict)</p>	<p>Signature:</p>  <p>Date: 08-10-2019</p>
---	---

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 by Mr Yagafarov Timur summarizes the candidate's research on the subject of organic semiconductor polaritonics, which is a topic of high scientific and technological importance. The structure of the thesis is logical and easy to follow. It consists of two introductory chapter which outline the general concepts of strong coupling and the properties of organic semiconductor materials, followed by two experimental chapters and a concluding/outlook chapter.

The first experimental chapter presents the performance of strongly coupled organic semiconductors to produce broadband polariton lasers (polariton condensates) at room temperature. The second experimental chapter investigates the origin of the blue shift that is observed in the process of the formation of the polariton condensate in these structures.

The work that is presented in the thesis is a significant contribution to the creation of tunable polaritonic sources of coherent light and to the deep understanding of the physical processes that take place in such a complex system. The candidate used appropriate scientific and technical methodology in his research and has obtained high quality experimental results. The significance and timeliness of these results is indicated by the high impact of the publications that resulted from this work.

I found that the outlook section was rather limited. Perhaps the candidate could offer a more insightful perspective of the future directions that could be followed as a result of this work.

In the discussion about the origin of the blue shift, which is observed in organic polariton condensates, perhaps the effect of the refractive index change in the cavity, as a result of the absorption change (due to the saturated transition) through the Kramers-Kronig relation could be investigated.

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