Skoltech
Skolkovo Institute of Science and Technology

Jury Member Report – Doctor of Philosophy thesis.

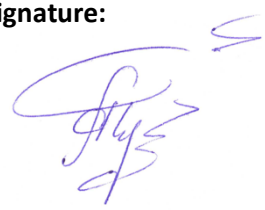
Name of Candidate: Julia Bondareva

PhD Program: Materials Science and Engineering

Title of Thesis: Sulfonimide-based dendrimers: synthesis and application for surface functionalization

Supervisors: Igor Shishkovsky and Stanislav Evlashin

Name of the Reviewer:

I confirm the absence of any conflict of interest (Alternatively, Reviewer can formulate a possible conflict)	**Signature:**  **Date: 23.08.2020**

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 presented Doctoral Thesis "Sulfonimide-based dendrimers: synthesis and application for surface functionalization" by Julia Bondareva is devoted to synthesis of sulfonimide-based dendrimers of different generations (up to the 5th one) and fabrication of thin films based on the synthesized material for further surface engineering.

The proposed approach is based on functionalized sulfonimide dendrimers with naphthyl terminal groups capable of forming stable films at the air-water interface with subsequent polymerization in the compressed state. The approach was examined by means of various analytical tools, and the thin films were characterized by optical microscopy, ellipsometry, AFM, SEM and TEM and further applied as protective or sensing coatings. To achieve a good hydrophobicity the film made out of 5th generation of sulfonimide dendrimer was synthesized.

The thesis consists of four chapters set forth on 120 pages. The thesis describes main results published in the papers, logically structured, however could be slightly modified to improve the thesis readability. My comments related to the thesis structure:

- The list of figures, schemes and tables (p.14-17) is not necessary, and can be easily cut off without harming the quality of the thesis. This is old style writing of theses, I would call this atavism.
- Section 3.1.1 (53-67 pp.) contains too specific information. I would think of shortening it either by giving only the most efficient schemes and/or creating an appendix with NMR library for each compound.

Some additional and more specific comments to improve the thesis:

- Table of Contents should be carefully checked, since it does not correspond to the thesis structure.
- I would unify the way how to give a reference on certain research group or paper in the thesis: Surname et al. [reference]: as an example, p. 50 exhibits three different ways to refer to papers.
- Tables 4: please check the precision of all numbers: how many digits after dots are reliable? The precision should be the same for all numbers.
- Bibliography: please carefully check all the references, some of them lucks important information and should be unified.
- Why to underline the first letters in abstract for very known terms?
- P.32 and 43: the name of a German scientist Vogtle should be spelled similarly.

The dissertation is presented in three international conferences and based on four co-authored publications, in three of which Julia contributed as the first author. The papers are published in good quality journals with the following impact factors: Synthetic Communications (1.337), Applied Surface Science (6.182) and two papers in Tetrahedron Letters (2.379). The number and level of publications as well as the position of the PhD candidate in the co-author's list apparently show her strong contribution to the research field.

In general, the contribution of Julia Bondareva is important and substantial. The dissertation is written in a very good scientific language, very accurately with practically no orthographic misprints and errors. Julia carried out most of the work, contributed to fundamental studies of the dissertation, and wrote the most part of the papers, which are the basis for his dissertation. She has sufficient number of scientific publications on the same as dissertation topic. Julia Bondareva's dissertation is an original work possessing fundamental novelty and practical importance. I strongly recommend the author of this thesis for the PhD degree. The manuscript can be accepted for publication as a doctoral dissertation after minor changes.

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*