

## Jury Member Report – Doctor of Philosophy thesis.

**Name of Candidate:** Stanislav Chernyshikhin

**PhD Program:** Mathematics and Mechanics

**Title of Thesis:** Tailoring the functional properties of NiTi shape memory alloy by high-resolution laser powder bed fusion

**Supervisor:** Associate Professor Igor Shishkovsky

### Name of the Reviewer:

I confirm the absence of any conflict of interest  (Alternatively, Reviewer can formulate a possible conflict)	<b>Date: 24-09-2023</b>
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*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.  
Quality is good.
- The relevance of the topic of dissertation work to its actual content  
Topic is relevant.
- The relevance of the methods used in the dissertation  
All methods relevance.
- The scientific significance of the results obtained and their compliance with the international level and current state of the art  
The results significant
- The relevance of the obtained results to applications (if applicable)  
Not applicable
- The quality of publications  
Quality is good

The summary of issues to be addressed before/during the thesis defense

The work conducted a detailed study of printing with nitinol. The study of the nitinol system in LPBF is complicated by the fact that during the printing process, depending on the energy input, elements evaporate, which in turn affects phase transitions. Despite this material having been well-researched, the author has obtained several new results. Symulation helped explain the experimental results. The work has been completed, and the results obtained have been published in scientific journals that meet Skoltech's protection requirements. In addition to the material research, Self-Adjusting Files were printed for potential use in dentistry.

The primary critique of the dissertation pertains to its structure. I suggest adding a section that describes methods for obtaining and examining samples.

I propose moving the description of calculations from the introduction to the methods section and Section 4 to the methods section as well.

In Figure 16, please increase the size of the letters in "Inclined angle."

Optical microscopy (OM) of cross-sections for thin walls consolidated with the regimes listed in Table 4 is presented in Figure 16. It is necessary to include dimensions for the thin walls and specify the distance from the substrate where the sections were made.

Remove the numbering for section 6.

**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*