

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Yulia Kuzminova

PhD Program: Mathematics and Mechanics

Title of Thesis: Properties and characteristics of the CrFeCoNi high-entropy alloys and its modifications produced by additive manufacturing technique

Supervisor: Associate Professor Igor Shishkovsky

Co-supervisor: Assistant Professor Stanislav Evlashin

Name of the Reviewer: Dr. Tatiana Mishurova

I confirm the absence of any conflict of interest	 Date: 28-08-2023
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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.

Yulia Kuzminova reported comprehensive study of the microstructure and the mechanical properties of CrFeCoNi alloy. Overall, the PhD thesis of Yulia Kuzminova has high scientific quality, also it is very well structured. The contribution of each chapter to the main scientific questions/hypothesis of the thesis is clearly explained in the general introduction, as well as at the beginning of each chapter and clearly summarized in the conclusions.

- The relevance of the topic of dissertation work to its actual content

The discussed topic is relevant for the current scientific context. Additive manufacturing of high entropy alloys recently gains a lot of interest from both industry and academia. However, the characterization of microstructure and mechanicals properties of such materials depending on heat treatments and

manufacturing methods is rarely reported in the literature. Mrs. Kuzminova contributed greatly to current state-of-the-art with a numerous of high-quality publications collected in the frame of the thesis.

- The relevance of the methods used in the dissertation

The methods used in the research are advanced and appropriated to the goals of the study. Each chapter includes deep microstructural and phase analysis of the obtained material.

- The scientific significance of the results obtained and their compliance with the international level and current state of the art

The obtained results push forward state of the art in the field of high entropy alloys and additive manufacturing. It improves understanding of the mechanical properties and microstructural evolution of CrFeCoNi alloys. The additive manufacturing of such alloy systems by powder blend is a very interesting topic to continue the research in the field.

- The quality of publications

The work is published in the high-quality journals with the good scientific reputation.

- The summary of issues to be addressed during the thesis defense

Mrs. Kuzminova discussed a lot about residual stresses and stress relieving heat treatments. There is only qualitative proof of the heat treatment acting as stress relief. How did you make sure that the residual stress is fully relieved (for example annealed condition in Chapter 2)? Was there an attempt to measure residual stresses?

The usage of powder bland showed inhomogeneous element distribution in the microstructure. Could you provide any suggestion or how can this be improved in the future?

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