In Prague, March 26, 2024

Co-supervisor evaluation

PhD candidate: Ing. Jakub Klečka  
Institution: Department of materials  
FNSPE CTU  
Thesis submission year: 2024

Overall thesis evaluation

The dissertation thesis of Ing. Jakub Klečka pertains to the controlled-atmosphere deposition of tungsten-based materials intended for potential applications in the nuclear fusion sector. Undoubtedly, this subject has a large social impact and represents one of the contemporary global challenges, the topic of work is therefore highly actual.

In more detail, the work is divided into four larger units, dedicated to four types of tungsten materials: W, W-steel, W-Cr, and WHA (tungsten heavy alloys). In these, the results obtained within the candidate's doctoral course are presented. The overall quality of the thesis is good, with minimum formal issues. The structured organization and used literature sources testify to the candidate's good orientation in the topic. The results are clearly discussed against the similar research outputs of other groups.

Considering the thesis, there are two major criticisms from my side. The first is the somewhat unclear presentation of the novelty of the research, where the contribution to the state of the art knowledge should have been more explicitly emphasized. The second is a slightly confusing aiming of the thesis as it seems to oscillate between attempts to understand fundamentals of the underlying physical phenomena on the one hand, to engineering preparation of materials for applications on the other, but in fact neither direction is adopted as the study target.

Candidate scientific evaluation

The new RF-ICP technology has several peculiar features not experienced previous with other devices at our department. This said, Jakub's position was somewhat more complicated when adopting it. Nevertheless, by years of hands-on experience, he managed to fully understand the entire process and became the method lead expert at our institute. He also personally participated in development of several unique modifications of the system, a fact that underscores his contribution and a fact I regard very highly. He has also engaged in training of Bachelor and Master's students and supervised the RF-ICP experimental parts of their theses. Finally, I would like to highlight Jakub's publication activities, as he is now finishing his doctoral studies having a Hirsch
index of 10 and 29 publication outputs in Scopus database, an accomplishment rarely encountered for a Ph.D. student.

Considering the candidate’s research attitude, I have one criticism, and one advice. The criticism aims at Jakub’s slightly lessened ability to control some parts of the scientific work independently (such as planning the research on a global level). The advice then pertains to Jakub’s work attitude: Jakub is a very talented, I daresay gifted student/scientist, but his work was partially impaired by his tendency to not focus (if procrastinate), as e.g. reflected by the eight years of the thesis making. I am positive that changing this could aid in Jakub’s future research efforts.

Concluding remarks

Within the course of his doctoral studies, Jakub has demonstrated his ability to carry out complex scientific work, his deep understanding of the problems associated with both nuclear fusion and advanced surface engineering methods, and, most importantly, contributed to the global research by novel results that will undoubtedly support the advancement in this area.

These said, I am happy to fully recommend Jakub for the conferment of the title of Doctor of Philosophy.

Jan Cizek, Ph.D.
Institute of Plasma Physics, CAS

I hereby declare that I fully agree with the evaluation of Jan Cizek.

Jiri Matejicek, Ph.D.
Institute of Plasma Physics, CAS