

Supervisor's report

Academic year: **2021/2022**

Student: **Ing. Vladimír Prajzler**

Doctoral programme: **Advanced materials and nanosciences**

Field of study: **Advanced materials**

Supervisor: **prof. RNDr. Karel Maca, Dr.**

Name of doctoral thesis topic: **Tailoring of microstructure of advanced ceramic materials by conventional and non-conventional sintering approaches**

Overall evaluation of doctoral thesis and study of the doctoral student :

Ing. Vladimír Prajzler has been studying Advanced Materials since September 2017. To fulfill the topic of his dissertation " Tailoring of microstructure of advanced ceramic materials by conventional and non-conventional sintering approaches ", he chose to study two non-conventional rapid-rate sintering techniques, namely rapid pressure-less sintering and flash sintering. His four year long full-time doctoral studies can be divided into three stages. In the first one he performed a large number of experimental studies dealing with rapid pressure-less sintering (RPLS) of alumina and yttria stabilized zirconia (tetragonal as well as cubic) ceramics and described the advantages and limitations of this sintering approach. As his greatest contribution in this field I consider revealing the causes of the formation of the core-shell structure during the rapid sintering of ZrO₂ ceramics. He published two papers dealing with RPLS of alumina and zirconia ceramics, both in WoS first quartile and both as a first author. In the second part of his study, Vladimír Prajzler applied the obtained knowledge to extend the use of the RPLS method to lead-free piezoelectric materials, which have not yet been prepared by this approach. He help to demonstrate that RPLS can decrease the processing time of piezoelectric materials several times while maintaining similar functional properties. He published this research in two scientific papers, both in WoS first quartile and both as a co-author. Within his last stage of PhD. study, Vladimír Prajzler completed an almost three-month internship at Oxford University, where he devoted his effort to another method of rapid sintering - flash sintering. At Oxford University, under the leadership of prof. Richard T. Todd, he studied the grain size evolution during flash sintering of tetragonal zirconia. After his returnhe processed and evaluated the results of his experiments and published the conclusions of this study as the first author in the paper, which is now under evaluation in the journal from WoS 1st quartile.

Although Vladimír Prajzler performed during his PhD. a large number of experiments with various sintering techniques and various ceramic materials, he was able to process his results in a very understandable and clear form in his dissertation. In my opinion, this dissertation fully meets the criteria for this type of work at the center of excellence, which is CEITEC BUT. During his PhD studies, Vladimír Prajzler made full use of the experimental and human background at CEITEC BUT for his professional

development and he became a full member of our research team, as evidenced by a number of his awards by the international community, two acquired junior research projects and publication activity (4 publications accepted, 2 submitted, 23 citations in total, h-index 3). Due to his professional skills and passion for science, he is a very good candidate for an international post-doc position which can move further his scientific career.

In my opinion, the reviewed thesis **fulfill** all requirements posed on theses aimed for obtaining PhD degree. This thesis **is** ready to be defended orally, in front of respective committee.

Place.....date.....

.....
prof. RNDr. Karel Maca, Dr.

supervisor