Brno University of Technology, Faculty of Mechanical Engineering

Opponents review for the degree of Doctor of Philosophy defence

Candidate: Kejík Pavel, Ing.

Thesis title: Low-cost filtration barriers for ultrafine particles separation

Thesis tutor: Prof. Ing. Tomáš Svěrák, CSc.

Study subject: Engineering Mechanics

This opponent´s review was written based on request of Doc. Ing. Jaroslav Katolický, PhD. – dean of the Faculty of mechanical engineering, dated February 13, 2019.

General information: Thesis is composed from 13 chapters, total volume of 136 A4 pages. Thesis structure is based on commented individual chapters dealing with the introduction, theoretical part, state of the art, methods, experimental, discussion and conclusions. Totally there was cited 122 references. Thesis were written in English language.

1. **The nature and the scope of the investigation:** The thesis presented deals with interesting scientific and technical problem of application, processing and manufacturing of porous inorganic membranes prepared from secondary raw industrial waste materials of fly ash bases. The thesis presented represents a typical combination of engineering mechanics and applied materials engineering approach. The main objectives of the study were to select and analyse the prospective particular raw mineral materials of fly ash bases, to predict structural and mechanical properties of the filtration membranes by means of geometrical/computational tools, to characterize the effect of mixture composition on mechanical and functional properties of the studied geopolymer based materials.
2. **The contribution made to the subject field, including the extent to which the thesis contains original, publishable work or merit:** Obtained results are the original contribution to the studied problem of novel type of mineral based porous membranes structure preparation and manufacturing and their material characterization. Author in her thesis has vigorously analysed and compared wide range of physico-chemical and material characteristics and their mutual dependences. Thesis represents complex experimental study with proper theoretical data evaluation and analysis. Results obtained by the applicant´s study brought a new valuable knowledge to the applied materials science and engineering study field. Student has published majority of the results in prestigious scientific journals of the materials engineering/ materials science and chemical engineering subject orientation, to name a few such as Powder Technology (2 publications, Q1), Minerals Engineering (1 publications, Q1, Q2, Q2) which were already published in international scientific journals. Applicant has attended several scientific conferences. Majority of the papers has successfully passed through vigorous review process in the journals, where the papers were published.
3. **The quality of the submission and, where appropriate, of the investigative work described:** Presented Ph.D. thesis is of usual quality standard both in content as well as in form of presentation and data analysis and interpretation. I have found several formal stylistic and graphical errors such as too small axes legends and numbers in many figures in the text, wrong

averaging of the obtained data as using too many valid digits etc. However this is not lowering an overall high standard of the thesis. That is why I am fully supporting submission of this thesis as a base for final examination. Ph.D. thesis presented fulfils usual quality requirements for PhD thesis.

Signed: Prof. Ing. Lubomír Lapčík, PhD. **Date:** March 19, 2019