

Review of the Doctoral Thesis

Title of the Doctoral Thesis: **Interaction of stem cells with materials**

Submitted by: **Ing. Kateřina Skopalová**

Doctoral study program: **Materials Science and Engineering**

Doctoral study course: **Biomaterials and Biocomposites**

Supervisor: **prof. Ing. Petr Humpolíček, Ph.D.**

The candidate Ing. Kateřina Skopalová presents her PhD thesis being the result of a number of studies on the interaction of stem cells with materials. During her PhD studies, the candidate mostly focused on the testing the biocompatibility of PANI, bioactive properties of PPy and last but not least, testing the influence of material topography on cell behavior.

The doctoral thesis submitted by Ing. Kateřina Skopalová is well written with minimum typographic errors and the results are quite interesting. In my opinion, I would improve the quality of the figures and mark footnotes differently from the marking of citations of publications in the thesis. More importantly, the dissertation demonstrates the broad understanding of the study field acquired by the student during the PhD course.

By looking at the scientific production of the candidate, it is immediately clear that Ing. Skopalová made a mark in the field by proposing innovative and original solutions to improve impact of the biochemical and geometric properties of the materials on the behaviour of different cell lines.

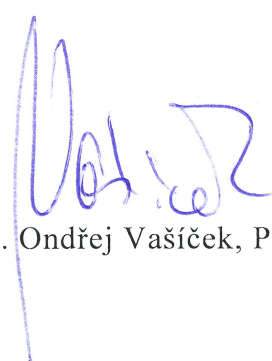
Indeed, she contributed as first author to two published papers of very good quality and participated in a number of other internationally recognized publications. Few more manuscripts are about to be finalized. The quality of the publications produced during her PhD is quite high and of international level. As such, the profile of the candidate appears outstanding and without any doubt ready to face the PhD defence. It would interesting that the candidate could answer the following questions that were raised while reading her PhD thesis.

Questions:

- 1) In this dissertation, the author writes about hemocompatibility and mentions, for example, Heparin. Could the author clarify the mechanism of action if she knows more about it? Could it be comparable to heparin and bind thrombin or antitrombin III?
- 2) The tested compounds work well in the differentiation of stem cells into neurites, as the author showed in dissertation. Could an indirect effect through the antioxidant properties of the tested compounds also play a role? Alternatively, can it be assumed that compounds directly affect signalling pathways such as AKT and MAPK?
- 3) Very interesting seems to be creating a "3D" scaffolds and focusing on influence of material topography on cell behaviour. What type of cells or differentiation would you like to focus on in the future?

The submitted doctoral thesis fulfils all requirements given by Tradition, Law and by The Study and Examination Rules of Tomas Bata University in Zlín as Ph.D. qualifying paper **and therefore I recommend approval of the paper for further needful assessment.**

In Brno, 9th August 2021



Mgr. Ondřej Vašíček, Ph.D.