

Review of the Doctoral Thesis

Title of the Doctoral Thesis: **Stimuli-responsive scaffolds**

Submitted by: **Ing. Martina Martinková**

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

Doctoral study course: **Biomaterials and Biocomposites**

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

The candidate Ing. Martina Martinková presents her doctoral thesis being the result of studies of different types of scaffolds suitable for modification with conducting polymers. The doctoral thesis shows that combinations of conductive polymers with natural polymers can be particularly advantageous, combining the electroactivity of conductive polymers (such as polypyrrole) with the biocompatibility of biopolymers. The doctoral thesis submitted by Ing. Martina Martinková is well-written with minimum typographic errors and the results are interesting. The goal of this doctoral thesis is to fabricate and modify stimuli-responsive materials that allow targeted interaction with the organism and observation of cellular behaviour on scaffolds using static and dynamic cultivation.

Looking at the scientific production of the candidate, it is immediately clear that Ing. Martinková has made her mark in the field by proposing innovative and original solutions to improve the effectiveness of bone tissue engineering, a new way of preparing biomaterials and a new method of preparing conductive composites based on PPy and polysaccharide dialdehydes.

In fact, she was the first author of one published article of very high quality and contributed to a number of other internationally recognized publications. Another manuscript has been submitted with the author as the first author. It would be good if the thesis, e.g. in the list of publications, indicated the author's contribution to the individual articles or what role she had in the individual articles. The quality of the publications produced during her doctoral studies is high and at an international level. Thus, the candidate's profile seems to be excellent and she is undoubtedly ready to face the PhD defense. It would be interesting if the candidate could answer the following questions raised during the reading of her thesis.

Questions:

- 1) The author has been involved in bone tissue engineering research. Among other materials, electrically stimuli-responsive materials were used. Can the author explain why the use of these materials is important or how it is advantageous to use these materials in bone tissue engineering?
- 2) Can bone tissue engineering also produce materials that mimic for example hypoxia, which is important for the proliferation and subsequent differentiation of cells (e.g. hematopoietic cells) or does bone tissue engineering focus mainly on materials that have supportive/structural rather than stimulatory function?
- 3) The author was involved in the article that focused on 3D bioprinting. Can the author summarize the current state of 3D bioprinting? Is it already in commercial use or are there any interesting applications?

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 a Ph.D. qualifying paper **and therefore I recommend approval of the paper for further needful assessment.**

In Brno, 9th November 2023

Mgr. Ondřej Vašíček, Ph.D.