Annex No. 11 to the MU Directive on Habilitation Procedures and Professor Appointment Procedures

PUBLIC LECTURE EVALUATION

Masaryk University	
Faculty	Faculty of Science
Procedure field	Biochemistry
Applicant	doc. RNDr. Petr Skládal, CSc.
Lecture date	24. 2. 2022, 12:00, building B11, room 205
Lecture topic	**"Biosensors – where are the limits?"**
Persons present (number)	69 (on-site) + 30 (on-line)
Designated evaluators (board members)	prof. RNDr. Zdeněk Glatz, CSc. (on-site) prof. Ing. Jiří Homola, CSc., DSc. (online) Prof. Maria Minunni, PhD (online) Prof. Dario Compagnone, PhD (online)

The public professorship lecture that was held in a hybrid format, took place as a part of a scientific seminar of the Department of Biochemistry, Faculty of Science, Masaryk University. In addition, scientists from other departments of Faculty of Science and CEITEC, and Institute of Analytical Chemistry, AS CR were invited as well. The above-mentioned members of the board attended the lecture and provided its evaluation. Furthermore, the whole lecture given in English was recorded and the record was added to the File Depository of Information system of Masaryk University to be available for the foreign evaluation board members. The record is also available here: https://www.orion.sci.muni.cz/cs/pro-verejnost/prednasky.html

Doc. RNDR. Petr. Skládal, CSc. in his public lecture briefly summarized the principles of biosensors and the existing challenges, introduced enzyme electrodes for glucose assays and inhibition of cholinesterase-based sensors for insecticides and nerve gases. Further developments of amperometric immunosensors were demonstrated on detection of pathogenic substances, which later were used for the detection of bioaerosols containing model microbes in controlled conditions. Recent combination of enzyme sensors with chemometric processing had started the research of bioelectronic tongues. Another different part of research activities included optical surface plasmon resonance and piezoelectric quartz crystal microbalance systems, which are able to follow biointeractions in real time and without labels. Enhanced response from biosensors can be realized using suitable amplification strategies. One of the most interesting subjects was the introduction of single-molecule sensing approaches utilizing photon up-conversion nanocrystals as labels. In this way, the classic analogue measurements can be transformed into digital formats, where the individual nanoparticle labels are counted using custom modified optical microscope.

The further benefit is excitation in the near infrared region at 980 nm, where biological samples do not interfere, and anti-Stokes emission in the visible part of the spectrum. The final part of the lecture briefly introduced atomic force microscopy and spectroscopy and its original application for nanomechanical biosensing. At this point, the most interesting is probing of the beating cluster of patient-derived cardiomyocytes; the resulting mechanocardiograms allow to obtain information on beating forces. A complex approach is complemented with monitoring electric activity of the beating cells. The "heart on chip" system functions as a model of patient for investigation of the disease conditions and heart drugs testing.

It can be stated that the lecture was well organized, easily understandable and interesting for the attending audience. During the discussion which followed, Petr Skládal answered both the questions from the committee members as well as several questions from the people present in the auditorium. The emphasis was focused on the validation of methods based on the biosensors operating parameters, especially their sensitivity and reproducibility. Furthermore, some general questions dealing with publications on biosensors, including recent trends, were discussed as well. At that point, the applicant demonstrated an excellent orientation within the subject of his research interest.

Conclusion

The lecture delivered by doc. RNDR. Petr. Skládal, CSc. entitled "***Biosensors – where are the limits?***" as part of the professor appointment procedure, fully **demonstrated** sufficient scholarly qualifications and pedagogical capabilities expected of applicants participating in a professor appointment procedure in the field of Biochemistry. All designated evaluators who participated online or in person are familiar with the text of the evaluation and agree with it.

Date: 24. 2. 2022

prof. RNDr. Zdeněk Glatz, CSc.