New directions of electrochemistry, bioelectrochemistry, nanoelectrochemistry and bioengineering

René Kizek[a], Zbyněk Heger[a], Petr Michálek[a], Ondřej Zítka[a]

[a] Laboratory of metallomics and nanotechnology, common workplace of Mendel University and the Central European Institute of Technology, Zemedelska 1, 613 00 Brno, Czech Republic - The European Union

Accepted: 28. 10. 2014

Working seminar „New directions of electrochemistry, bioelectrochemistry, nanoelectrochemistry and bioengineering“under the CEITEC project, whose main mission was to build an important European center of science and education with excellent facilities and conditions for the best scientists in Brno was held on the premises of biotechnology center (INBIT), Kamenice 771/34, Brno, September 29, 2014. The seminar was attended by both undergraduate and graduate students as well as experienced researchers from Mendel University, University of Technology and Masaryk University.

The event in the area the Masaryk University campus was backed by the Vice-Rector for Science and Research, Mendel University in Brno[1] . Workshop at the end of September (29th September 2014, 10:00 a.m. to 2:00 p.m.), which was held in the meeting room INBIT Kamenice was attended by fifty participants including foreign presenters from India, Vietnam and Spain. It is necessary to recall the integral share of support from the Eppendorf company, carried by Dr. Milan Řezka. The plenary lectures led to productive discussions of workers of Laboratories of metallomics and nanotechnology, Laboratories of sensors, and the Department of biomedical engineering, primarily on new directions in the field of electrochemistry, bioelectrochemistry, nanoelectrochemistry and bioengineering and gave a new impulse for further cooperation and planning of shared project and outcomes. An important part and also pleasant duty of all involved was to commemorate the birthday of Mrs. Libuše Trnková, Assist. Prof., personality respected in the field of an electrochemical research. According to the program of the workshop the meeting was started with a lecture by Professor René Kizek, followed by Assist. Prof. Vojtěch Adam with presentation with the headline - Electro-Metalomics, were new findings in the field of thiol compounds, especially metallothionein, were presented. Research in the Laboratory of metallomics and nanotechnology has been focused in the long term on this particular thiol compound. Another presentation with the title „Modern micro- and nanotechnologies for bioapplications“ was presented by associate professor Jaromir Hubálek. The presentation summarizes and discusses new technologies suitable for the study of biomolecules, wherein the attention has been focused on quantum dots and a new generation of microelectrodes. The possibilities of using electrochemical methods for studying biological processes and structural changes of nucleic acids were presented by Dr. Michal Masařík in a lecture titled „Electrooncology“. The voltage of cell membranes is a parameter that significantly affects the contraction and the relaxation of muscle cells. Micro- and possibly nanoelectrodes can be used to study these processes. These options with illustrative examples of measurement of myocardial cells was demonstrated in a lecture by Professor Ivo Provazník. An interesting direction seems to be also fluorescent labeling of these cells and monitoring the changes in emission maximums. In the next block of the seminar lectures of foreign participants were presented. The block started with the lecture by Miguel Angel Merlos Rodrigo about new chip techniques for monitoring of the expression profiles not only in cancer cells, but also for identifying viruses. These technologies work with different detection methods, especially fluorescent labels, but also electrochemistry as in

Journal of Metallomics and Nanotechnologies **2014**, 4, 57—58

the case of ElectraSense device, which has been detailed described in the lecture in the lecture. Hoai Viet Nguyen presented a presentation entitled „Electroanalysis of etoposide“ about the potential of electrochemical methods serving as a sensitive tool for monitoring the interaction of anticancer drugs with biomolecules on a specially modified electrode. The glassy carbon electrode is cleaned by ultrasound and alumina and then polished on velvet. The electrode is then modified by multiple-walled carbon nanotubes (MWCNT). After drying, thus prepared surface is covered with the anticancer drug which is thus prepared for monitoring interactions with biopolymers such as DNA. The entire block was concluded by Dr. Amitava Moulick with a lecture „Synthesis of peptides and nucleic acids“ where the technology of preparing synthetic oligonucleotides and linear peptides were described in detail. Discussion was held on the use of these molecules in nanomedicine, as well as individual parts of synthesis, wherein the functional groups for binding the individual building blocks of peptides or oligonucleotides are deprotected.

We can conclude that workshop with its outputs contributed to improving communication between the various partners and brought new methodological information for use in all partner groups. All presentations were summarized in a special electronic output, which is available in an internal information system[2].

Group photo of participants of the seminar: „New directions of electrochemistry, bioelectrochemistry, nanoelectrochemistry and bioengineering“. INBIT, 29th September 2014, 12:00 pm

The authors declare they have no potential conflicts of interests concerning drugs, products, services or another research outputs in this study.

The Editorial Board declares that the manuscript met the ICMJE „uniform requirements“ for biomedical papers.

REFERENCES:

1. Kizek R: New directions of electrochemistry, bioelectrochemistry, nanoelectrochemistry and bioengineering. Special seminar on the occasion of the birthday of Assoc. Prof. RNDr. Libuše Trnkové, CSc.. In: Seminar 31/2014. Edited by Brno MU, vol. 1. Brno: Laboratory metallomics and nanotechnology; 2014.
2. Kizek R, Adam V, Hubalek J, Masarik M, Provaznik I, Rodrigo M, Hoai N, Moulick A: New directions of electrochemistry, bioelectrochemistry, nanoelectrochemistry and bioengineering. In: 1. vol. 1, 29.9.2014 edn: Laboratory of Metallomics and Nanotechnology; 2014: 1.

MY. VY. **SPOLEČNĚ.**

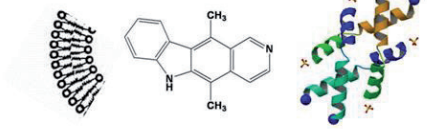
pragolab

MINISTERSTVO ZDRAVOTNICTVÍ
ČESKÉ REPUBLIKY

NanoBioTECell

P102/11/1068
Délka trvání: 2011-2016

GAČR 14-18344S



NANOCHEMO

Vývoj nanočástic obsahujících cytostatika a enzymy pro zlepšení chemoterapie lidských neuroblastomů a studium mechanismu jejich působení
2014-2016

CEITEC
středoevropský technologický institut
BRNO | ČESKÁ REPUBLIKA