PhD studentship on electrochemistry for cell culture applications

**Project title:** Electrochemical detection of metalloproteinases, for cell culture purposes.

**Institution:** Laboratory of Cell Biophysics, Nencki Institute of Experimental Biology, Polish Academy of Sciences (supervisor Jakub Włodarczyk, DSc)
Charge Transfer Processes in Hydrodynamic Systems Group, Institute of Physical Chemistry, Polish Academy of Sciences (co-supervisor Martin Jönsson-Niedziółka, DSc)

**Position starts on:** October 2016,

**Funding:** from 1700 PLN (net/stipend) during first year up to 2100 PLN (net/stipend), additional funding possible

**Deadline for application:** August 31, 2016

Nencki Institute of Experimental Biology together with the Institute of Physical Chemistry are offering a PhD-studentship to a talented candidate who wishes to enhance his/her scientific career in the field of **Electrochemistry for cell culture applications** and acquire a doctoral degree.

**Metalloproteinases** form a group of proteolytic enzymes which are responsible for degradation of the components of the **extracellular matrix and remodeling** of the surrounding tissues. In this way, they play a key role in many physiological (morphogenesis, angiogenesis), and pathological processes (inflammation, cardio-vascular and pulmonary diseases, carcinogenesis). The main analytical techniques used for the detection of enzymes pertaining to this group are immunological tests, including ELISA, electrophoresis, Western blot and measurement of fluorescence.

Application of **electrochemical sensing** could shorten the time of analysis, and most importantly, in case of a sensor matrix allow to **analyse spatial distribution** of the enzyme in both **cell cultures and in vivo tests**. Several electrochemical techniques were already proposed for the analysis of metalloproteinases during the last few years. Those systems are based either on electrochemically labeled (e.g. ferrocene) peptides linked to the electrode – in which case a decay of the signal is observed – or on binding of the enzyme to specific antibodies localized on the electrode surface, which results in an increase of the analytical signal. Unfortunately proposed solutions are not compatible with standard and microfluidic cell culture systems.

This project is destined to **construct an biosensor**, which, in contrast to systems based on proteolysis, can be **used repeatedly**, or could be applied during **prolonged measurements** in **cell cultures**. Upon favourable development of the project, a **sensor matrix** will be constructed, which will allow for measurements of spatial distribution of the enzyme in cell cultures. Preparation of the analytical system and preliminary tests will be done in Institute of Physical Chemistry, Polish Academy of Sciences. Substantive analysis of obtained results in terms of biology, as well as final measurement in cell cultures will be done in Nencki Institute of Experimental Biology.
Requirements:
• Master of Science (or equivalent) degree in chemistry, physics, biology, biotechnology or similar;
• a strong motivation for experimental work,
• ability to work both individually and as part of a group,
• good knowledge of English,
• optionally, experience in electrochemistry, microfluidics, work with cell cultures will be a plus;

More information about the required documents and application process can be found at: http://studia.nencki.gov.pl/?lang=en&a=pg0038

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