

Project 3.3. Microfluidic cells for high-throughput multiple response analyses

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Institute: ICP PAS

Unit: Charge Transfer in Hydrodynamic Systems Group

WWW: charge-transfer.pl

Background:

The PhD project is part of a collaboration between the Institute of Physical Chemistry, the Gdańsk University of Technology, the company redox.me and the Norwegian research institute Sintef, to develop a first-of-its-kind, multiparametric instrumentation equipment integrating microfluidic electrochemical cells and advanced microelectrodes materials, and being compatible with other in situ analyses technologies such as UV-Vis, FTIR/IR, Raman, NMR and ultra-fast laser spectroscopy.

IPC PAS is the main responsible partner for testing and development of the electrochemical part of the system.

Microfluidic devices offer important benefits such as fast analysis time, reduced use of reagents (sometimes very expensive, highly reacting and/or highly toxic compounds) and the possibility of more accurate reaction control. Microfluidics coupled with electrochemistry has been exploited for a variety of applications ranging from electrochemical energy storage and conversion to biosensing, environmental and chemical synthesis.

Here we will be combining novel electrode materials developed at Gdańsk University of Technology with microfluidic design by Sintef and the technical know-how from redox.me. This offers the PhD student a unique opportunity to work on fundamental electrochemistry in an international collaboration with a clear path towards practical implementation to commercial production.

Aim:

The PhD student will work together in a team to build up the test facility needed for the evaluation of materials from GUT, with the student focussing more on the fundamental science and characterization. The materials will be tested both as general-purpose electrodes, but also for specific purposes within (bio)analytical chemistry. The final goal will be the development and demonstration of a multi-parameter electrochemical measurement platform based on microfluidics.

Requirements:

- MSc diploma in chemistry, chemical engineering, physics or similar,
- Creativity measured by the quality and number of projects, study record, internships, authorship in peer-reviewed publications and patents in which the Candidate participated and contributed,
- Good technical skills,
- Knowledge in physical chemistry,
- Previous knowledge of electrochemistry and microfluidics is a plus,
- Excellent communications, organisation and time management skills,
- Ability to work independently as well as in a group,
- Analytical thinking and critical problem solving skills,
- Fluent in spoken and written English