

Development of a Portable Sensor based on Molecularly Imprinted Polymer for Detection of a Disease-related Protein

Summary

The overall objective of the PhD study is to design and synthesize a molecularly imprinted polymer (MIP) endowed with the selectivity to a disease-related protein biomarker and its integration with a portable sensor platform in order to develop a cost-effective sensor for medical diagnostics.

Research field:	Chemical, materials and energy technology
Supervisors:	Dr. Vitali Söritski Dr. Jekaterina Reut
Availability:	This position is available.
Offered by:	School of Engineering Department of Materials and Environmental Technology
Application deadline:	Applications are accepted between May 03, 2021 00:00 and May 31, 2021 23:59 (Europe/Zurich)

Description

Nowadays, in clinical diagnostics there is an increasing demand for fast and reliable analytical methods for detection of specific disease-related biomarkers, suitable for achieving appropriate selectivity with low limit of detection while being low-cost, portable and capable of in situ real-time monitoring. Molecularly imprinted polymers (MIPs) are functional materials with antibody-like ability to bind and discriminate between molecules.

Molecular imprinting can be defined as the process of template-induced formation of specific molecular recognition sites in the polymer material. We offer a 4-year PhD position in developing a portable sensor based on MIP for detection of a disease-related protein. The overall objective of the study is to design and synthesize a MIP endowed with the selectivity to a disease-related protein biomarker and its integration with a portable sensor platform in order to develop a cost-effective sensor for medical diagnostics.

Foreseen tasks within the PhD study:

- rational selection of functional monomers using computational modeling and spectroscopic analysis
- finding an optimal polymerization method and an efficient procedure for target molecule removal to produce MIP
- adapting the synthesis methods to generate protein-MIP with enhanced specific surface area
- rational improvement of protein-MIPs to approach biological receptors in terms of affinity and selectivity towards the chosen target analytes
- studying the analytical performance of the prepared MIP based sensors

The primary responsibilities of the PhD student will be:

- to actively participate in the experimental work, incl. design, synthesis and characterization of MIP materials and optimization of their selective properties as well as studying the analytical performance of the resulting MIP-based sensor
- to collaborate with internal and external groups
- to communicate results at meetings, conferences, and write reports and publications

Applicants should fulfil the following requirements:

- MSc in the field of chemistry, analytical chemistry, biochemistry, or materials science
- excellent command of English (Level B2 or higher)
- practical experience in polymer synthesis, biochemistry (protein characterization and analysis), electrochemistry, nanofabrication
- good laboratory skills
- motivated and able to work independently, write up results of your own research and prepare for presentations



The top candidates for the position may be interviewed and asked to present their scientific work and experience.



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