

# Portable solutions for banned and regulated substances analysis by electrophoretic and molecularly imprinted techniques

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## Summary

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*The aim of this PhD project is to develop in-situ cost-effective portable solutions for quick, sensitive and selective determination of banned and regulated substances in various biological as well as non-biological sample matrices. Supervisor: Jekaterina Mazina-Šinkar. Co-supervisor: Vitali Sõritski.*

Research field:	Chemistry and Biotechnology
Supervisors:	Vitali Sõritski Jekaterina Mazina-Šinkar
Availability:	This position is available.
Offered by:	School of Science Department of Chemistry and Biotechnology
Application deadline:	Applications are accepted between May 03, 2021 00:00 and May 31, 2021 23:59 (Europe/Zurich)

## Description

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The use, distribution and trafficking of regulated and banned compounds are serious problems causing negative health, economical, psychosocial and environmental outcomes. Nowadays, microfabricated devices based on electrophoretic separations have found numerous applications in medicine, biotechnology and chemistry. Despite the multiple advantages (possibility to miniaturize, low consumption of solvents and samples, low cost, high speed of analysis and high separation efficiency) of electrophoresis, it lacks enough sensitivity. Therefore, the coupling to sensitive techniques, which are possible to miniaturize, is in high demand.

Molecularly imprinted polymers (MIPs) are functional materials with antibody-like ability to bind and discriminate between molecules. These materials can be employed as drug-selective pre-concentrators or sensing elements. MIP technology has also found application in the development of portable sensing tools for drug detection in powders and surfaces. However, MIPs may lack enough selectivity, failing to identify drugs in the mixtures with cutting agents and other drugs. Therefore, application of MIP for analytical scale separations in electrophoresis can be advantageous for both technologies, solving both selectivity and sensitivity issues.

This project will explore the coupling possibilities of MIP as a sensing element and/or pre-concentrator for various banned and regulated compounds, including illegal drugs, prior to analysis by electrophoresis. This symbiosis can give rise to the novel, portable, low cost, sensitive and selective solutions for rapid and simultaneous determination of regulated and banned compounds in various sample matrices in different fields (clinical, environmental analysis and security).

Supervisor: Jekaterina Mazina-Šinkar

Co-supervisor: Vitali Sõritski

### Responsibilities and tasks of the PhD student:

- To conduct research
- To display initiative in identifying and resolving problems relating to the research
- To write research publications and present the results of PhD project at scientific conferences

### Applicants should fulfil the following requirements:

- MSc in chemistry, material or related field
- must be a highly motivated and proactive individual with excellent communication skills
- strong written and verbal communication skills in English

The following experience is beneficial:

- laboratory work in general
- experience with electrophoretic and MIP techniques
- working knowledge of statistics



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