

User-friendly laboratory automation in chemistry

Summary

We are looking for a highly motivated and ambitious PhD candidate with background in electronics, laboratory automation, system integration, optics, or related fields to join our Microfluidics and Lab-on-a-chip team in Tallinn University of Technology (TalTech). The task of the PhD project is to develop an automated, in-line, chemical analysis platform that integrates flow control, light source(s), detector(s) and a single control interface. The aim of the automated platform is to integrate optical detection and flow control with a microfluidic system that separates chiral molecules.

Research field:	Information and communication technology
Supervisors:	Dr. Tamas Pardy Prof. Dr. Ott Scheler
Availability:	This position is available.
Offered by:	School of Information Technologies Department of Chemistry and Biotechnology
Application deadline:	Applications are accepted between June 01, 2023 00:00 and June 30, 2023 23:59 (Europe/Zurich)

Description

The goal of this PhD project is to develop an automated in-line chemical analysis platform by integrating together light sources, detectors, flow control systems and a central control unit. The aim of the automated platform is to connect to a microfluidic system that separates chiral molecules with optical detection setup.

Research questions:

- Can an open-source automated chirality analysis platform be created as an add-on to widely used off-the-shelf instruments (e.g. pumps, spectrophotometer etc.)?
- Can this platform be developed further to be universally compatible with different optical and fluidic setups?
- Can the developed analytical platform be integrated with an innovative chiral separation chip integrate?

This project is part of a Horizon Europe funded EIC Pathfinder program called "CHIRALFORCE", which aims to develop a technology for sorting chiral analytes with enantio-selective optical forces in nanophotonic waveguides. This EU program brings together international partners with expertise in chiral nanophotonic design, in design and synthesis of chiral molecules and nanoparticles, in microfluidics, in polarimetric scatterometry, and in automation and system integration. Within this consortium the task of the TalTech team is to provide an automated in-line platform for the analysis of chiral separation.

Within TalTech this project is a collaboration between Department of Chemistry and Biotechnology, and Thomas Johann Seebeck Department of Electronics.

Main supervisor: Prof. Dr. Ott Scheler

Co-supervisor: Dr. Tamas Pardy

Responsibilities and (foreseen) tasks:

- Research the state-of-the-art in instrumentation for automated chirality analysis
- Develop and add-on for widely available chemical analysis instruments (e.g. pumps, spectrophotometer) to integrate and automate chiral analysis in a single system
- Develop control and user interface hardware and/or software that allows control of process parameters and data collection in a particular format
- Create standardized microfluidic chip interface for the developed platform, compatible with different microfluidic chips
- Integrate developed platform with chiral analysis microfluidic chip



- Possible additional tasks: autoloader integration, cloud-based control and data collection, integration with in-house developed hardware

Applicants should fulfil the following requirements:

- MSc in electrical engineering, mechanical/mechatronics engineering, applied physics, chemical engineering, bio-medical engineering or related field
- a clear interest in the topic of the position
- excellent command of English
- Good candidate should like to play for a dynamic, interdisciplinary, and international team
- Successful candidate should have prior experience in at least one of those areas: embedded software, microcontrollers, electronics/instrumentation design, microfluidics instrumentation, chemical instrumentation or similar

The following experience is beneficial:

- Experience with (micro) fluidic systems
- PS! No previous knowledge of chemistry or chiral optics is expected, but is definitely a strong advantage

We offer:

- 4-year PhD position in a leading technological research University in Estonia that is also its most international university,
- The chance to be part of the Horizon Europe funded research collaboration between 7 partners across Europe
- Opportunities for conference visits, research stays and interdisciplinary networking with partners both locally and internationally
- We offer a starting salary package with 20000 EUR/year gross, with potential for increase depending on performance
- Position comes with full social and medical benefits in Estonia

About the department

The Department of Chemistry and Biotechnology (DCB) is developing solutions to the great challenges of the 21st century – climate change, environmental protection, carbon neutrality, renewable energy and biodiversity conservation. DCB has offered high level interdisciplinary research training in the field for over 100 years. The department has long history in providing hands-on education in the fields of chemistry, biotechnology, gene technology and food sciences

The research and teaching competences of Thomas Johann Seebeck Department of Electronics (TJS ELIN) cover the Cognitive Electronics and Communication Technologies activity fields. The R&D activities are well justified with interests of the industry, but also are looking into the future, following the major development trends in the indicated activity fields. The department has a very solid laboratory base for R&D and study activities, giving the students high-level skills for starting their professional careers.

Both involved Departments are continuously very active and successful in obtaining competitive research funding from local and international funding agencies (e.g. Estonian Research Council, Horizon Europe, MSCA, etc)

Additional information

For further information, please contact Prof Ott Scheler (ott.scheler@taltech.ee) or Dr. Tamas Pardy (tamas.pardy@taltech.ee)

Microfluidics and Lab-on-a-chip team Website | Facebook



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