MSCA COFUND Doctoral Fellowships “Droplet Microfluidic Tools for Sustainable Biotechnology”

Summary

This PhD topic is part of the INNOCHEMBIO Doctoral Programme, which is funded through the Marie Skłodowska-Curie Actions (MSCA) COFUND action. The main objective of INNOCHEMBIO is to train future experts of sustainable chemistry and biotechnology, helping Europe to take the next steps in the green transition. This project aims to develop and apply next-generation droplet analysis tools that are more efficient and sustainable for high-throughput biological assays in collaboration with Estonian flagship biotechnological companies. This PhD position will be hosted at TalTech with main supervisor Prof. Ott Scheler and will contain a secondment to co-supervisor Prof. Tomasz Kaminski at University of Warsaw (PL).

Research field:	Chemistry and biotechnology
Supervisor:	Prof. Dr. Ott Scheler
Availability:	This position is available.
Offered by:	School of Science Department of Chemistry and Biotechnology
Application deadline:	Applications are accepted between July 01, 2025 00:00 and August 31, 2025 23:59 (Europe/Zurich)

Description

1. General description of programme and host

The PhD fellowship is part of the Marie Skłodowska-Curie Actions (MSCA) COFUND doctoral programme INNOCHEMBIO (https://taltech.ee/en/innochembio), which is co-funded by the European Union (Grant agreement 101217295). The main objective of INNOCHEMBIO is to train future experts to help Europe take the next steps in the green transition. The solutions and trained experts can reduce the environmental impact of the chemical and agricultural industries, offer eco-friendly analytical techniques, and assess the safety of new materials. INNOCHEMBIO funding will co-finance **15 PhD positions**, for which the application process in the first call will start on the **1st of July in 2025**.

For 12 PhD positions the hosting institution will be Department of Chemistry and Biotechnology (DCB) at Tallinn University of Technology (TalTech) which combines three divisions – Chemistry, Gene Technology and Biomedicine, and Food 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 hosts the second biggest PhD programme in TalTech with nearly a hundred enrolled students.

For 3 PhD positions the hosting institution will be the implementing partner – National Institute of Chemical Physics and Biophysics (NICPB). NICPB is a public research institution that conducts both fundamental and applied research, developing novel directions in fields ranging from material sciences to informatics. NICPB houses the Laboratory of Environmental Toxicology and several laboratories focused on fundamental research in NMR technologies with expertise dating back decades. The PhD training activities conducted by NICPB are funded through TalTech.

Importantly, each PhD project has one co-supervisor from another European country, which is detailed under the specific offer (see under supervisors' section). In total, INNOCHEMBIO has **19 associate partners from 11 European countries**.

2. Description of specific PhD project

This PhD project focuses on developing and applying novel user-friendly droplet-based microfluidic pipelines for high-throughput biological assays. This includes employing a vast array of techniques such as hands-on construction and manipulation of microfluidic platforms, generation of small (pico- and nanoliter sized) water-in-oil droplets, biology and chemistry experimental procedures, signal detection or imaging, and image analysis via different software tools.

Droplet-based microfluidic applications are rapidly expanding sustainability in biological research. Encapsulation of study material into microdroplets enables massive high-throughput parallelization, chemical separation, and confined sample analysis. This is unprecedented via classical methods that use flasks, petri dishes, and microtiter plates.

However, despite new droplet microfluidic tools evolving and providing new experimental pathways, many obstacles and limitations remain, and the tools are underused in general biology and chemistry labs. There is a need for bridging the gap between state-of-the-art droplet-based microfluidics tools and their easy application for the general scientific community.

The prospective PhD project is developed around these topics pursued currently in the supervising labs:

- Development of user-friendly droplet microfluidic technologies for biotechnology
- Investigation of antimicrobial susceptibility and resistance mechanisms at single cell level in droplets
- Influence of different anthropogenic pollutants (Micro-and nanoplastic, metals, chemicals, etc) to cells and their drug sensitivity
- Development of different labelled or label-free approaches for droplet microfluidics
- Development and validation of active and passive systems for high throughput sorting of droplets
- Functional enrichment of microbial strains and consortia from environmental samples
- Prospective students can also propose and develop their own research directions in the field of droplet microfluidics that align with topics listed above.

Link to the project: https://taltech.ee/en/innochembio/scheler

3. Supervisory team

- Tallinn University of Technology (main supervisor): Prof. Ott Scheler
- University of Warsaw (Poland): Prof. Tomasz Kaminski (The PhD student will stay 6-16 months at the co-supervisor's lab as mutually agreed upon).
- Tallinn University of Technology: Dr. Simona Bartkova

4. Requirements

- Excellent command of written and spoken English.
- Compliance with the rules of INNOCHEMBIO (e.g. eligibility, adhering to MSCA mobility rules, etc.).
- The primary workplace will be in Estonia. Therefore, candidates from outside the EU must be eligible to obtain a visa. The position is expected to start in the first half of 2026.
- We are looking for an open-minded candidate who would like to apply a wide set of multidisciplinary tools for biotechnology.
- Candidate must have master’s degree in natural science (e.g in gene technology, microbiology, biotechnology, bioinformatics, bioengineering, biochemistry or similar).
- We expect previous hands-on experience with basic laboratory techniques in at least one of the following areas: molecular biology, microbiology, genetic engineering, biochemistry or similar.
- Previous experience in microfluidics is a strong bonus, but not expected.
- Experience in any of the following fields is a strong advantage, but is not expected: informatics, statistics, image analysis, engineering, robotics or other similar.

5. Duties and Responsibilities

- Undertake postgraduate research for specific doctoral research project at TalTech or NICPB, respectively.
- Present and publish research in both academic and non-academic audiences. Attend and participate in academic and non-academic conferences, events and seminars.
- Attend and participate in all training events and supervisory meetings.
- Be seconded to the associated partner as necessary to fulfil the grant obligations.
- Prepare progress reports and similar documents on research for funding bodies, as required.
- Actively contribute to the public engagement and outreach activities of the project.
- The above job descriptions are not exhaustive, the PhD candidate may be required to undertake other tasks, which are broadly in line with the above duties and responsibilities.
- Full-time employment (40 hours per week), temporary contract for 4 years.

6. Eligibility requirements

- The applicant must be a doctoral candidate (i.e. not already in possession of a doctoral degree at the date of the recruitment).

- At the time of recruitment, the researcher must not have resided or carried out their main activity (work, studies, etc.) in Estonia for more than 12 months in the three years immediately prior to the recruitment date. Compulsory national service and/or short stays such as holidays are not taken into account.

7. Benefits

- Competitive funding scheme, with a minimum gross monthly salary of EUR 2500. Topped by additional mobility allowances as well as optional family allowances (if applicable).
- Covered tuition costs, research costs and funding for short term mobility (i.e. conference attendance).
- Interdisciplinary and international research projects.
- Early-stage researcher position, with corresponding social and medical benefits in Estonia.
- Becoming a Marie Skłodowska-Curie PhD fellow.

8. How to Apply

All applications must be sent through TalTech's official application platform Glowbase and only applications submitted here will be considered for the programme. We ask the candidates not to contact the supervisors directly, in case of questions please write at innochembio@taltech.ee. Each application must include the following material: CV, 1-page motivation letter, copies of BSc and MSc study records and diplomas, scanned copy of valid photo ID, 2 reference letters, eligibility statement.

NB! The INNOCHEMBIO programme has additional requirements compared to the standard TalTech application process. Details on the exact nature of these documents and how to insert them in Glowbase can be found at our official INNOCHEMBIO website: https://taltech.ee/en/innochembio/application-process. **If any of the required documents are missing, the candidate will not be eligible to proceed to the selection stage.**

9. Selection Process

The selection and recruitment process will be in accordance with the European Charter and Code of Conduct for the Recruitment of Researchers. The recruitment process will be open, transparent, impartial, equitable, and merit-based. There will be no overt/covert discrimination based on race, gender, sexual orientation, religion or belief, disability or age. To this end, the following selection criteria will be considered.

The application deadline is 31 August 2025. The application process will be carried out in 3 steps. In short, first an eligibility check is performed. All eligible candidates will proceed to stage 1, where they will be evaluated by independent evaluators based on the application documents. Lastly, shortlisted candidates from stage 1 will proceed to stage 2, where they will be interviewed via teleconference, which will be used to determine a candidate to whom an offer will be made. All candidates will be informed about the progress in due course after each step of the process. The selection process is described on the guide for applicants available here: https://taltech.ee/en/innochembio/application-process.

10. Disclaimer

By applying for this position, the applicants

1. give their consent to circulate their application and personal data within the INNOCHEMBIO consortium and with the evaluators;
2. confirm that the data provided is valid and accurate;
3. confirm compliance with the eligibility requirements;
4. commit to undertaking the planned secondment at the co-supervisor's institution.

To get more information or to apply online, visit https://taltech.glowbase.com/positions/1021 or scan the the code on the left with your smartphone.