

MSCA COFUND Doctoral Fellowships “Green Novel Technologies for Forensic Research on Drugs (NOVTECH-DRUGS)”

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 shift the forensic toxicology field toward more sustainable practices with a significantly lower environmental footprint by focusing on integrating deep ultraviolet fluorescence detection (DUV-FD) and microfluidic chip-based electrophoresis to replace traditional lab-intensive techniques. This PhD position will be hosted at TalTech with main supervisor Prof. Jekaterina Mazina-Šinkar and will contain a secondment to co-supervisor Prof. Michał Woźniakiewicz at Jagiellonian University (PL).

Research field:	Chemistry and biotechnology
Supervisor:	Prof. Dr. Jekaterina Mazina-Šinkar
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

The NOVTECH-DRUGS PhD project addresses the growing global need for environmentally sustainable, rapid, and accurate forensic drug testing tools. With illegal drug use presenting critical challenges to public health and safety, this research seeks to develop innovative, portable solutions for on-site detection. The project focuses on integrating fluorescence detection and microfluidic chip-based electrophoresis to replace traditional lab-intensive techniques. A key goal is to transition toward non-invasive, eco-friendly sample matrices, such as exhaled breath. The research is carried out in collaboration with Jagiellonian University and the TalTech spin-off company SafePAS OÜ.

Illegal drug abuse remains a major global challenge, affecting millions of individuals annually. According to the latest EMCDDA report, an estimated 270 million people used drugs in 2017 (+30% increase compared to 2009), and 56 million in 2019 (+48% since 1990) have a drug disorder (by IHME).

The NOVTECH-DRUGS project is designed to contribute to a paradigm shift in forensic toxicology—one that prioritizes sustainability, mobility, and speed. Traditional laboratory instruments used for drug detection are often bulky, energy-intensive, and require invasive sampling. This PhD project explores novel methodologies to miniaturize and streamline the detection process without compromising analytical performance.

The student will work on one of the following focus areas (or an interdisciplinary combination thereof):

- Development and optimization of microfluidic chip-based electrophoresis platforms
- Innovation in sustainable, non-invasive sample collection and pre-treatment (e.g., exhaled breath or oral fluid).

In addition to experimental work, the candidate may engage in the development of validation protocols and explore the real-world applications of the technology in collaboration with public health, law enforcement, and clinical stakeholders.

This doctoral position will be carried out in cooperation with:

- Jagiellonian University, Poland is renowned for its expertise in forensic chemistry, modern analytical techniques, and method validation. The student is expected to stay for a period of 12–16 months at Jagiellonian University for hands-on training and collaborative research.
- SafePAS OÜ, Estonia, is a TalTech spin-off specializing in portable analytical instrumentation for drug and soil analysis. SafePAS will provide access to advanced prototypes and field-testing opportunities, supporting the commercialization path for the developed technologies.

Practical Impact

By enabling fast, mobile, and accurate drug testing in a wide range of environments, NOVTECH-DRUGS supports public safety, reduces healthcare costs, and enhances the efficacy of legal proceedings. Over time, the project aims to shift the forensic toxicology field toward more sustainable practices with a significantly lower environmental footprint.

Responsibilities and (foreseen) tasks

- Design and develop portable microfluidic systems for forensic applications
- Integrate and optimize fluorescence and capillary electrophoresis modules
- Conduct experimental validation using various biological sample matrices
- Use advanced instrumentation (e.g., LC coupled to mass spectrometry, capillary electrophoresis, and other techniques) for comparative studies for quantification and identification of drugs and their metabolites
- Assist in coordinating joint projects and knowledge exchange with Jagiellonian University and SafePAS
- Collaborate with engineers and data scientists at SafePAS to integrate findings into portable detection platforms
- Publish scientific results and contribute to patents, if applicable
- Present findings at international conferences and stakeholder meetings
- Contribute to organizing research and practitioner workshops where project findings are presented
- Actively participate in the academic or corporate life of TalTech and Partners

We offer:

- A fully funded 4-year PhD position with access to state-of-the-art laboratory infrastructure
- Supervision by experts in toxicology, analytical chemistry, and device development
- Participation in a high-impact, cross-sectoral research collaboration with academic and industry partners
- Opportunities to travel, attend conferences, and join international research stays
- A chance to contribute to the development of life-saving drug detection tools for law enforcement and healthcare

The project will be conducted in cooperation with two universities, Tallinn University of Technology, School of Science, Department of Chemistry and Biotechnology, Smart Analytics Research Group, supervised by Dr. Jekaterina Mazina-Šinkar (TALTECH) and co-supervised by Dr. (habil.) Michał Woźniakiewicz, Professor (Associate) at Jagiellonian University, Faculty of Chemistry, Laboratory for Forensic Chemistry, Kraków, Poland.

The internship will be provided by SafePAS OÜ, an Estonian deep-tech company, Tallinn University of Technology spin-off, that specializes in the development of portable analytical devices for drug detection (e.g., Drug Hunter analyzer), collaborating with law enforcement agencies and forensic science institutes across Europe.

Link to the project: <https://taltech.ee/en/innochembio/mazina-sinkar>

3. Supervisory team

- Tallinn University of Technology (main supervisor): Prof. Jekaterina Mazina-Šinkar
- Jagiellonian University (Poland): Prof. Michał Woźniakiewicz (The PhD student will stay 6-16 months at the co-supervisor's lab as mutually agreed upon).

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.
- A master's degree in chemistry, analytical chemistry, chemical engineering, biomedical technology, or a related field.
- Experience in microfluidics, capillary electrophoresis, mass spectrometry, fluorescence spectroscopy, or forensic toxicology is highly desirable.
- Strong analytical, problem-solving, and hands-on laboratory skills.
- Motivation to work in interdisciplinary and applied research settings.
- Ability to work both independently and as part of a collaborative team.
- This project entitles work with illegal substances and if given the offer to join I must provide proofs of a clean criminal record issued by the competent authority in the country of origin, Estonia and Poland.
- Experience in:
 - capillary electrophoresis or electrochromatography;
 - chemical engineering and prototyping;
 - 3D printing and modelling;
 - working with biological matrices (e.g., saliva, exhaled breath).
- Knowledge of pharmacokinetics, metabolic pathways, or drug–enzyme interactions and software tools for data processing (e.g., MATLAB, Python, R).
- Previous active participation in national or international scientific conferences.
- Previous authorship of articles published in journals from the JCR list.

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/1025> or scan the the code on the left with your smartphone.