

Combining organocatalysis with borane catalysis for the synthesis of amino alcohols and diamines

Summary

The aim of the project is to implement classical organocatalytic approaches with borane catalysis, thereby unlocking novel reactivity that can revolutionize the synthesis of chiral amino alcohols and diamines. These motifs are widely represented in the structure of bioactive molecules and hold immense potential for applications in pharmaceuticals and beyond. As direct access to these motifs in an enantioselective manner is rare, a strategy enabling their synthesis in an atom-efficient approach would be highly valuable to the chemical community.

Research field:	Chemistry and biotechnology
Supervisor:	Dr. Mikk Kaasik
Availability:	This position is available.
Offered by:	School of Science Department of Chemistry and Biotechnology
Application deadline:	Applications are accepted between June 01, 2024 00:00 and June 30, 2024 23:59 (Europe/Zurich)

Description

Project Overview: Asymmetric organocatalysis utilizes renewable and less toxic small organic molecules as catalysts instead of transition metals and thus offers several advantages for industrial applications, where the need for rare metals is ever increasing. Borane-based frustrated Lewis pairs are also seen as alternatives to transition metals for the activation of small molecules. *This project's objective is to explore how to combine these two approaches and unlock novel reactivity for the atom efficient synthesis of valuable chemicals.* To demonstrate this the project aims to apply these novel approaches for the asymmetric synthesis of chiral amino alcohols and diamines, which are important scaffold found in bioactive molecules.

Position Details:

- **Location:** Tallinn University of Technology, Tallinn, Estonia
- **Duration:** 4 years (full-time)
- **Funding:** Full financial support, including stipend and research expenses
- **Starting Date:** Second part of 2024

Responsibilities and (foreseen) tasks:

- Development of novel methods for combining organocatalysis with borane catalysis
- Planning experiments for the project, carrying these out in a laboratory and analyzing the results
- Participation in group discussion and group meetings
- Contribute to dissemination of results relevant to the project (e.g. writing scientific articles, presentations and posters at international conferences, and workshops).
- Contribute to supervision of bachelor and master students
- Aid in organizational tasks relevant to the project

Applicants should fulfil the following requirements:

- a master`s degree or equivalent in chemistry, biochemistry, or related
- strong knowledge of organic chemistry and sufficient knowledge of relevant analytical methods
- Demonstrate competence and motivation to pursue postgraduate studies
- good command of English
- work experience in a research laboratory
- capacity to work both as an independent researcher and as part of an international team
- capacity to work on-site at TalTech campus

The following experience is beneficial:

- organocatalysis
- presentation skills

About the group: Our long-term goal is to push the boundaries of chemical reactivity in organic synthesis by leveraging on the synergism of different catalytic systems, mainly with asymmetric organocatalysis. Asymmetric organocatalysis and cocatalysis emerge as beacons of future technology, promising advancements that prioritize safety, efficiency, and minimal environmental impact. By harnessing the synergistic effects of different catalytic systems, we want to develop innovative processes that meet societal needs and align with the goals of sustainable chemistry.

Read more: <https://taltech.ee/en/departments-chemistry-biotechnology/division-of-chemistry/cocatalysis>

We offer:

- a fully funded 4-year PhD position, with employment at the Department of Chemistry and Biotechnology at TalTech as an early-stage researcher
- starting salary package with gross 22 000 EUR/year
- modern working conditions, with years of knowledge of asymmetric organocatalysis on site
- opportunities for conference visits, research stays and networking

With our guidance and supervision, the candidate will advance practical and theoretical skills in synthetic organic chemistry, especially in relation to asymmetric organocatalysis and borane catalysis, along with pertinent analytical (NMR, HPLC) skills. In addition, the candidate will develop and enhance transferrable skills, such as writing, communication, public speaking (preparation of scientific articles, presenting work at group meetings and conferences), problem-solving, project and time management (planning the experiments to reach the goal of the project, carrying out those experiments and analyzing the results).

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

Additional information

For further information, please contact Dr. Mikk Kaasik mikk.kaasik@taltech.ee



To get more information or to apply online, visit <https://taltech.glowbase.com/positions/746> or scan the the code on the left with your smartphone.