

To interested Master students
in Biotechnology and (Bio)Engineering

Vienna, 2026-03-27

Scale up of *Rhizobium radiobacter* production in defined animal-component free medium for use in transient expression of proteins in plants

Research internship and **Master thesis**
at the **Institute of Bioprocess Sciences and Engineering**

Dear interested Students,

Abstract: Plant molecular farming using *Nicotiana benthamiana* has emerged as a cost-effective, scalable platform for rapid pharmaceutical proteins production during emergencies. This technology relies on transient expression induced by the infiltration of the leaves with the bacterium *Rhizobium radiobacter*. However, industrial-scale deployment is limited by the massive quantities of *Rhizobium radiobacter* inoculum required. This thesis focuses on developing a low-cost, animal-free, and GMP-compliant culture medium optimized to maximize biomass density and productivity without compromising expression. A liquid handling robot will be utilized to automate the high-throughput screening of industrial-grade components, followed by a scale-up to lab-scale bioreactors. This transition will address critical engineering challenges, including maintaining oxygen transfer rates (k_{La}) and managing shear stress at high densities. Virulence capacity will be validated in both plant cell packs and whole plants. The final goal is to establish a robust, economically viable bioprocess for the large-scale production of infiltration-competent bacteria.

Tasks:

1. Media screening and kinetic growth monitoring using a liquid handling robot
2. High-throughput transient expression validation in plant cell packs
3. Liter-scale bioreactor cultivation to identify limiting factors (k_{La} , shear stress)
4. Optional: Development of feeding strategies for ultra-high biomass densities.
5. Write a glorious thesis and publication 😊👓

Duration: The initial internship will take 2-3 months and the master thesis will be 6 months. In the course of the project, weekly meetings with your supervisor as well as flexible on-demand meetings will ensure the success of your work. Monthly progress presentations improve scientific critique and exposition skills.

Requirements: The student successfully applying for this project has good basic knowledge in (bacterial and plant) biotechnology. Experience with bioreactors and coding (Python) knowledge is valued. Skill in written and spoken English is needed to get familiar with the relevant protocols and to fluently communicate within the international environment at IBSE.

Contact: For further questions and applications, please contact Johannes Buyel

Muthgasse 18, 1190 Vienna
T +43 1 476 54-79083
F +43 1 476 54-79009
johannes.buyel@boku.ac.at
www.boku.ac.at/dbt/ibse