Professorship for Bioprocess Engineering
TUM Campus Straubing
Technical University of Munich

Master Thesis

In situ Product Removal from Fermentation Broth via Pressure Swing Adsorption

Hydrolysis can make renewable raw materials such as lignocellulosic residues accessible to microorganisms. The production of so-called second-generation (2G) hydrolysates is well established at BVT lab. However, the further utilization of 2G hydrolysates as sugar-rich substrates in fermentation processes introduces new challenges. Especially during the fermentative production of bio-based platform chemicals, microorganisms often tolerate inhibitory compounds but show low tolerance towards the product. Thus, the development of innovative fermentation strategies is necessary to overcome such challenges, ultimately promoting the utilization of renewable raw materials and accelerating the shift towards a sustainable and circular bioeconomy.

Aim of the thesis

The aim of the thesis is the development of an innovative process for *in situ* product removal from fermentation broth via pressure swing adsorption.

To achieve this aim, the thesis is divided into three work packages:

1) Commissioning of the specialized pressure swing adsorption device.
2) Production of 2G hydrolysates from lignocellulosic residues following an established SOP.
3) *In situ* product removal from fermentations with 2G hydrolysate as substrate (2 L bioreactor scale).

Findings from literature research will complement the overall process development.

Requirements

- Proactive way of working
- Independent planning of experiments
- High motivation
- Practical problem-solving skills
- Advanced laboratory skills
- Basic fermentation skills
- Basic analytic skills (e.g., HPLC)
- Team player

Application

Please send your application documents (CV and Cover Letter) to **M. Sc. Nico Geisler** (nico.geisler@tum.de) by **October 24th, 2025**. Feel free to reach out to him with any questions regarding this position.

Start of the project: November 2025