Chair of Bioseparation Engineering TUM School of Engineering and Design Technical University of Munich



Bachelor's/ Master's/ Semester Thesis

Design of carbon composite electrodes for potentialcontrolled chromatography

Keywords: sustainable processes, process development, electrode design, electrosorption, carbon electrodes

Project Description

Chromatographic techniques are a vital component of biopharmaceutical separation and recovery. However, traditional chromatography methods are expensive, wasteful, and require complex procedures to bind and elute target molecules. We aim to



develop an innovative separation process using carbon composite electrodes, that can be influenced in their surface charge and binding character simply by applying an electrical potential.

This project is focused on functionalizing carbon composite electrodes for use in preparative separation processes, tuning their material properties, and optimizing their process performance. With this new technology, biomolecule purification can be made more sustainable, efficient, and cost-effective.

Äkta pure – preparative chromatography plant

Within this project you will have the opportunity to:

- Learn how to develop and optimize industrial relevant separation processes
- Conduct material design, characterization and process optimization using various methodologies
- Work in a interdisciplinary team combining material research and process development within a biotechnological and electrochemical context

Profile

Structured and independent work
Maker spirit
Chemical-, bioprocess-, mechanical-, medical-, engineering, or similar *Ideal, but not required*:



• Lab experience

Tasks

- 1. Design and optimization of carbon electrodes
- 2. Material and process characterization
- 3. Application of self-designed electrodes on a preparative chromatography plant
- 4. Methods & devices: Chromatography, electrochemical characterization, 3D printing, BET, REM, EDX, DLS, IR, Raman etc...

Start: flexible



Left: Potential-controlled chromatography application Right: Carbon composite electrodes





