



Bachelor-/ Master-/ Semester thesis:

Innovative Bioseparation: Potential-Controlled approach for Gene Therapeutic Separation

Keywords: Therapeutic plasmid DNA – Potential-controlled bioseparation – Modeling – Process Development

Project description

Nucleotide-based gene therapeutics, including mRNA and viral vectors are currently highly relevant and rapidly growing areas in medicine. The goal of this project is to further develop a potential-driven chromatographic system for the purification of nucleotide-based therapeutics that eliminates the need for solvents or salts. For this purpose, carbon-based composite materials with high binding capacity will be tested as innovative chromatographic materials. Besides environmental, process, or material factors, the focus is on industrial implementation. The project includes various analytical tools to verify the plasmid's integrity and activity during the process. To understand the physical interactions, the experimental data will also be used for mathematical modeling of the adsorption and desorption behavior and applied in COMSOL. The development of a flow cell module for the ÄKTA chromatography system is one of the next steps.

Research objective

- Static/Dynamic adsorption and desorption experiments
- Material characterization
- Flow cell module design (3D print)
- Testing conditions (buffer systems, potential, and flow)
- Analytical methods: DLS, Zeta, CE, Gel electrophoresis, HPLC
- Process development & Modeling

Profile

- Structured and independent workflow
- Motivation to implement own ideas
- Student in the field of Bioprocess-, Biochemical- Physical - Chemical-, Mechanical-, engineering, or similar

Ideal, but not required:

- Lab experience

Thesis topic: adjustable according to interest & profile
Start: flexible

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Conductive material

Sample flow

