



GE Healthcare Life Sciences provides products and services used as tools for biopharmaceutical manufacturing, drug discovery and the latest in cellular technologies, thereby enabling our customers around the world to be more productive, effective and innovative.

Master thesis work will be for spring 2020. Deadline for application is 15th November 2019.

Master thesis work:

“Novel approaches to the pore structure in materials in downstream bioprocessing”

Project:

Modern biopharma produces a plethora of novel active biomolecular substances, ranging from small peptides to large viruses. In downstream bioprocessing we selectively capture the desired biomolecule from a complex mixture. One of the main tools for that is chromatography where a porous functionalized matrix selectively binds the target molecules.

The performance of chromatographic materials produced by GE Healthcare in Uppsala is ultimately dependent on the pore structure of the matrix. Characterizing that is difficult, particularly for liquid-filled materials. The Master Thesis project (examensarbete) presented here is aimed at developing new methods based on spectroscopic approaches. The principle exploited already in, for example, size exclusion chromatography is simple – smaller pores permit smaller molecules to enter them. A new approach, tested and shown promising in a preliminary study (1), is as follows: soak the porous matrix in a solution of a polydisperse polymer and detect how the smaller polymers that get into the pores become depleted in the solution. This can be detected by methods such as diffusion NMR and inelastic light scattering that are sensitive to the size distribution of polymers in solution. The goal is to characterize the pore structure in chromatographic materials at a fraction of both cost and time compared to any other currently available method.

During this thesis work, your task will be to develop and optimize the proposed new methodology toward adaptation in quality control (QC). The project requires good basic knowledge of spectroscopic methods, interest in and enthusiasm for physical chemistry and/or bioprocessing, a systematic and analytic mind and endurance. GE Healthcare contributes with outstanding supervision and world-class instrumentation.

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(1) F. Elwinger, J. Wernersson and I. Furó, Quantifying size exclusion by diffusion NMR: A versatile method to measure pore access and pore size, *Anal. Chem.* 90 11431 (2018).