

Diplomarbeit / Masters Project

Project Summary:

Magnetic Ion Exchange (MIEX) for fouling control in nanofiltration

Fouling is a major problem in nanofiltration (NF) process for water treatment. Membrane fouling results in deterioration of membrane performance. Natural organic matter (NOM) is ubiquitously present in natural waters and it is one of the most potent foulants. Water chemistry, such as pH and the presence of dissolved cations (such as calcium) has significant effect on membrane fouling as foulant-foulant interaction and foulant-membrane interaction are strongly affected.

MIEX particles have higher kinetic rates of adsorption of NOM that is mainly removed through ion exchange with chloride ions at the active sites on the resin surface. Uncharged micropollutants partition through affinity interactions into the ion exchange resins. Under certain water chemistry conditions (such as varying pH, ionic strength and organic matter content) may desorb from the material.

The aim of this project is to carry out experiments that help understand the interaction mechanism of MIEX and micropollutants/NOM for controlling fouling in the combined NF/MIEX process. The following task will be performed:

- Literature review on the topic (MIEX, NF, NOM, micropollutants; endocrine disrupting chemicals (EDCs); ion exchange and adsorption processes)
- Perform MIEX-NF experiments with micropollutants
- Analyse water samples from experiments with relevant analytical instruments following calibration and validation
- Analyse data and write/co-author a research publication (in English)
- The topic builds on previous projects from which publications are available.

Required Skills:

Studies in Chemical/Process Engineering or equivalent (Uni, TH)

Basic knowledge in polymer chemistry, water treatment technologies, membrane technology. Evidenced writing skills in English language, proficiency with Origin Labs software for data analysis and graphing, willingness to lead or contribute to the writing of a scientific publication.

Institute/ Dept:

Institute for Functional Interfaces (IFG) / Membrane Technology Department & Department of Advanced Polymers and Biomaterials

Start Date:

Flexible/negotiable

Application Procedure:

Please email CV, transcripts and motivation letter with available time period for evaluation.

Project Supervisor(s):

Dr. Alessandra Imbrogno: alessandra.imbrogno@kit.edu
Prof. Dr.-Ing. Andrea Schäfer: andrea.iris.schaefer@kit.edu
<https://www.ifg.kit.edu/english/3803.php>

