Master Project (6 months)

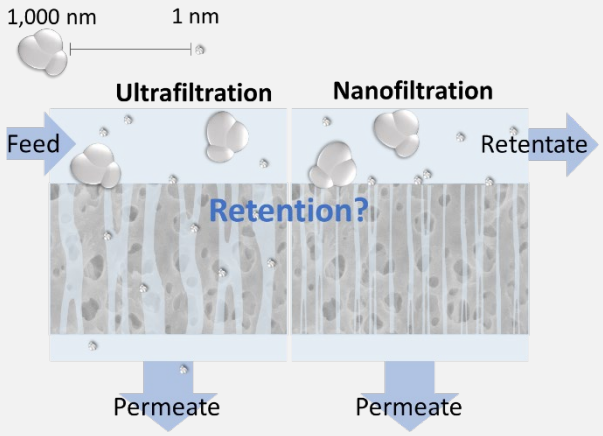
Inline quantification of nanoplastics retention during membrane filtration

Project

Nanoplastics are ubiquitous in global drinking water sources, with mounting evidence of negative health impacts from exposure. Based on pore size, ultrafiltration (UF) and nanofiltration (NF) membranes represent ideal technologies for the removal of nanoplastics during drinking water treatment. However, the behaviour of nanoplastics in treatment systems and analytical methods are yet to be determined. In addition to potential removal challenges, the accumulation of retained nanoplastics on the surface of UF and NF membranes over extended operating periods may result in membrane fouling and reduced water production. During typical membrane operation, hydraulic cleaning is utilized as a fouling control method, but only limited results are available regarding hydraulic cleaning efficiency for control of fouling by nanoplastics.

Using a novel method for the online quantification of nanoplastics, this project aims to determine the retention of nanoplastics and subsequent release during hydraulic cleaning using UF and NF membranes. Outcomes of this project will provide currently unavailable knowledge regarding monitoring and removal technologies for effective treatment of nanoplastics in drinking water. Specific project tasks will include:

- Determine the size, shape, surface charge, and surface morphology of nanoplastics using advanced particle characterization techniques
- Perform experiments using a bench-scale membrane filtration system to quantify the retention of nanoplastics during membrane permeation and backwash
- Analyse experimental data and contribute to writing a joint research publication (in English).



Qualifications

The project is the final research project in a Master's degree. The candidate will be studying for a Master's in Chemical, Process, Environmental Engineering, or equivalent, and is naturally curious, eager to learn, and has a strong interest in research. Basic knowledge of water chemistry, water treatment processes, and membrane technology is essential. Evidence of writing skills in English language, ability to learn/use OriginLab for data analysis/graphing as well as EndNote for literature management, and the willingness to lead or contribute to writing a scientific publication are a must.

KIT

KIT is one of the biggest research institutions worldwide and has access to state-of-the-art research facilities. This project is hosted by the relatively new Institute for Advanced Membrane Technology (IAMT) in new laboratories and state-of-the-art equipment. IAMT is part of the Division Earth and Environment at KIT and the Faculty of Chemical and Process Engineering. The research team is international and the language is English (oral and written communication)

Contact

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Applications

Please send applications with CV, motivation letter interests and preferred start date, academic transcripts, and degree certificates.

Start Date

Flexible/negotiable.