

Diplomarbeit / Masters Project

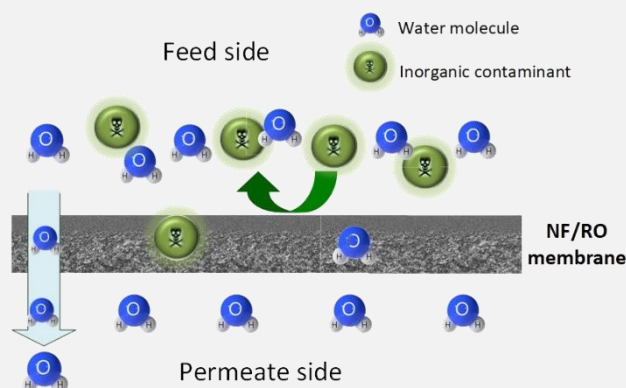
Project Summary

Removal of inorganic water contaminants by nanofiltration (NF) and reverse osmosis (RO) technologies

Nanofiltration (NF) and reverse osmosis (RO) technologies are widely used for drinking water production. RO membranes are applied for water desalination giving their ability to remove monovalent salts up to ~99%, while NF membranes are commonly used to remove micropollutants and treatment of natural waters contaminated by inorganics such as fluoride, nitrates and arsenic.

In treatment plants, NF/RO membranes are typically designed for continuous operation without considering water quality variations. However, in locations with extreme climate variability, NF/RO membranes can face radical variations in terms of hardness, salinity as well as the content of natural organic matter (NOM). Such variations can therefore affect the separation process, energy consumption and ultimately operational costs.

The aim of this project is to carry out experiments to evaluate the resilience of NF/RO membranes to remove inorganic water contaminants (e.g. fluoride, arsenic, nitrate) with varying water salinity, hardness and in presence of NOM. NF/RO separation mechanisms will be also investigated.



The following specific task will be performed as part of the project:

- Literature review on NF/RO technologies and their applications to remove inorganic contaminants like fluoride, arsenic and nitrate; transport mechanisms in NF/RO membranes; system resilience of membrane processes; application of such technologies in international development (e.g. sub-Saharan Africa).
- Perform filtration experiments using a cross flow filtration system designed for NF/RO membranes and operate analytical equipment for the analysis of inorganic contaminants and organic matter
- Analyse experimental data and write/co-author a research publication (in English) and take part in IAMT team activities

Required Skills

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

Basic knowledge in water treatment technologies, membrane processes, water chemistry, water analysis. Evidenced skills in English language, ability to learn/use Origin Labs software for data analysis/graphical design and Endnote for literature management, willingness to lead or contribute to the writing of a scientific publication.

Institute

Institute for Advanced Membrane Technology (IAMT), Bldg 352 Campus North

Start Date

Flexible/negotiable

Application Procedure

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

Project Advisor(s)

Dr. Youssef-Amine Boussouga: youssef-amine.boussouga@kit.edu
Prof. Dr.-Ing. Andrea Iris Schäfer: andrea.iris.schaefer@kit.edu, <http://iamt.kit.edu/>