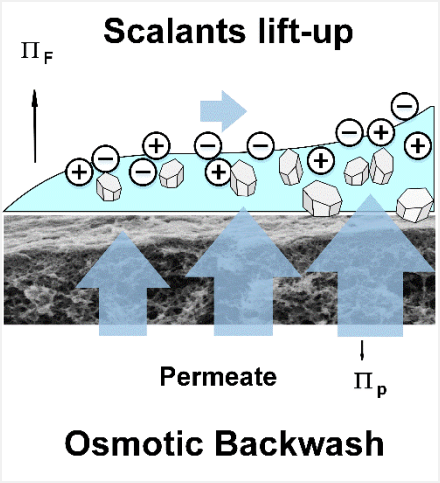
Karlsruhe Institute of Technology

Diplomarbeit / Masters Project

Project Summary	**Impact of osmotic backwash during solar irradiance fluctuations on Nanofiltration/Reverse Osmosis scaling** Decentralized directly coupled photovoltaic-powered Nanofiltrration/Reverse Osmosis (PV-NF/RO) systems are a promising solution for groundwater desalination in off-grid rural areas such as developing countries. In such systems, mineral scaling developing on membranes is a common challenge that results in loss of membrane performance and an increase in energy consumption. On the other hand, solar irradiance fluctuations cause non steady state operations that lead to the occurrence of direct osmotic backwash (OB). OB is a potential self-cleaning method to mitigate scaling and maintain membrane performance. The impact of OB on scaling during the solar irradiance fluctuations is to date unclear and will be the main purpose of this study. The aim of this project is to carry out a range of scaling and OB experiments under variable solar irradiance fluctuation conditions to evaluate the cleaning effectiveness of OB as a self-cleaning method for mineral scaling. The following specific tasks will be performed as part of the project: • Literature review on the topic (membrane scaling, cleaning methods for scaling, direct osmotic backwash mechanism, photovoltaic powered membrane system, etc.). • Prepare scaling solutions and perform scaling and OB experiments with a lab-scale macro cross-flow system powered by a solar array simulator (SAS). • Perform membrane autopsy (scanning electron microscope, deposited mass analysis) after scaling experiments to evaluate the cleaning effectiveness of OB. • Analyze experimental data and write/co-author a research publication (in English). 
Required Skills	**Studies in Chemical/Process Engineering or equivalent (Uni, TH)** Basic knowledge in water chemistry, water treatment process, membrane technology. Evidenced writing skills in English language, ability to learn/use Origin Labs software for data analysis and graphing 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, Hermann-von-Helmholtz-Platz 1, 76344 Eggenstein-Leopoldshafen
Start Date	Flexible/negotiable
Application Procedure	Please email CV, transcripts and motivation letter with the available time period for evaluation.
Project Advisor(s)	M.sc. Yang-Hui Cai: yanghui.cai@partner.kit.edu Prof. Dr.-Ing. Andrea Iris Schäfer: andrea.iris.schaefer@kit.edu **https://www.iamt.kit.edu/**