

Project

Development and Application of Functional Regenerative Nanomembranes

This PhD project builds on two ongoing research projects that explore novel materials and membrane preparation methods for high-efficiency functional membrane development in water treatment. The goals of the project will be i) develop novel membrane materials (nanofibers or flat sheet), ii) explore options of material functionalization to achieve membrane regeneration, iii) investigate membrane fouling, iv) lab scale application of the novel membranes to micropollutant removal from water, and v) application to water treatment with real water. Modelling aspects are open to exploration at molecular and process scale. There are many aspects of this project that require in-depth basic research, including:

- ◆ What is the mechanism of micropollutant adsorption & desorption of contaminants in-situ in a functionalized membrane?
- ◆ What is the most suitable functionality for micropollutant removal and fouling prevention in water treatment applications?
- ◆ What are the mechanisms behind the reaction kinetics and membrane regeneration and how can such mechanisms be quantified?



The PhD project will be largely experimental and will begin with an identification of a set of research questions based on detailed literature survey. The preliminary research proposal required for application (with a timetable for the 3 to 4 year research project) will be further expanded to 4 main experimental chapters. Required equipment will be set up and further development of relevant analytical methods will follow. Execution of the research plan through conducting of experiments, sample and data analysis and write up of results for scientific publication are part of the PhD process – a journey to become an independent researcher!

The project is interdisciplinary and collaborative, there will be multiple travel opportunities for cooperation with international partners (Japan, France and Turkey), supervising bachelor and master students, giving oral presentations at conferences, writing high-impact journal articles, as well as contributing to teaching.

Qualifications

You are required a Masters in Chemical, Process, Environmental Engineering, or equivalent. Strong organic synthetic chemistry experience is an advantage. Experience with membrane filtration systems (of any scale) are desired, as well as being comfortable in specifying system components and sound experimental problem solving skills. You are a naturally curious person who is eager to learn more and has a strong interest in research. Excellent English language proficiency is essential; basic German language skills are a definite advantage.

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 Institute for Advanced Membrane Technology (IAMT) in collaboration with Prof. Dr. Pavel Levkin at the Institute of Biological and Chemical Systems (IBCS). The PhD will be registered in the Faculty of Chemical and Process Engineering.

Contact(s)

Prof. Dr.-Ing. Andrea I. Schäfer, Institute for Advanced Membrane Technology (IAMT), +49(0)721 608 26906, Andrea.Iris.Schaefer@kit.edu, <https://www.iamt.kit.edu>

Prof. Dr. Pavel Levkin, Institute of Biological and Chemical Systems (IBCS), levkin@kit.edu; <https://fms.ibcs.kit.edu/index.php>

Application

Please send applications with CV, publication list and your contribution to the publication (if relevant), academic transcripts, degree certificates, contact details for three references and a preliminary research proposal. A valid driver's licence will be required.