

### Project

This PHD project relates with ongoing research projects in the area of electrochemical membrane processes as well as renewable energy powered membrane processes, in particular solar powered electrodialysis at IAMT. The removal of inorganic contaminants such as nitrate, arsenic, selenium, uranium and fluoride is a key priority. This project will explore the adaptation of new resin materials to an electro-deionization process. The project will include i) ion-exchange resin selection, looking beyond commonly used materials, ii) explore methods for modifying ion exchange membranes, iii) developing a filtration protocol, to have comparable results with other membrane based processes, and finally, iv) an application for the removal of priority contaminants in water treatment and reuse.

There are many aspects of this project, that require in-depth research and development, including;

- ◆ Feasibility studies on removal of contaminants in a modified EDI process
- ◆ Establishment of the most suitable materials capable of both ion-exchange and effective contaminant process
- ◆ Elucidate the predominant mechanisms such that both fundamental understanding and optimized process performance can be achieved

The PhD project will be predominantly experimental and will begin with an identification of a set of research questions based on a detailed literature survey. A preliminary research proposal is required for the application stage with a timetable for a 3-4 year research project. Equipment will be set up and further development

of relevant analytical methods will be established. Development of suitable models to explain the results obtained drawing of interdisciplinary and potentially multi-scale approaches will be an opportunity to integrate experiment and model. 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!

Throughout the project, there will be multiple opportunities for cooperation with internal and external partners, supervising master students, giving oral presentations at conferences, writing high-impact journal articles, as well as sharing your knowledge via (a minimal amount of) teaching.



### Qualifications

You will most likely already hold a Masters in Chemical, Process, Environmental Engineering, or equivalent. You are a naturally curious person who is eager to learn more and has a strong interest in research. Experience with membrane filtration and electrochemical systems (of any scale) is a definite advantage, as well as being comfortable in specifying system components and sound experimental problem solving skills – as well a good common sense. Excellent English language proficiency is essential, basic German language skills of advantage.

### KIT

KIT is one of the biggest research institutions worldwide and has access to state-of-the-art research facilities resulting from the merger of the National Research Centre of the Helmholtz Association and the former Technical University of Karlsruhe. This project is hosted by the new Institute for Advanced Membrane Technology (IAMT). The PhD will be registered in the Faculty of Chemical and Process Engineering.

### Contact

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### Applications

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 to the above contact(s). A valid driver's licence will be required.