

PhD Position (Doktorarbeit) Sustainable water supply for green hydrogen production

Project

This PhD project focuses on provision of high quality treated water for green hydrogen (GH₂) production. During GH₂ production, contamination of feed water by trace concentrations of inorganic ions and organic matter can cause defects in electrolyser stacks, resulting in costly process disruptions. This project considers: i) development of analytical methods for the quantification of priority contaminants relevant to GH₂ production, ii) characterization of alternative water supply sources (e.g. treated wastewater effluent) for GH₂ production, iii) laboratory investigation of advanced treatment technologies, such as nanofiltration, electro- and photocatalysis, and ion exchange for the removal of priority contaminants, and iv) identification of suitable membrane technologies for prospective water supply sources based on contaminant removal performance and specific energy consumption. Water-energy nexus, resource recovery, and circular economy feature in this project, and will be used to provide both context and guidance for research activities.

Specific research questions that will be addressed in this project include:

- ◆ What is the occurrence of priority contaminants in prospective water supply sources for GH₂ production?
- ◆ Which membrane processes are suitable for priority contaminant removal in specific water supply sources?
- ◆ What are the economic implications of membrane process selection in terms of overall costs to GH₂ production?

This project is mainly laboratory-based and will begin with identification of research questions from a detailed literature review focused on the requirements of water in GH₂ production from a technological, water quality, economic, and circular economy perspective. A preliminary research proposal is required for application, including a tentative timetable for the four-year project to be submitted to DAAD. Development of relevant analytical methods and setting up of required laboratory equipment will be conducted in parallel. Execution of the research plan by conducting 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!

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Qualifications

The candidate will hold a Master's in Chemical, Process, Environmental Engineering, or equivalent, and is a naturally curious person who is eager to learn and has a strong interest in research. Experience in the design, operation, or maintenance of membrane filtration systems (of any scale) is a definite advantage, as well as experimental problem solving skills and good common sense. Excellent English language proficiency is essential, basic German an advantage.

KIT/DAL

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 collaboration with Dr. Graham Gagnon of the Centre for Water Resources at Dalhousie University in Halifax, Canada. The PhD student will be registered at KIT in the Faculty of Chemical and Process Engineering and spend time in Canada. The IAMT research team is international and the language is English (oral and written communication).

Contact

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>.

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. A valid driver's licence is required.

