Institut für Angewandte Materialien
Elektrochemische Technologien
Adenauerring 20 b
76131 Karlsruhe

Master thesis / Student Research Assistant

Title of work

Research area

- ☐ Batteries
- ☐ Fuel cells and electrolysis
- ☐ Electrocatalysis
- ☒ Water electrolysis and CFD

Assignment

- ☐ Experimental
- ☐ Electrical Characterization
- ☐ Material analysis
- ☐ Development of measurement technology
- ☒ Modelling
- ☒ Simulation
- ☒ Literature Research

Course of study

- ☐ Electrical engineering and IT
- ☒ Mechanical Engineering
- ☒ Chemical Engineering
- ☒ Physics
- ☐ Techno mathematics
- ☐ Industrial Engineering

Language

- ☒ English
- ☐ German

Starting date

As soon as possible

Contact person

Pooria Hadikhani
Room 315
E-Mail: pooria.hadikhani@kit.edu

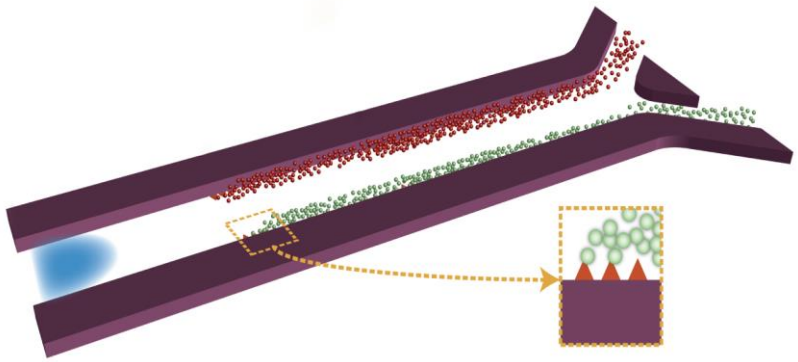
http://www.iam.kit.edu/et/

Motivation

Hydrogen's high energy density and its potential for a green lifecycle are the main drivers behind the ongoing development of the hydrogen economy. Water electrolyzers are the primary method used for producing green hydrogen. However, improvements in efficiency and throughput are necessary before electrolyzers can be widely adopted. Numerical models can accelerate the design improvements of water electrolyzers by providing information about physical phenomena that are not available through experimental tests. Additionally, these models can be used to optimize the design of electrolysis units.

We have developed numerical models to simulate two-phase flows inside water electrolyzers. The goal of this project is to extend this model to include the transport of species inside electrolyzers. Afterwards, the model will be used to study and simulate bubble nucleation. The experimental data are available for numerical simulation validation. The developed model will be used for the design optimization and fabrication of novel water electrolyzers.

A research assistant with monthly working hours between 20 and 30 is needed to perform the above-mentioned task. The project is flexible and the research assistant can bring her/his ideas. The duration of the project is at least six months. The knowledge of scientific programming is desired and the numerical model can be developed in C++ or Python.



Areas of responsibility:

- Determining the current state of the research in the field of transport of species in water electrolyzers
- Learning to use the available flow solver for multiphase flow simulation inside water electrolyzers
- Implementing the mass transport physical model in the flow solver

Application

The working hours are flexible. It is possible to work from home or work onsite. Please send your CV and transcripts to Pooria.hadikhani@kit.edu.