



Master Thesis

Method development for experimental characterization of PEM electrolysis via mass spectrometry

Research area

- Batteries
- Fuel cells and electrolysis
- Electrolysis / Power-to-X

Alignment

- Experimental
- Electrical Characterization
- Analysis
- Measurement method development
- Modelling
- Simulation
- Literature Research

Course of study

- Electrical engineering and IT
- Mechanical Engineering
- Chemical Engineering
- Physics
- Material Sciences
- Industrial Engineering

Language

- English
- German

Starting date

June/July / Upon agreement

Contact persons

Debora Brinker
Room 336
Tel: +49 721 608-48793
E-Mail: debora.brinker@kit.edu

Gözde Kardes
Room 336
Tel: +49 721 608-48155
E-Mail: goezde.kardes@kit.edu

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

Motivation

Hydrogen plays a central role in the energy transition and it is an excellent storage form for the energy generated from the renewable energy systems. In that regard, water electrolysis is a favorable hydrogen production method and polymer electrolyte membrane electrolysis (PEMEL) is of particular interest due to its high-power density, high-pressure operation possibility and partial load capability.

For the investigations on PEMEL cells, at IAM-ET a high-pressure test bench is developed, focusing on the electrochemical characterization of incremental single cells under system-relevant operating conditions (pressure of up to 50 bar, precise temperature control in between 40 and 90°C, current density of up to 8 A/cm²). In this test bench, different loss processes in the cell are to be identified and quantified using electrochemical impedance spectroscopy, cyclic voltammetry as well as mass spectrometry.



Task description

In this work, the implementation of a new measurement method for the in-operando characterization of the gaseous products of the PEM electrolysis using mass spectrometry is to be done.

The work is divided into the following work packages:

- Literature research
- Development and implementation of a measurement setup for in-operando characterization using mass spectrometry
- First measurements and optimization of the set up
- Measurement method development

Application

Enjoy an exciting topic in the field of sustainable and green energy technology and work together with a motivated and interdisciplinary team in a friendly working atmosphere. We offer excellent support throughout the duration of the master thesis. If we have raised your interest, please feel free to contact us. We kindly ask you to send your CV and current transcripts to goezde.kardes@kit.edu and debora.brinker@kit.edu. If you have further questions, do not hesitate to contact us.