



Master`s Thesis

Method Development for Catalyst Performance Analysis in PEM Water Electrolysis

Research area

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

Alignment

- Experimental
- Electrical Characterization
- Material analysis
- Development of measurement method
- Modeling & Simulation
- Literature Research

Course of study

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

Language

- English
- German

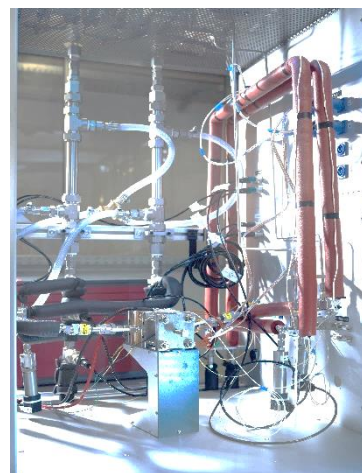
Starting date

June-July / Upon agreement

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Hydrogen plays a central role in the energy transition. Polymer electrolyte membrane water electrolysis (PEMWE) is a key technology for hydrogen production. The central research question is how to improve the performance and reduce degradation. Particularly, the water splitting reactions at the anode is the largest obstacle. Highly active electrocatalysts are, thus, needed to reach high conversion rates. For the development of such catalysts, it is crucial to understand the electrochemical processes and their changes during operation.



The topic of the master`s thesis will be to develop a method to perform cyclic voltammetry measurements at a PEMWE test bench, and investigate the reaction processes on electrocatalysts, limiting the catalyst performance. First, the given measurement method will be implemented into the test bench. Further, electrochemical measurements will be carried out in a full cell to determine the catalyst performance. Lastly, the method will be optimized and validated for reliable and reproducible data generation. The gained information will be used to deepen the knowledge on the catalyst performance and stability, the catalyst surface states and their limitations under realistic application conditions.

Areas of responsibility:

- Literature research
- Method development for cyclic voltammetry measurements at PEM electrolysis test bench
- Electrochemical measurements, e.g. cyclic voltammetry and impedance spectroscopy
- Method validation
- Evaluation and interpretation of the results

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`s thesis. Additionally, your work would be a valuable reference for the future vacancies at the institute. 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. If you have further questions, do not hesitate to contact Mrs. Kardeş.