Lehrstuhl für Energiesysteme
TUM School of Engineering and Design
Technische Universität München

ZAE BAYERN

Master's Thesis

(Experimentell)

NH_3-Utilizing Solid Oxide Fuel Cells for Green Power Generation
Impact of NH_3 on Stability of Anode Components

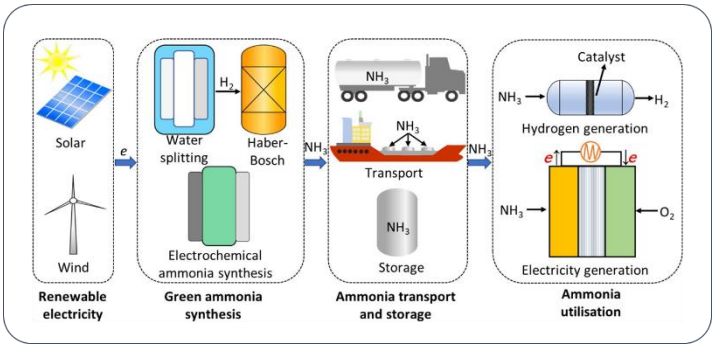
Description:

Solid Oxide Fuel Cell (SOFC) technology is considered one of the most efficient energy conversion technologies. However, the highly demanding storage and transport processes of H_2 are standing as major obstacles. In this regard, NH_3 is considered to be a quite promising H_2 carrier owing to its appealing thermo-physical properties. Also, NH_3 can be directly utilized in SOFCs, which can enhance the SOFC system efficiency significantly. However, direct utilization of NH_3 in a SOFC makes the system more complicated due to the ammonia decomposition reaction. Besides, NH_3 can react with the components within anode compartment, such as mesh, separator, etc., which reportedly results in various issues regarding the performance and durability of the SOFC.

In this study, we plan to investigate the stability of the anode components of potential materials under NH_3 atmosphere. One of the objectives of the study is to determine the most stable materials of the anode components under NH_3 atmosphere. The other objective of the study is to determine the operating conditions which minimize or eliminate the impact of NH_3 on the anode components. The interaction between NH_3 and anode components will be investigated through TGA (Thermo-gravimetric Analysis). After the TGA, the microstructures of the anode components will be inspected using SEM (Scanning Electron Microscopy) and chemical characterization techniques (EDX, XRD, etc.). Eventually, the study will reveal the stability of the potential anode components, and under what conditions these components can be safely operated, which will support the development of the direct NH_3-utilizing SOFCs.

Work Packages:

- TGA of the anode components of potential materials under NH_3 atmosphere
- Inspection of the components' microstructures using SEM
- Chemical characterization of components' microstructures using EDX, XRD, etc.



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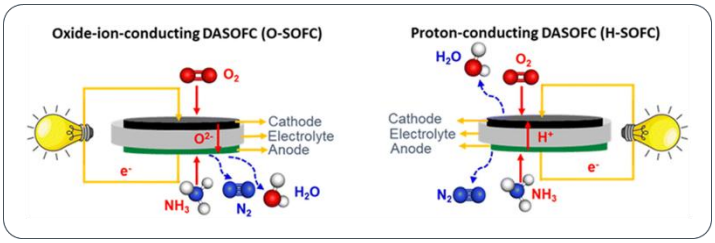

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