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| <input type="checkbox"/> Design exercise | <input checked="" type="checkbox"/> experimental |
| <input checked="" type="checkbox"/> Master's thesis | <input type="checkbox"/> design engineering |

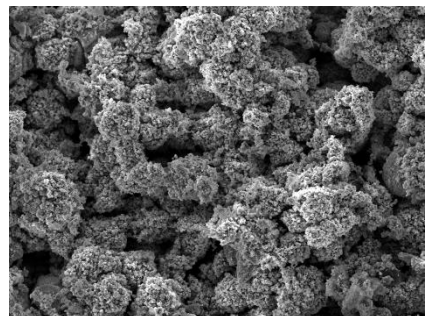
Master's thesis:

Development and characterization of novel synthesis methods for hydrogen production with metal-oxide oxygen carriers

The working group fuel cells and hydrogen recently introduced a **novel hydrogen production technology** to meet the stringent requirements for low-temperature PEM fuel cells in small-scale decentralized units. The method is based on the chemical looping principle, in which metal oxides are applied in a redox cycle to gain H₂ from renewable hydrocarbons.

Own scientific research in preliminary projects found **unique demands of the investigated process towards the applied oxygen carriers**: The metal oxides have to maintain their chemical and structural integrity, resist high-temperature sintering and provide mechanical robustness while at the same time being highly reactive towards the redox reactions.

The **aim of the master's thesis** is to investigate and characterize several state-of-the-art synthesis methods based on own experience and latest scientific literature. The materials are synthesized in-house and characterized concerning their longevity and kinetic properties via thermogravimetry (TGA), their morphology (SEM/EDX, XRD, MIP, BET) and their mechanical resistance. The most promising methods are further refined to fulfil the high requirements of the unique process scheme proposed at CEET. Within your master's thesis you will be involved in a **diversified and motivated team of researchers** and work in strong collaboration with your colleagues. The desired outcomes significantly advance the knowledge of the research group as well as the worldwide scientific community in a highly regarded subject.



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Info-Video: https://www.youtube.com/watch?v=gt_zMpluYik

Starting date: immediately