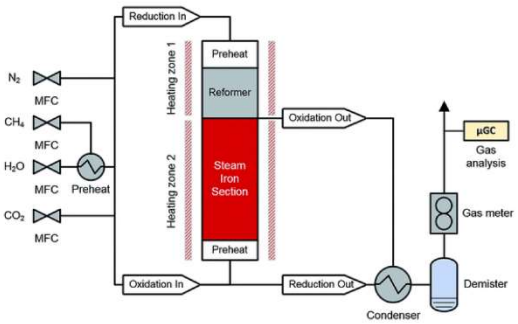
Experimental study on process intensification for chemical looping hydrogen processes by advanced inert support materials

Topic suitable for Master Thesis / Bachelor Thesis / Plant Design / Project Lab

The working group at CEET introduced the Reformer Steam Iron Cycle as a novel process concept to produce hydrogen. The process applies metal oxides to produce pure H_2 and CO_2 as products from renewable hydrocarbon feedstocks. Such concepts are referred to as chemical looping in scientific literature. Own scientific research found distinctive demands towards the applied oxygen carriers: The metal oxides must maintain their chemical and structural integrity, resist temperature-induced sintering and provide mechanical robustness while being highly reactive towards the redox reactions.

The aim of the master's thesis is to improve the sintering resistance and mechanical stability of the applied metal oxides. For that purpose, advanced inert support materials will be investigated in a holistic experimental parameter study. Based on these results, the preparation methodology is optimized, and a standard operation procedure (SOP) will be determined. Furthermore, the investigation of a novel approach for biogas and gasified biomass conversion is experimentally verified. Finally, the kinetic properties are characterized via thermogravimetry (TGA) and ex-situ methods characterize the morphology (SEM/EDX, XRD), mechanical resistance and carbon deposition within the unique chemical looping process scheme.

As a master student in the Working Group Hydrogen and Fuel Cells, you will be part in a team of experienced researchers, supportive PhD students and motivated master students working on the same topic. The research group supports you with expertise from ongoing international research cooperation and existing knowledge in chemical looping hydrogen production and material development.



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Starting date: Upon common agreement