

ICB PhD public presentations

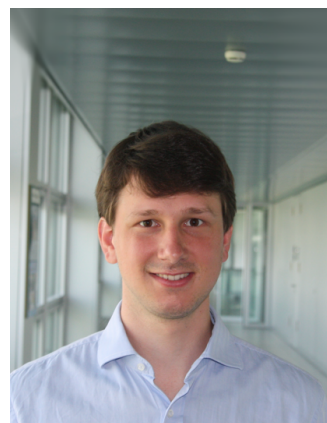
DEVELOPMENT OF A NOVEL CHEMICAL LOOPING HYDROGEN PROCESS FOR SEASONAL ENERGY STORAGE

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Supervisor: Prof. Dr. Wendelin Jan Stark

Co-examiner: Prof. Dr. Gonzalo Guillén-Gosálbez

ETH Hönggerberg, 07/07/2021, 2:00 pm
Zoom Meeting ID: 648 9671 3800

Project Summary: The main contribution of greenhouse gas emissions originates from fossil fuel energy production (coal, oil, natural gas). To reduce CO₂ generation, renewable power (e.g. solar, wind, hydro) has to progressively replace conventional power. As renewable energy generation heavily depends on environmental factors, production of renewable energy fluctuates on multiple time scales: hourly, daily and seasonally. Therefore, the transition towards a more sustainable energy system requires additional measures to match supply and demand at all times, such as peak shaving, loading shifting and energy storage. Seasonal energy storage allows to balance long-term variations in renewable energy availability. The focus of my PhD project is the development of a chemical-looping process for hydrogen storage as a novel alternative to existing seasonal energy storage technologies. Commercially available iron based pigments were identified and chosen in view of stability towards repeated reduction and oxidation with H₂ and H₂O, respectively. Two pilot-scale fixed-bed chemical-looping reactors were planned and built. Finally, the reactors have been operated to assess process performance and parameters for seasonal energy storage and release.

CV. Urs obtained his BSc. and MSc. in Chemical and Bioengineering from ETH Zurich. In 2017, he started his doctoral studies at the Functional Materials Laboratory.