

## SEMINAR SERIES

# HIGHLIGHTS IN ENERGY RESEARCH

14.12.2017, 10:30 - 11:30, ENERGYPOLIS Sion, 4<sup>th</sup> floor, Zeuzier room

## Hydrogen Technologies and Synthetic Fuels - From the Lab to the Market

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Two examples of pilot plants for the production of synthetic hydrocarbons are presented. First, the design and build of a demonstrator for the conversion of solar energy to synthetic hydrocarbons is presented. The average power of the installation is set to 2 kW, which corresponds to the global energy consumption of a single person. The main components of the system are photovoltaic cells, batteries, an electrolyser, a metal hydride storage and compression system, a CO<sub>2</sub> capture unit and chemical reactors. The installation allows studying the energy flows and reservoirs and the interaction between different components, comparing the performance of competing technologies and establishing an energetic and economic database from the real world. Further, the operating parameters such as pressure, temperatures and energy flows are recorded at different locations to enable for system modeling and advanced optimization techniques to be applied on real data. The second pilot plant aims at improving the overall energetic efficiency of gas metering and regulating stations positioned as interface between the transmission (50-70 bar) and distribution (5 bar) grids. The goal of this project is to combine the use of renewable waste heat with the production of synthetic methane in order to partially replace the conventionally used natural gas boiler. Waste heat from the electrolyser and the chemical reactor is recovered to pre-warm the incoming stream of natural gas prior to the expansion. The proposed system not only prevents the consumption of natural gas, but instead produces synthetic, renewable methane. Finally, the fundraising, founding and development of a tech startup (GRZ Technologies Ltd.) aiming at commercializing some of the technologies mentioned above will be presented.

### References:

[1] N. Gallandat, J. Bérard, F. Abbet, and A. Züttel, "Small-scale demonstration of the conversion of renewable energy to synthetic hydrocarbons," *Sustain. Energy Fuels*, 2017.



### CV: Dr. Noris Gallandat

Noris Gallandat graduated with a BSc in Mechanical Engineering from the Swiss Federal Institute of Technology Zurich (ETHZ) in 2012. He then went on to pursue graduate studies as a Fulbright Scholar at the Georgia Institute of Technology, where he obtained MSc and PhD degrees in 2015. His doctoral thesis focused on the enhancement of ambient heat rejection in passive thermal management systems. In 2016, he joined the Laboratory of Materials for Renewable Energy at EPFL Valais as a postdoctoral fellow. In March 2017, he co-founded GRZ Technologies Ltd., a tech startup aiming at commercializing hydrogen-related technologies.