Project Parameters	
Project Title	Experimental characterization of metal hydride cells under challenging conditions
Student	
Supervisor	
Supervisor (GRZ)	Arnaud Schuller (Head of Thermal Engineering)
Project Duration	6 months (100%)
Place of Work	GRZ Technologies SA, Route de la Plaine 47, 1580 Avenches
Official Project Start	

Description of the Company GRZ Technologies SA

GRZ is a deep-tech startup active in the field of hydrogen technologies. The company was founded in 2017 as a spinoff from EPFL and employs around 30 people. It is located in Avenches (VD) and operates its own materials laboratory and production workshop. GRZ is commercializing three lines of products: (i) Solid-state hydrogen storage systems DASH, (ii) thermo-chemical hydrogen compressors HyCo, and (iii) methanation reactors UPSOM.

The first line of product (DASH) has reached commercial maturity and is distributed internationally. References customers include Gruyère Hydrogen Power SA (Bulle, Switzerland), Gaznat SA (Aigle, Switzerland) or MOVE ON Energy GmbH (Witzniz, Germany).

The second and third product lines (HyCo and UPSOM) have been demonstrated at large scale and in an industrial environment. However, the standardization and commercial launch has not been completed yet.

Background Information on the Technology

The project proposed considers the thermo-chemical hydrogen compression technology HyCo and the DASH hydrogen storage systems. The technology is based on the use of metal hydrides and an active thermal management system which controls the pressure based on the needs of the user. GRZ has built several compressors based on this technology. The largest system is a 30 kg_{H2}/h unit compressing hydrogen from 10 bar to 200 bar. The system is installed on the site of Lonza in Visp (VS) and uses waste heat as a driving force.

A detailed description of the technology can be found in the publication cited below[1].

Project Description

GRZ has developed two main lines of product based on metal hydrides for two different purposes: hydrogen storage and hydrogen compression. While the technology and working principle are the same, the conditions and constraints on the material will vary greatly, mostly in terms of temperature, heat transfer conditions, pressures and hydrogen flow rates. Under low hydrogen absorption/desorption rates and therefore low thermal stresses, the system behave as expected from the simulations based on the data gathered. However, in more extreme conditions such as high temperature gradients or high hydrogen absorption/desorption rates, there are deviations between the simulations and experimental results. The goal of this thesis is to test these conditions in a controlled laboratory environment to better understand the behavior of metal hydride cells under demanding conditions and thereby improve our modelling tools.

The following tasks are expected:

- Literature review on metal hydrides, heat transfer and existing models
- Preparation of the experimental setup and plan the different conditions to test
- Experimental campaign
- Detailed analysis of results and comparison with existing metal hydride models

[1] *Application of hydrides in hydrogen storage and compression: Achievements, outlook and perspectives, J. von Colbe et al., Intl. Journal of Hydrogen Energy, 2019*

Made by	AS2	On	03.10.2025