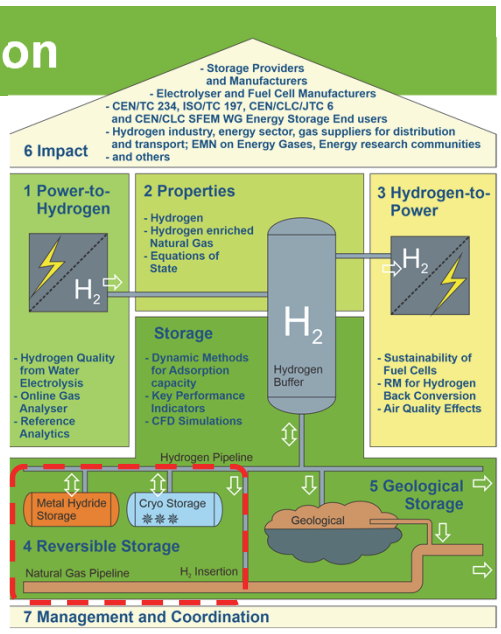
Metrology for Reversible Hydrogen Storage Technologies – Metal Hydride Storage, Cryo Storage (WP4)

MefHySto
Metrology for Advanced Hydrogen Storage Solutions

MAHYTEC SAS (France), Fundacion para el desarrollo de las nuevas tecnologias del Hidrogeno en Aragon (Spain), Max-Planck-Institut für Intelligente Systeme (Germany), Bundesanstalt für Materialforschung und -prüfung (Germany)

MefHySto Introduction

- Duration 2020–2023
- EU Funding 2.3 M€
- Coordinator BAM
- 14 Partners



- Ambitious new EU energy target of using 32 % of renewable energy by 2030
- Cannot be reached without advanced energy storage solutions, e.g., H_2 storage
- Measurement science is critical for realisation of this commitment
- Financial concerns of amount of hydrogen generated – stored – back-converted

Work Package 4 Introduction

- Dynamic Methods for Adsorption Capacity
- Storage Key Performance Indicators

WP lead MAHYTEC
partners MAX PLANCK INSTITUTE FOR INTELLIGENT SYSTEMS, BAM

Tasks

- Assess and harmonize key performance indicators for H_2 adsorption using dynamic methods
- Develop dynamic methods for H_2 ad/absorption capacity and influence of pollutants
- Develop reference materials and reference methods for H_2 ad/absorption capacity

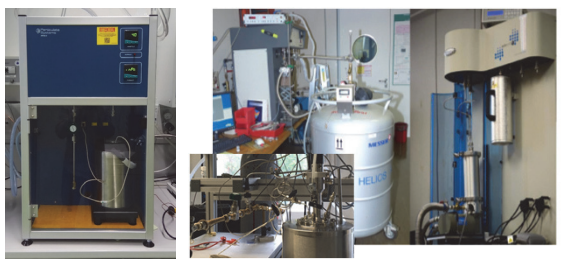


Figure 1: Cryo-adsorption labs @BAM and @MPI

Figure 2: Metal Hydride Storage Container @MAHYTEC

Storage Key Performance Indicators

Despite two decades of research, the dynamic methods for H_2 adsorption need to be harmonised, e.g., using reference materials.

- Metal hydride (an AB5 alloy) as well as metal-organic framework (MOF) material ZIF-8 were selected, purchased and verified
- Interlaboratory comparisons about to start

Figure 3: First gram scale batches of MOF Reference Material produced

Effect of Impurities

- The selection of pollutants was based on ISO 14687-2-2019, specifying the quality characteristics of hydrogen fuel in proton exchange membrane (PEM) fuel cell road vehicle systems.
- Most important impurities for metal hydride hydrogen compression process are O_2 and water vapour from electrolysis, or traces of CO_2 and CO from carbonaceous feedstock

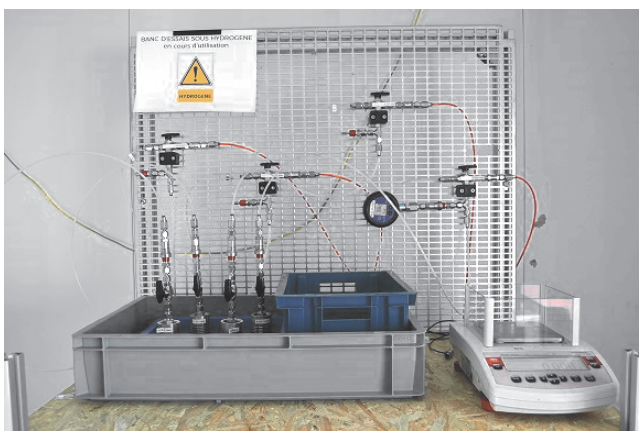


Figure 4: Experimental bench on the effect of some pollutants in hydrogen on metal hydride storage

Heat Conductivity Measurements

- Literature survey on thermal conductivity measurements completed
- Experiment stand for measuring relevant parameters will use the hot wire method

EMPIR EURAMET
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