HyCARE: Hydrogen CArrier for Renewable Energy storage

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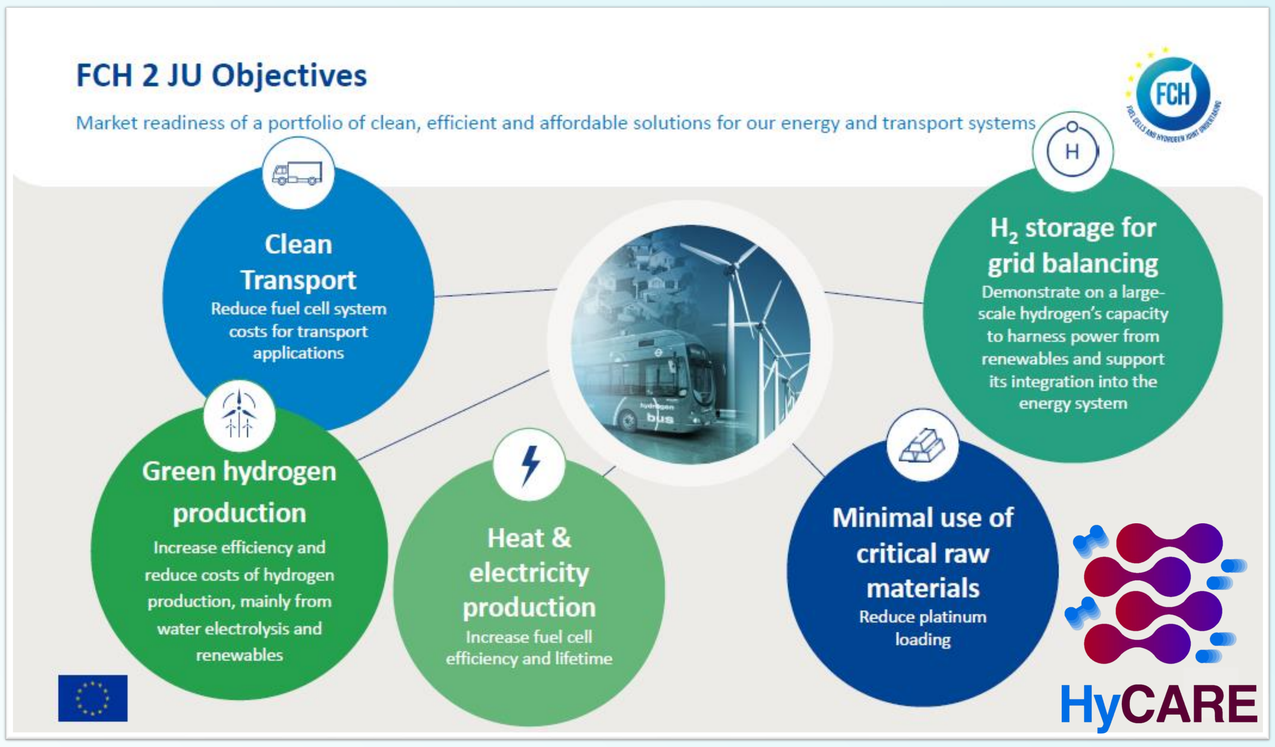
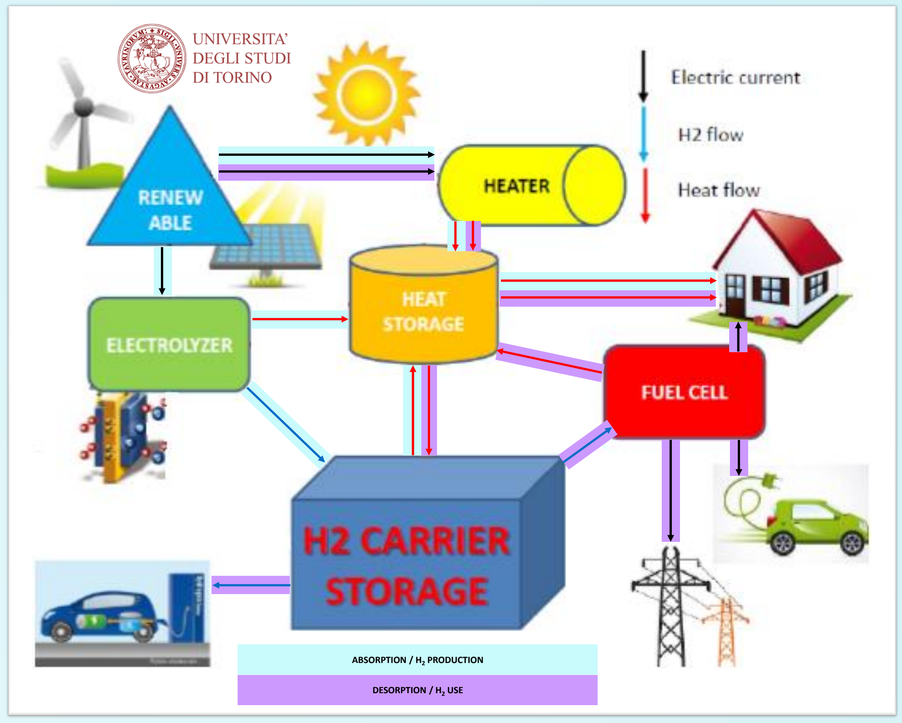
Motivation



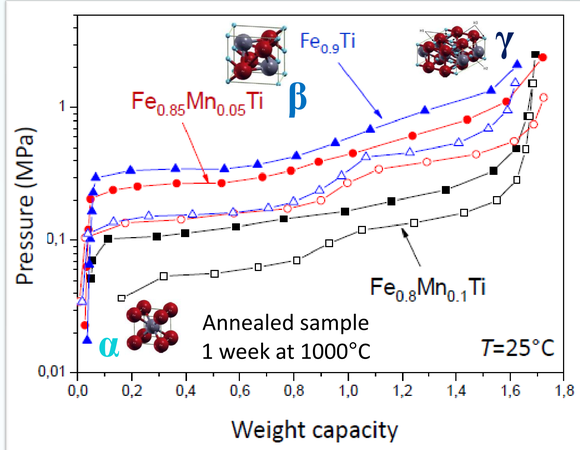
Goals

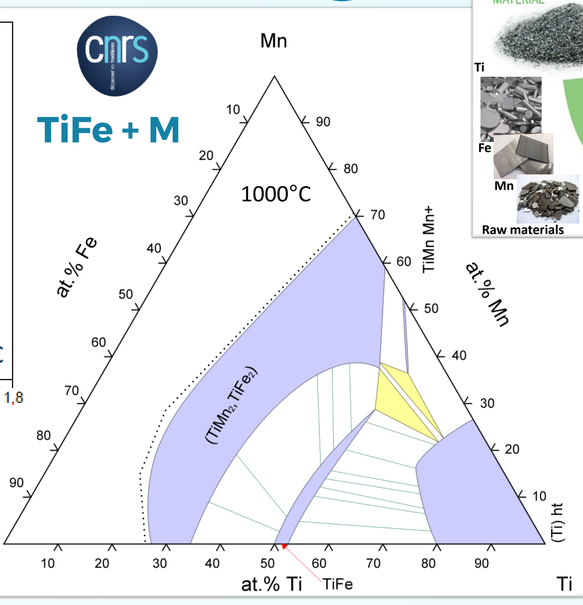
- Extending the use of **renewable energies**
- Demonstration of **large-scale applications**
- Storage of **50 kg** of H_2 under **mild conditions**
- Production of **5 tons** of metal powder for **solid-state H_2 storage**
- Innovative thermal management using **Phase Change Materials**
- High efficiency and **low footprint**
- Large European Partnership to build a
- Demonstrating system at the **Living Lab of ENGIE** in Paris

P_{abs} = 20 bar
P_{des}= 2 bar
T= 25, 40, 55 °C
Rev. Cap. 1.3 wt%
250 cycles
loss<0.2% per cycle

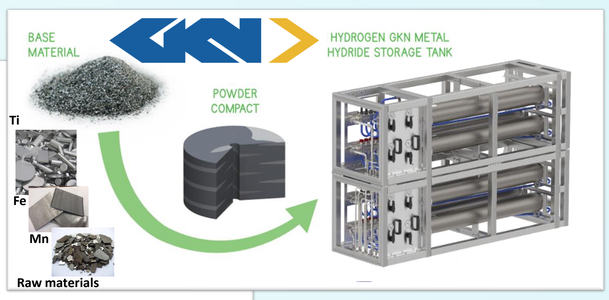


The Carrier: Optimisation and Processing



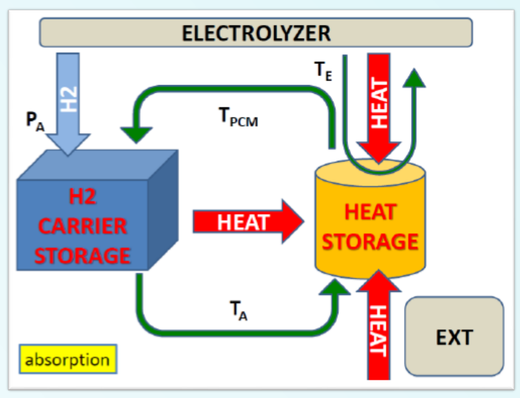


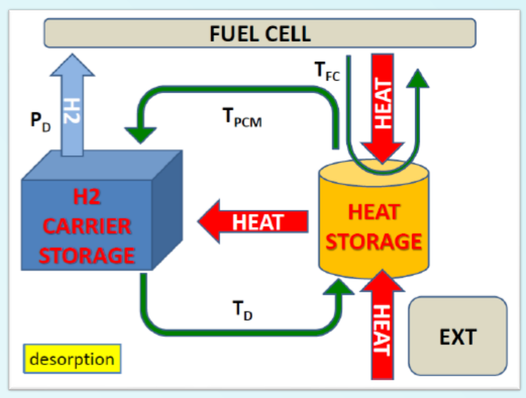
- Improvements of properties
- Tailoring composition and additives

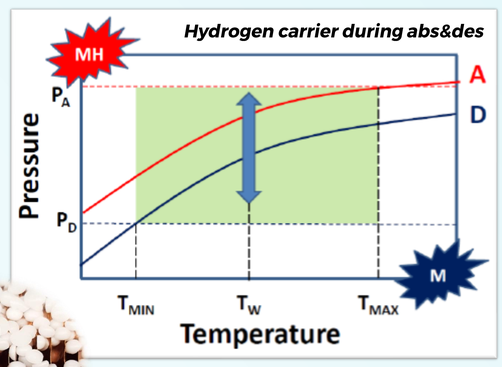


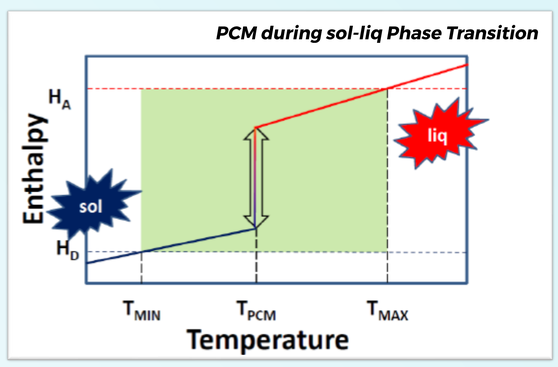
- Production

Phase Change Material & Thermal management





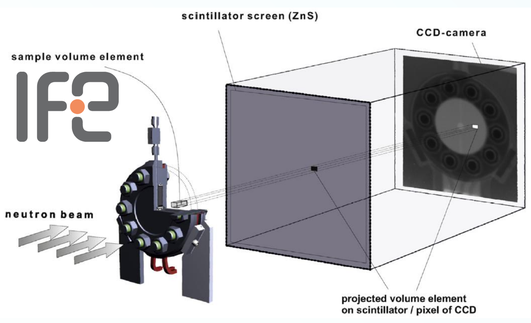


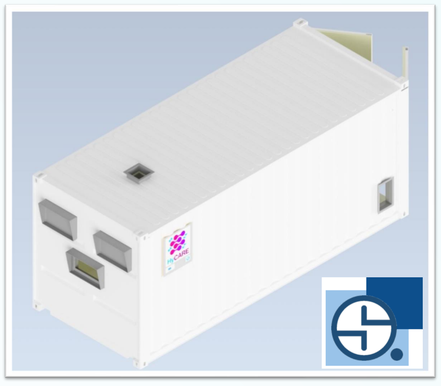


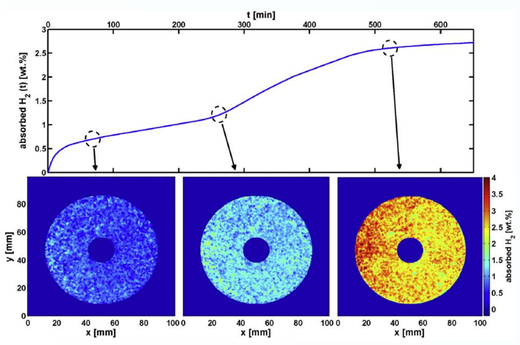
Organic PCM

TECNO DELTA

Solid-State Hydrogen Tank





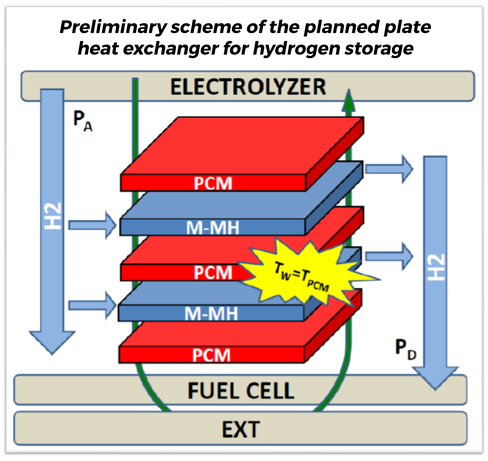


- In-situ neutron radiography
- Ex-situ tomography
- Characterization
- Design
- Test

Helmholtz-Zentrum Geesthacht
Centre for Materials and Coastal Research

- Development
- Construction
- Fabrication
- Implementation
- Installation

Modelling & Integration



- Stationary & Dynamic modeling
- Best solution
- PFD and P&ID drawing of the system
- Control strategy
- Safety
- Management of hydrogen flows:
  - Electrolyser
  - Fuel cells & Tank
  - Ancillaries (buffer, purifier…)
- Thermal exchange
  - Storage system & PCM
  - Cooling/heating fluids

FONDAZIONE BRUNO KESSLER

ENGIE

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TECNO DELTA
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UPEC

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