Advances in Energy Storage and Hydrogen Purification Technology

Technical Lead: Donald Ryland

Objectives: Develop materials, processes and models for large scale energy storage and hydrogen purification

Expected Outcome: A novel material or process suitable for storing hydrogen in large quantities for certain applications

Work Performed in First Six Months

- Refined the process conditions of making magnesium-based materials for hydrogen storage
- Prepared and tested a new catalyst for dehydrogenation of liquid organic hydrogen carrier (LOHC)
- Reviewed the published information relevant to thermal energy storage using phase change materials (PCMs)
- Identified potential Canadian locations of natural hydrogen and for underground hydrogen storage

Test rig for Mg-based materials

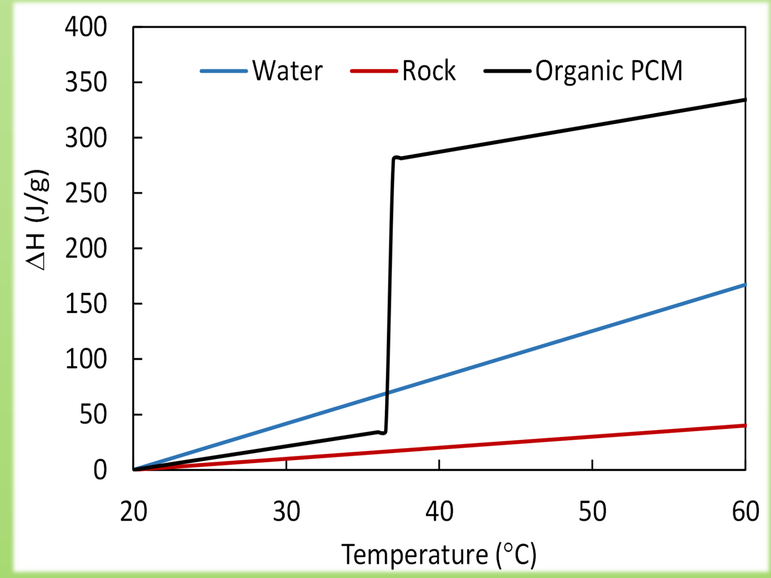
Test rig for LOHC materials

Achievements:

- CNL magnesium-based material showed minimal capacity drop even after 150 cycles of hydrogen adsorption/desorption.
- CNL in-house catalyst demonstrated satisfactory performance for dehydrogenation of LOHC.
- Natural hydrogen has been found to be present in Sudbury and Timmins area.

Future Work:

- Study the scale-up options for magnesium-based hydrogen storage materials.
- Assess hydrogen purification technologies for certain applications.
- Develop a techno-economic analysis tool for energy storage systems.
- Demonstrate a practical hydrogen storage system in laboratory.



Enthalpy change for a PCM

Federal Stakeholders:
Natural Resources Canada