

Thermal Conductivity Characterization for Hydrogen Storage Materials

Simplifying **thermal conductivity** testing for the materials of tomorrow.





C-THERM

TYPE:	PRESSURE VESSEL
MFG YEAR:	2018
SN:	P025
MAX PRESSURE:	55 BAR (800 PSI)
MAX TEMPERATURE:	100 C
MATERIAL:	STAINLESS STEEL 304
INTERNAL VOLUME:	100CC
MIN WALL THICKNESS:	10.5mm
SS BOLTS TORQUE:	15 N-m

Thermal Conductivity of Magnesium Hydride



Jacques Huot¹ and Adam Harris*²,

¹ Institut de Recherche sur l'Hydrogène, Université du Québec à
Trois-Rivières, Québec, Canada

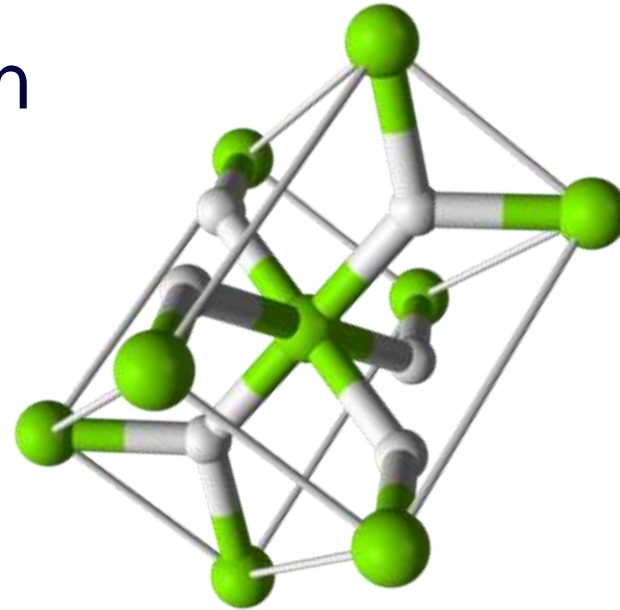
²C-Therm Technologies, Fredericton, New Brunswick, Canada

North American Thermal Analysis Society (2010)

C-THERM

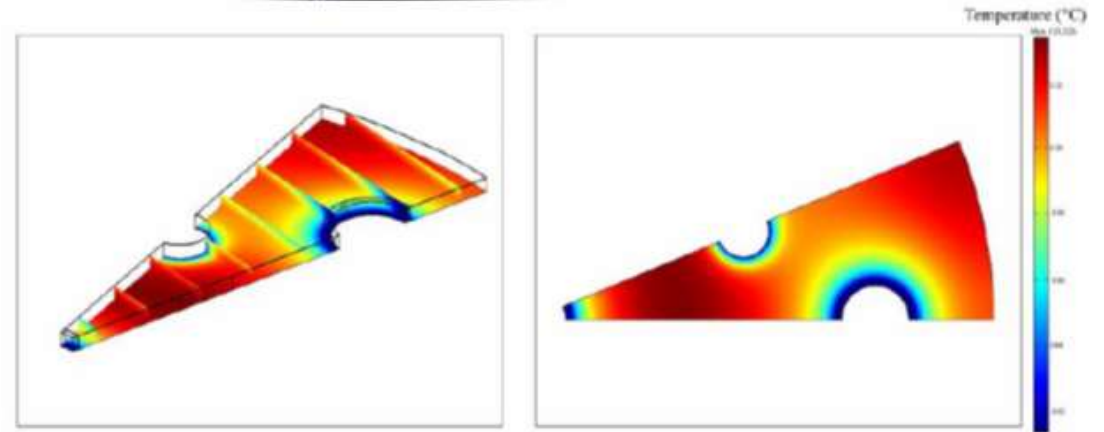
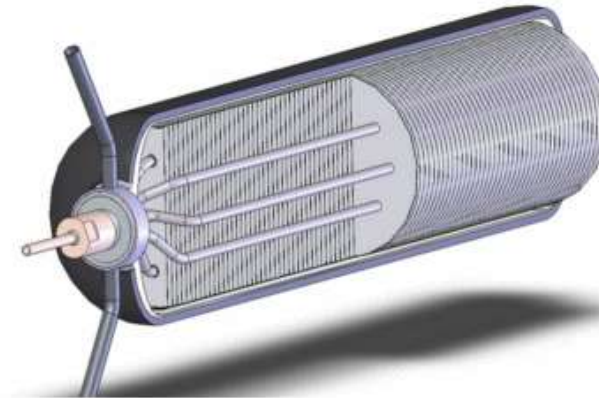
MAGNESIUM HYDRIDES

- Shows potential as a reversible "storage" medium for hydrogen which has led to interest in improving the hydrogenation and dehydrogenation reaction kinetics.
- Challenges:
 - High temperature of operation
 - Relatively slow kinetics
 - Cost (\$)
 - Resistance to cycling
 - Heat transfer issues

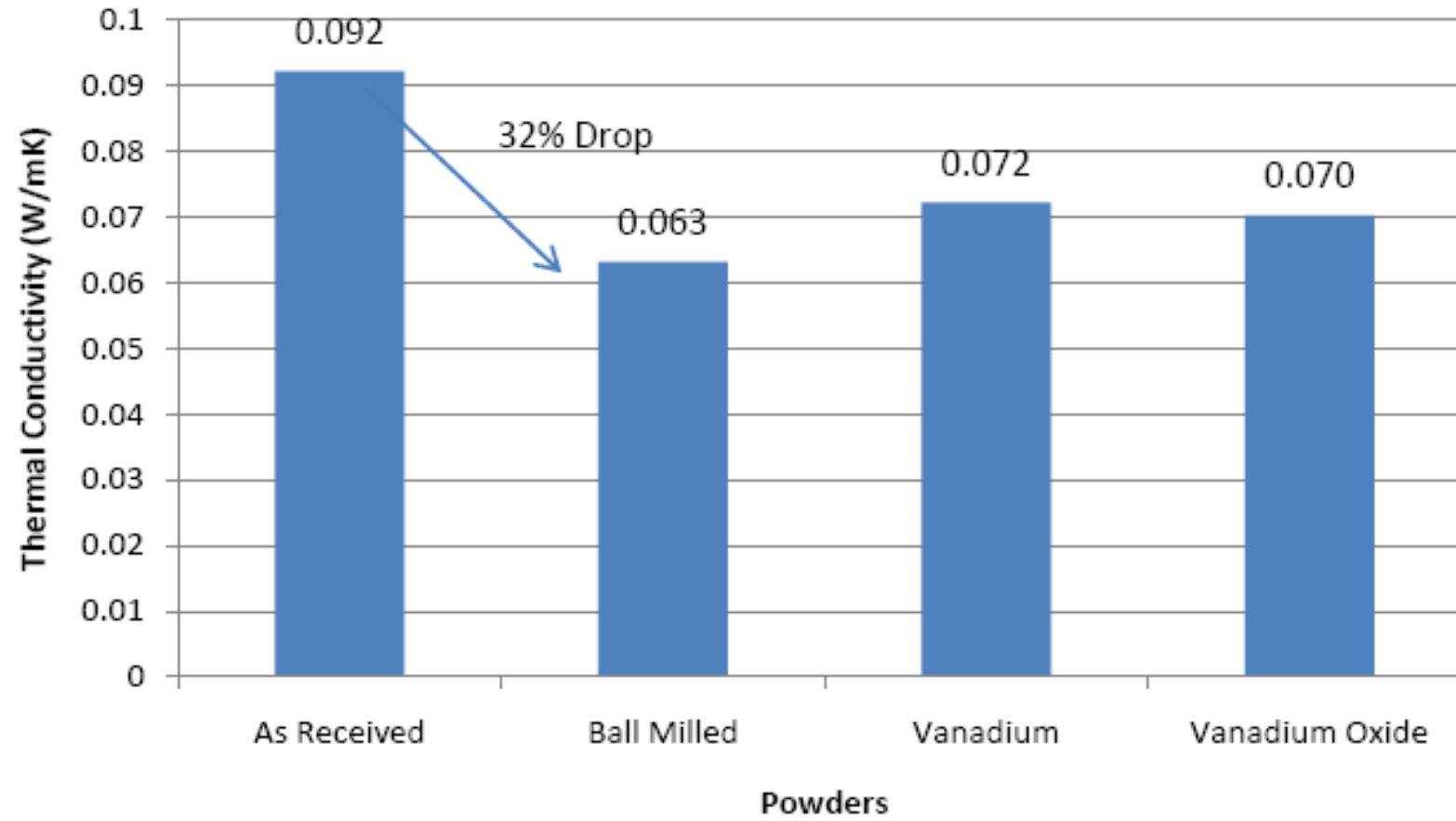


HEAT TRANSFER ISSUES

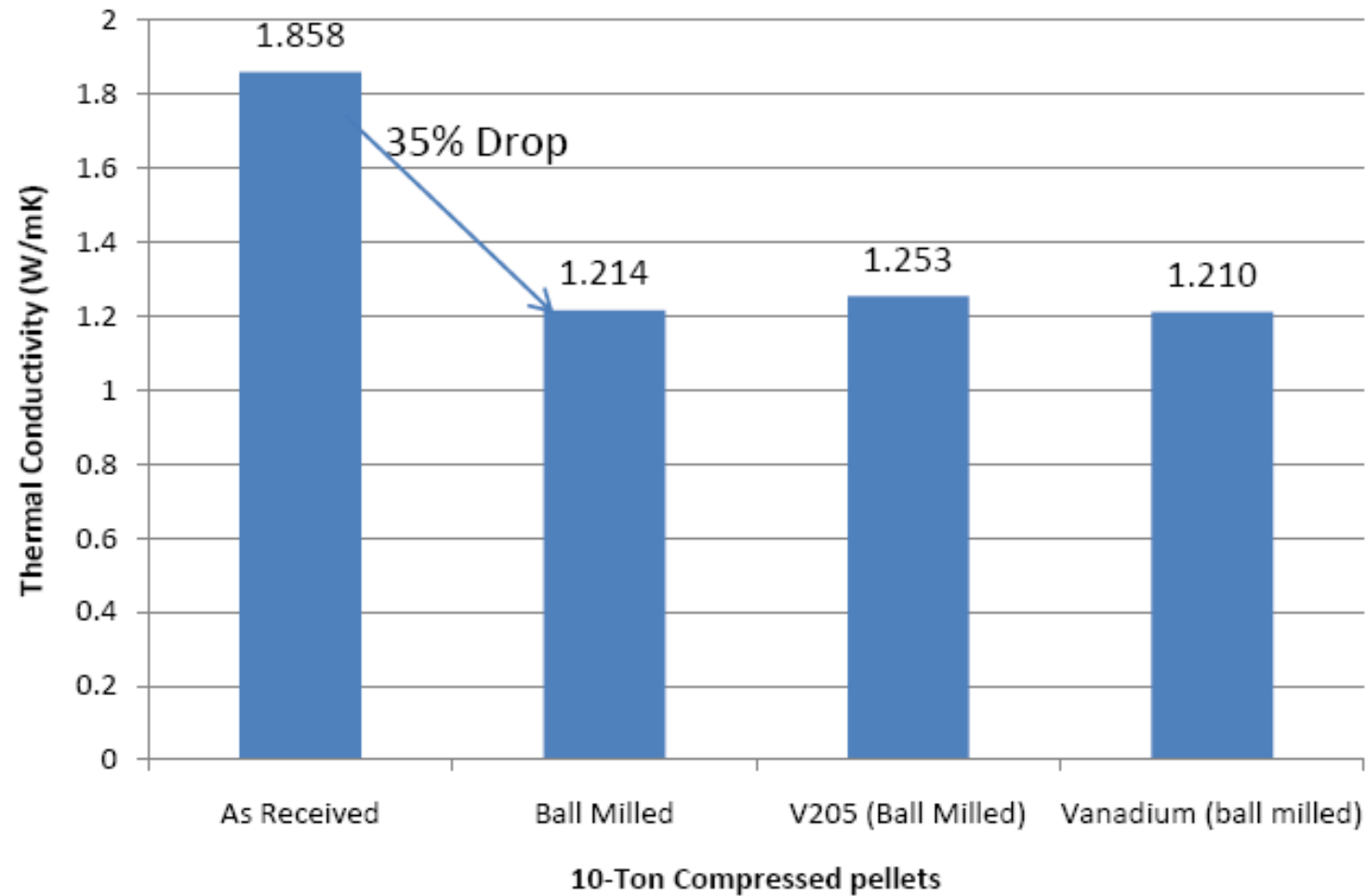
- In the case of heat transfer, the problem is especially significant because of the high heat of formation of magnesium hydride (75 kJ/mol).
- Compounded by the fact that magnesium has a low melting point.
- If heat is not transferred rapidly to some heat exchanger the magnesium inside the tank runs the risk of melting during absorption (an exothermic process).



Results



Results



Unique Hazards

- Most chemisorbant hydrogen storage materials are pyrophoric (right)
- Hydrogen itself has one of the widest explosive ranges of flammable gasses
- For safety reasons, they need to be insulated from air and water
- Generally this involves use of specialized equipment (e.g. glove boxes)



Image Courtesy of Dr. Shane Beattie

Looking for?

Seeking collaboration with researchers in the public or private sector
focused on the development of hydrogen storage materials

TridentThermalConductivity.com

info@ctherm.com

+1 506 457 1515

C-THERM