HYDROGEN STORAGE
WEDNESDAY, NOVEMBER 6 - ROOM 103-C, 1:30 PM - 3:30 PM

- **Innovative Hydrogen Storage and Transportation -** *Bart Norton, KONTAK, Inc.*

  - Kontak is a small team of inventor/entrepreneurs from Redmond, Washington. Their approach is known as HOLA or Hydrogen-on-Liquid Carrier. The Carrier being developed by Kontak can hold up to 10.8% hydrogen by weight, is liquid over a wide temperature range and does not require cooling or pressurization. Initial recycling tests showed no degradation to the Carrier offering the possibility of over 100 cycles or more in the future. Our presentation will detail the Hydrogen Release Module and our Hydrogen Fueling Station. The basic Station stores 1,700 kilograms of hydrogen and can deliver it as 900 BAR compressed or 200 kW of zero-emission electricity or a combination of the two.

- **Advances in Chemical Carriers for Hydrogen -** *Daisuke Kurosaki, Chiyoda International Corporation*

  - In our presentation we will describe our SPERA process for hydrogen transport and our upcoming 2020 commercial demonstration project.

- **Levelized Cost of Returned Energy (LCORE) Methodology for Comparing Energy Storage Technologies -** *Dr. Jacob Brouwer, University of California, Irvine*

  - A method for analyzing the levelized cost of conversion, storage, and return of input energy as an end product net of losses with a zero cost of input energy, termed the levelized cost of returned energy (LCORE), is introduced. The methodology is uniformly applied to compare the net conversion and storage costs of various renewable electrolysis technologies and hydrogen end-uses with battery and flow-battery energy storage technologies. The LCORE methodology is intended to support the comparison of technologies across a range of Use Cases, some of which return energy in forms other than electricity, such as vehicle fuel.

- **Discussions on the Hydrogen Flow Rate from the Storage Tank of Metal Hydride by a Simulation Model and Experimental Data -** *Shun Yamate, Tokyo University of Science*

  - In this study, we proposed the H2 storage tank using a metal hydride and discussed the suitable conditions of H2 discharge from the storage tank in consideration of the experimental data.

- **Numerical Model and Evaluation of Metal Hydride When Absorbing Hydrogen with Impurity -** *Torii Seigo, Tokyo University of Science*

  - Metal hydrides are attracting attention as a medium to store and purify hydrogen with various impurity. However, metal hydrides require a long time to store and release hydrogen, and it is necessary to improve the efficiency of experiments by constructing a simulation model. However, only simulations using only hydrogen and simulations using the discharge flow rate equal to the inflow rate are currently being constructed. Therefore, in this study, we

constructed a simulation model when a metal hydride is absorbed with a mixed gas of hydrogen and methane. Moreover, the relationship between the reaction rate and the offgas flow rate was clarified assuming the use in the plant constructed as an example.

- **Fail Safe Storage of Hydrogen at High Pressures -** *Dr. Michael Kezirian, H2Safe, LLC, USA*

  - H2Safe, LLC has developed disruptional "fail safe" technology that does not restrict the storage tank to being a single chamber tank. The H2Safe storage tank would have a freestanding, hyper-elastic insert of multiple, smaller chambers, or which could otherwise be integrated into the outer wall of the tank. The hyper-elastic material has great "self sealing" properties, eliminating the need for a liner. In addition, H2Safe technology does not restrict the storage tank to being only cylindrical, increasing the fuel capacity, allowing significant increased range. The elimination of the need for a pressure relief device or liner, and the reduction of the thickness of the outer wall would offset the additional weight and cost of the insert. With H2Safe technology, the carbon fiber requirement for a composite tank could be reduced dramatically (a minimum of 25%), resulting in potentially less cost, less weight, increased range and increased safety ("fail safe").