

I²CNER

Hydrogen Infrastructure Research Aids Energy Independence Goal

Sandia National Laboratories' (SNL) unique experimental capabilities to quantify the effects of hydrogen on structural materials at high pressures are one of the reasons it was chosen to be a part of I²CNER, the International Institute for Carbon-Neutral Energy Research.

I²CNER is an international consortium, one of six research institutes that comprise the World Premier International Research Center Initiative (WPI) established by the Japanese Ministry for Education, Culture, Sports, Science and Technology in 2007. WPI provides support for research and development (R&D) projects, and encourages international collaboration among leading researchers.

Working towards energy independence is a goal that fits under the umbrella of SNL's national security mission. Leadership in the I²CNER initiative provides an opportunity to coordinate with international experts to address big, complex problems.

The main objective of I²CNER is to develop the science required for the removal of barriers facing the use of hydrogen for carbon neutral energy. Materials selection for infrastructure components such as tanks, tubes, valves, and pipelines is one of the barriers facing the use of hydrogen as a fuel.

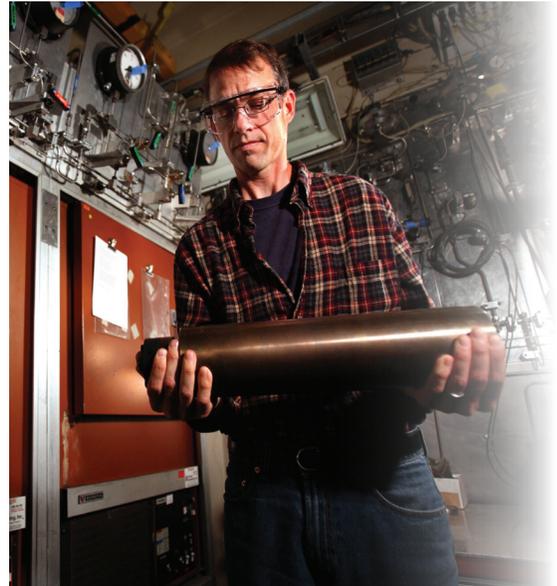
As Lead of the Hydrogen Structural Materials program area of I²CNER, Brian Somerday of SNL is directing I²CNER work on the science needed to understand the behavior of materials when exposed to hydrogen. Hydrogen can degrade materials in ways that can lead to failure or reduced lifetimes. The experiments and analysis performed in this program can help develop new materials which will be either higher performing, lower cost, or both. By understanding the interactions of hydrogen with metals and alloys, materials with resistance to hydrogen fatigue and fracture can be developed.

I²CNER's research goals strongly overlap with SNL's interests. The institute's technical areas include hydrogen production, fuel cells, thermophysical properties, hydrogen storage materials, and carbon capture and storage.

Although based at Kyushu University in Japan, I²CNER is unique in that its director is Professor Petros Sofronis of the University of Illinois, a longtime collaborator with SNL. Professor Sofronis has most recently been conducting hydrogen embrittlement R&D at the University of Illinois, funded by the DOE Office of Energy Efficiency and Renewable Energy (EERE).

The collaboration with I²CNER is complementary to SNL's Hydrogen Program and its presence in the Livermore Valley Open Campus in California. One of the Program goals is to perform as an international R&D center, an objective supported by the U.S. DOE since global collaborations are crucial to solving difficult problems in hydrogen.

By working as part of an international team to increase safety and reduce costs for the use of hydrogen as an energy source, SNL is helping to make carbon-neutral energy a reality.



■ Brian Somerday, an SNL researcher, prepares to load a hydrogen pressure vessel into a laboratory furnace.

Unequivocally Sandia's strong research record and industrial experience on hydrogen materials compatibility has helped I²CNER better coordinate its research activities toward issue-driven objectives.

Dr. Petros Sofronis
Director
I²CNER