

## HIGH-EFFICIENCY DEHYDROGENATION PROCESS

*This opportunity provides a patented, 100% efficient process in which hydrogen obtained from the adiabatic dehydrogenation process is used as the heat energy source.*

### PATENTED TECHNOLOGY

U.S. patent **5,449,848** protects:

- Two-zone chamber separated by a hydrogen-permeable membrane.
- Directing the evolved hydrogen (by combusting Oxygen- or oxygen-containing feed gas) into the chamber.
- Hydrogen permeable membrane that is comprised of a ceramic membrane sandwiched between two metal layers of palladium, palladium-alloy, Ti, Ni, or Cu.

### APPLICATIONS

Dehydrogenation processes are used extensively to produce **styrene** in the Fine Chemicals, Oleo Chemicals, Petrochemicals and Detergents Industries.

Likely feed stocks to be used in this dehydrogenation process include hydrocarbons such as:

- Ethylbenzene;
- Methanol;
- Butane & Butene; and
- Cyclohexane

...as well as inorganic compounds such as hydrogen sulfide or hydrogen iodide.

### INTELLECTUAL CAPITAL

On April 1, 2001, Japan's National Institute of Advanced Industrial Science and Technology began operations as the "new" AIST.



# Hydrogen

The new AIST is a research organization that comprises 15 research institutes previously under the former Agency of Industrial Science and Technology in the Ministry of International Trade and Industry and the Weights and Measures Training Institute.

AIST is Japan's largest public research organization with research facilities and more than 3,200 employees across Japan.

### FOR MORE INFORMATION

AIST is seeking to license these technologies and assist with their commercialization success to qualified organizations. A number of investment options are currently under consideration.

Consideration will be provided to a range of financial, strategic, and commercial investment partnerships.

### *Contact:*

Michael F. Allan  
Vice President  
First Principals, Inc.  
1768 East 25<sup>th</sup> Street  
Cleveland, OH 44114  
Tel: 216-881-8526  
Fax: 216-881-8522  
email: [mfallan@firstprincipals.com](mailto:mfallan@firstprincipals.com)  
Website: <http://www.firstprincipals.com>