GEORGIA TECH RESEARCH

News Release
Research Communications Office
226 Hinman Research Building
Georgia Institute of Technology
Atlanta, Georgia 30332
(404) 894-3444

CONTACT: Mark Hodges/Ray Moore
(404) 894-3444

CHEAPER SULFUR REMOVAL TECHNOLOGY
DEVELOPED FOR COAL GASIFICATION PLANTS

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ATLANTA, GA -- An electro-chemical membrane cell under development at the Georgia Institute of Technology may remove sulfur from the coal combustion process with equipment one-tenth as expensive as conventional scrubbers.

Dr. Jack Winnick, the Tech chemical engineering professor who invented this process, estimates that a $15 million system would serve the sulfur-removal needs of a gasification plant processing 10,000 tons of coal per day. He believes that scrubbing tower for such an operation would cost some $160 million to install.

"The membrane cell approach is so novel that poeple are a little afraid of it," says Winnick. "It's never been tried on a large scale before, but all indications are that it would be highly cost-effective."

Such a cell, as designed by Winnick, would be comprised of a wafer-like collection of paper-thin ceramic plates. Raw hot gas would pass between each layer of the cell on its way out of the gasification furnace. An electric field supplied to the membrane would attract the most acidic part of the synthetic gas -- hydrogen sulfide.

In Winnick's process, this compound would be broken down into hydrogen and sulfur. The hydrogen would be retained in the gas, enriching its fuel value. The sulfur would be transmitted through the membrane, then condensed and collected as solid sulfur. Removal of this element is important since sulfur corrodes coal gasification equipment.

In contrast, conventional scrubbers require a more expensive multi-step process to remove sulfur from the gas and convert it into waste sludge.

(More)

"Sulfur is easiest to handle in its solid form," says Winnick. "It is simplest to dispose of but sulfur has such high economic value that many manufacturers would probably sell or use it for productive purposes."

Winnick already has used the membrane cell concept in a patented invention for removing sulfur dioxide from the stack gases in coal-burning power plants. This technology is designed to prevent acid rain. In this application, the sulfur compound is attracted by the electric field applied to the membrane, then transferred as concentrated sulfuric acid, a compound with economic value.

Winnick has done extensive consulting with American industries on problems calling for electro-chemical solutions. He also has worked with the National Aeronautic and Space Administration (NASA) to develop an electrified-membrane method for efficiently removing the carbon dioxide exhaled by astronauts from their breathing air on long-term space missions.

His research for the space program led Winnick to consider a membrane cell approach for cleaning up coal-produced gases.

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