TECHNOLOGY*Profile*

Ammonia Removal for Hydrogen PEM Fuel Cells

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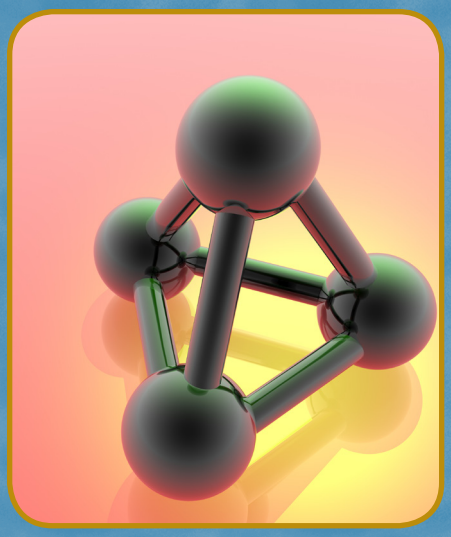

Hydrogen is a potential clean and environmentally-friendly energy carrier because when it combines with oxygen in fuel cells to generate electricity, its only product is water. However, a major obstacle for the development of hydrogen powered vehicles is the lack of safe, light weight and energy efficient means for on-board hydrogen storage. Over the last five years, ammonia borane (AB) has attracted interest as a hydrogen storage material because of its relatively large amounts of hydrogen by weight. However, current proposed methods of hydrogen release from AB exhibit an undesirable conversion of AB to ammonia gas which results in a degradation of fuel cell performance.

Researchers at Purdue University have developed a novel process for ammonia/hydrogen separation in vehicular proton exchange membrane (PEM) fuel cell applications. Through a dual process of ammonia absorption using recycled water from the fuel cell and adsorption through activated carbon, the weight penalty of the hydrogen purification system can be minimalized. Additionally the combination of absorption and adsorption allows this technique to remain effective for a much longer time period before ammonia concentrations raises above acceptable levels as compared to either absorption or adsorption alone. This allows for the continued delivery of ultra-high purity hydrogen with minimal purification system weight.

Domain:

- Energy

Advantages:

- High hydrogen capacity
- Minimal extra weight
- Remains effective for long time

INNOVATOR

INNOVATOR BIOGRAPHY

Dr. Arvind Varma is not only the Head of the School of Chemical Engineering at Purdue University, he is also the R. Games Slayter Distinguished Professor of Chemical Engineering. Dr. Varma's research interests include hydrogen fuel cells, underground coal gasification, carbon sequestration, and combustion synthesis.

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