PURDUE INNOVATES | Office of Technology Commercialization

Production of Hydrogen Using an Anaerobic Biological Process

A low-pressure anaerobic process efficiently generates significant hydrogen from ethanol byproducts (DDGS), enhancing the economic value and utility of the feed supplement.

As ethanol continues to become an integral part of the international energy future, it is critical to continue to increase the overall value and efficiency of ethanol production. Ethanol is an alcohol produced by yeast fermentation from sugars. The products of this biological reaction are carbon dioxide, ethanol, and waste products. Distillers dried grains with solubles (DDGS) are the nutrient by-products, i.e., protein, fiber, and oil, of ethanol production.

Typically used to create livestock feed, Purdue University researchers have discovered that DDGS can produce large quantities of hydrogen with a low-pressure anaerobic process. This method of hydrogen production could be implemented in the near term with minimal cost and impact upon existing operations. This is possible due to the minimal operation requirements and readily available components. It is estimated that this method can add a 15 percent economic value to the DDGS. Additionally, the DDGS protein fraction increases, significantly increasing its use as a feed supplement.

Advantages:

-Produces large quantities of hydrogen

-Increases the DDGS use as a livestock feed supplement

-Increases the overall value to DDGS

-Can be implemented at minimal cost

Potential Applications:

-Agricultural Industry

-Green Technology

-Clean Energy

Technology ID

66106

Category

Agriculture, Nutrition, & AgTech/Livestock & Animal Health Solutions
Energy & Power Systems/Hydrogen & Fuel Cell Systems
GreenTech/Circular Economy & Waste Reduction

Authors

Robert Kramer
John Patterson
Liberty "Libbie" Pelter

Further information

Dipak Narula
dnarula@prf.org

View online

TRL: 5

Intellectual Property:

Provisional-Patent, 2012-05-10, United States | Utility Patent, 2013-05-10, United States | DIV-Patent, 2016-11-21, United States

Keywords: Ethanol production, DDGS, hydrogen production, low-pressure anaerobic process, distillers dried grains with solubles, livestock feed supplement, clean energy, green technology, agricultural industry, economic value, protein fraction, Agriculture, Chemical Engineering, Clean Energy, Distillers Dried Grains with Solubles (DDGS), Fuel Cells, Green Technology, Hydrogen Storage