PURDUE INNOVATES | Office of Technology Commercialization

Synergistically Integrated Natural Gas Reforming Biomass Fast Hydropyrolysis Process

A highly efficient biomass hydropyrolysis process generates liquid hydrocarbons with 1.6 times greater yield and better energy efficiency than current methods, allowing for smaller, lower-cost production plants.

For the past 150 years, society has relied on fossil fuels for both illumination and energy generation. Continued consumption of fossil fuels has led to an increasingly large amount of carbon dioxide gas released into the atmosphere. A proposed alternative would be the use of hydrocarbons made from biomass, an essentially carbon neutral source of energy. While hydrocarbons are released into the atmosphere, an equal amount is captured from the atmosphere by biomass growth. Unfortunately, the two major processes for the conversion of biomass to liquid fuels, fermentation and gasification, are both extremely inefficient at large scales.

Researchers at Purdue University have developed a highly efficient process to generate liquid hydrocarbons from biomass hydropyrolysis. For this process, liquid hydrocarbons (bio-oil) are generated from a fast hydropyrolysis process using a variety of biomass sources. This process ideally has a residence time of about two seconds. The hydrogen for the hydropyrolysis is provided from a syngas derived from a natural gas reforming process. This technology provides a 1.6 times greater yield of liquid hydrocarbons and has better energy efficiency than current methods (fermentation and gasification). The current design allows for a significantly smaller plant size, resulting in hydrocarbon production that is both low cost and highly efficient.

Advantages:

-Better yields than current methods

-Lower cost and higher efficiency

Potential Applications:

Technology ID

65061

Category

GreenTech/Carbon Management

Energy & Power Systems/Power Generation

Authors

Rakesh Agrawal

Navneet Singh

Further information

Will Buchanan

wdbuchanan@prf.org

View online

-Green technology

-Clean energy

-Liquid hydrocarbon production

TRL: 6

Intellectual Property:

Provisional-Patent, 2008-03-05, United States | Utility Patent, 2008-08-27, United States

Keywords: biomass hydropyrolysis, liquid hydrocarbons, bio-oil, syngas, carbon neutral energy, green technology, clean energy, fast hydropyrolysis, energy efficiency, fossil fuel alternative, Biomass, Chemical Engineering, Clean Energy, Energy, Fuel Cells, Green Technology, Hydrocarbons