UNIVERSITY OF BIRMINGHAM

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Cheaper, Greener Biofuels Processing Catalyst

A new processing method for biofuels through the use of a catalyst made from palladium metal and bacteria

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Seeking

Development partner, Commercial partner

About **University of Birmingham**

At the University of Birmingham our research leads to new inventions and fuels innovation and business growth.

Background

Biofuels are made from renewable materials such as plants or algae, and offer an alternative to petroleum-based sources. However, many biofuels are costly to produce because the precursor product, bio-oil, must be processed before it is sent to the refinery to be turned into liquid fuel.

Bio-oils could form an increasing part of the transport fuel mix. Although the UK government intends to phase out petrol vehicles by 2040, biofuels could still be required for hybrid vehicles, as well as haulage, aviation and marine applications. The conversion of algae to crude bio-oil is attractive because it does not use food crops and is near carbon neutral.

Tech Overview

A research team at the University of Birmingham, in collaboration with the University of Illinois' Prairie Research Institute, have identified and tested a new processing method through the use of a catalyst made from palladium metal and bacteria.

The bio-oil produced in the lab from algae contains impurities like nitrogen and oxygen, but treating it with palladium as a catalyst during processing helps remove those impurities to meet clean-air requirements. For the palladium to do its job, the bio-oil needs to flow past it during processing. Previous studies have shown that allowing the oil to flow through porous carbon particles infused with palladium is an effective method, but those carbon particles are not cheap. Therefore, researchers at the University of Birmingham, developed techniques for supporting an array of metal nanoparticles on bacteria, which act as a renewable catalyst support.

The team performed a variety of chemical and physical analyses to test the effectiveness of the new method and the results showed that their new processing treatment produced a liquid fuel that is comparable in quality to one made using the commercially produced catalyst. However, the more costly commercial catalyst has the added benefit that it can be used over and over without extensive processing, whereas this group's palladium-on-bacteria catalyst would need to undergo processing to be reused.

The researchers at the University of Birmingham are currently working on developing recycled catalyst using second life bacteria from fermentation processes and precious metals extracted and recycled from road dust.

Further details:

The paper "Nanoparticles of Pd supported on bacterial biomass for hydroprocessing crude bio-oil" is available online. DOI: 10.1016/j.fuel.2017.08.007

Benefits

- Cheaper to manufacture than commercially produced catalysts
- Sustainably sourced from discarded electronics, catalytic converters, street sweeper dust and processed sewage
- Quality of liquid fuel is maintained

Applications

The production of biofuels is of widespread relevance across the transport industry, encompassing haulage, aviation and marine applications.

Opportunity

The university is seeking partners for further development and commercialisation.