University of Central Florida

Technology Available for Licensing

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Heterogeneous, Metal-Free Hydrogenation Catalyst Reduces Carbon Dioxide and Other Organic Compounds

Hydrogenation is a versatile chemical process most commonly used in the food industry to convert vegetable oils into solid or semi-solid fats found in products such as margarine. These food products have had health concerns due to the use of nickel catalysts in processing. Heterogeneous FLP catalysts have shown promising usefulness in the catalytic heterogeneous hydrogenation process because of their relative stability and slower degradation in comparison to homogenous catalysts. These properties make these type of catalysts a more attractive option since products can be quickly separated from the catalyst, improving product quality and reducing production costs. This catalyst is also attractive for the goal of reducing carbon dioxide emissions, since the alternatives—sequestration, electrochemical reduction, and homogenous reduction—depend on available space, intensive energy usage, and the use of more sensitive catalysts, respectively.

Invention

The invention entails a new heterogeneous, metal-free catalyst capable of reducing carbon dioxide as well as hydrogenation. Specifically, this catalyst contains a structurally-frustrated Lewis pair (FLP) that can hydrogenate a carbonyl bond, producing formic acid, which can be used as a fuel or in fuel cells, and other hydrocarbons. It can also hydrogenate other compounds that can lead to biofuels, hydrogenated oils and fats, plastics, and even pharmaceutical precursors. By utilizing hexagonal boron nitride (h-BN), this improvement on a popular reduction method eliminates the expensive requirement of precious metals. Additionally, the use of this metal-free FLP catalyst will eliminate metal impurities in hydrogenated products that can cause undesirable effects such as increased toxicity in humans and animals.

Looking for Partners

The technology has been laboratory tested, and we are looking for a partner to scale up the technology and commercialize it. The process can be incorporated into current production methods or into a new product line.

Stage of Development

Lab scale testing

UCF Inventor

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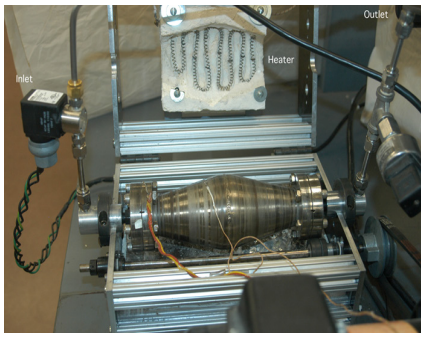
Tech Fields

Biofuels, Clean Technologies, Environmental Remediation



Mechanical reactor for the reduction of CO_2 to formic acid

Benefits

- Low in cost
- Metal-free process
- Eliminates metal impurities in hydrogenated products
- Improved catalyst stability
- Low energy, economical CO_2 conversion method

Applications

- CO_2 emission reduction
- Formic acid production
- Hydrogenated products
- Reduction or saturation of organic compounds
- Power generation facilities

Keywords

CO_2 reduction, emission reduction, formic acid production, heterogeneous catalyst, hydrogenation, FLP, frustrated Lewis pair, hexagonal boron nitride, h-BN, hydrogenated oils, hydrogenated fats, carbon dioxide

Patent Application Pub. No's

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If you or your company are interested in this opportunity, Contact:

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