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Biokerosene from Oxidation Products of High Oleic Oil as the Alternative to Winter-season Diesel, Kerosene, and Jet Fuels

High-oleic oil oxidation yields stable biokerosene with superior cold-flow, safety, and emission properties.

Purdue researchers have developed a method for generating biofuels through the oxidation products of high oleic oil, which can be derived from any suitable vegetable oils, for use as winter-season diesel, kerosene, and jet fuels. This method involves the ozonolysis of oleic acid to produce nonanoic acid, which is then esterified with various alcohols to produce the biofuels. The resulting biofuels demonstrate extraordinarily low-temperature performance and remarkable oxidation stability, with an overall decrease in greenhouse gas emission in their production compared to traditional methods. The exceptional performance of these biofuels is a direct result of their unique composition, which allows for improved energy density and decreased nitrogen oxides emissions compared to traditional biofuel. Moreover, the biofuel production process demonstrates a high yield, which plays a crucial role in achieving cost-effective and sustainable production of these fuels in commercial applications. These biofuels provide safer handling due to a flash point that is greater than 90C, and lower particulate and carbon monoxide emissions when compared to traditional biofuels. These advantages make them suitable for a broad range of applications, such as an alternative to conventional diesel and as a component in other biofuels.

Technology Validation:

- Fourier Transformed Infrared Spectroscopy (FTIR) analysis performed showed the formation of ester groups

- A fatty acid ester having a cloud point of -35Â°C to -70Â°C and a flash point of at least 90Â°C was produced

- High yield obtained

Advantages:

Technology ID
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Category
Agriculture, Nutrition, & AgTech/Livestock & Animal Health Solutions
GreenTech/Carbon Management
Materials Science & Nanotechnology/Materials
Testing & Characterization Tools

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- Better oxidation stability when compared to modern biofuels, which require antioxidants in their fuel mixture for improved stability

- Comparable volumetric and gravitational energy density to diesel and biofuels

- Higher cetane numbers than the minimum specification of kerosene or jet fuels

- High ranging flash point, ranging from 70 to 120C

- Short filtration time in cold soak filtration test (ASTM D 7501)

Applications:

- Biokerosene that can be used as winter season diesel, kerosene, or jet fuel

Publication:

https://statics.teams.cdn.office.net/evergreen-assets/safelinks/2/atp-safelinks.html

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