



Microbes Produce High Yields of Fatty Alcohols from Glucose

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WARF: P140076US02

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method to produce fatty alcohols for biofuel and specialty chemicals using genetically engineered microorganisms.

Overview

Fatty alcohols are used in detergents, emulsifiers, lubricants and personal care items. More than 1.3 million tons of fatty alcohols are used worldwide each year, representing a \$3 billion market.

Currently, fatty alcohols are produced either through the processing of natural fats and oils or from petrochemicals. As both routes require biodiesel or petrochemical fuel stocks, microbial production of fatty alcohols from renewable sugars is a promising alternative.

To be economically competitive, microorganism-based methods must boost titers and yields.

The Invention

UW–Madison researchers have developed a method to produce fatty alcohols such as 1-dodecanol and 1-tetradecanol from glucose using genetically engineered microorganisms. The organism, e.g., a modified *E. coli* strain, overexpresses several genes (including *FadD* and a recombinant thioesterase gene, acyl-CoA synthetase gene and acyl-CoA reductase gene). Other gene products are functionally deleted to maximize performance.

The strain is cultured in a bioreactor in the presence of glucose.

Applications

- Production of fatty alcohols for biofuels (e.g., jet fuel) or specialty chemicals

Key Benefits

- Some of the highest yields ever reported using *E. coli* and glucose
- Other organisms such as yeast or Gram-positive bacteria may be used.

Stage of Development

The modified *E.coli* strain is capable of generating yields higher than 0.13 grams of fatty alcohol per gram of consumed glucose.

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Additional Information

For More Information About the Inventors

- [Brian Pflieger](#)

Related Technologies

- [WARF reference number P09329US02 describes genetically modified *E. coli* that are capable of overproducing fatty acid precursors for medium- to long-chain hydrocarbons.](#)

Publications

- Youngquist J.T., Schumacher M.H., Rose J.P., Raines T.C., Politz M.C., Copeland M.F. and Pflieger B.F. 2013. Production of Medium Chain Length Fatty Alcohols from Glucose in *Escherichia coli*. *Metabolic Engineering*. 20, 177-186.

Tech Fields

- [Clean Technology : Biobased & renewable chemicals & fuels](#)
- [Materials & Chemicals : Biochemicals & biomaterials](#)

For current licensing status, please contact Jennifer Gottwald at jennifer@warf.org or 608-960-9854

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