Biomass Program

Platform Chemicals from an Oilseed Biorefinery

Vegetable oils, such as soy oil, are important renewable resources that can serve as feedstocks for the production of fuels, chemicals, materials, and power. This project is developing a novel platform of industrial chemicals based on metathesis chemistry that will serve as the foundation of an oilseed biorefinery or an integrated sugar/oilseed biorefinery. Specific objectives include:

- Identify and optimize metathesis catalysts and associated processes as applied to unsaturated fatty acids and their derivatives
- Integrate the steps above with the concept of the oilseed biorefinery by developing separation schemes, detailed process modeling, and economic modeling.

R&D Pathway

Existing metathesis catalysts (first and second generation Grubbs catalysts) have been screened for the ethenolysis of industrial grade soybean oil. The influence of different oil sources on catalyst activity has been studied and researchers are examining the effects of different oil refining processes on catalyst activity, catalyst decomposition, and catalyst poisoning. Catalysts are being modified for improved performance.

A process for ethenolysis of soybean oil that includes catalyst removal from the reaction mixture and purification of the products (e.g., caproleic acid) is being developed and optimized. Bench-scale tests have been conducted to establish reproducibility, generate data for preliminary process economics, and generate material samples for applications testing.

A process model has been developed for caproleic acid production for use in analyzing process economics. A general metathesis reactor model has also been developed to effectively evaluate various oilseed biorefinery concepts. Researchers are compiling a physical properties database to support the modeling activities.

Bioproducts R&D

Benefits

- **Enable the production of novel chemical intermediates and products from vegetable oils**

Applications

Metathesis chemistry can be used in both oilseed biorefineries and integrated sugar/oilseed biorefineries to diversify the product slate and boost profitability.

Project Participants

California Institute of Technology
Cargill, Inc.
Materia, Inc.

Project Period

FY 2004 – FY 2006

For more information contact:

Fred Gerdeman
DOE Golden Field Office
Fred.Gerdeman@go.doe.gov

EERE Information Center
1-877-EERE-INF (1-877-337-3463)
www.eere.energy.gov

Visit the Web site for the Office of the Biomass Program (OBP) at
www.eere.energy.gov/biomass/

June 2006