



Biomass Program

Bioproducts R&D

Functionalized Vegetable Oils for Use as Polymer Building Blocks

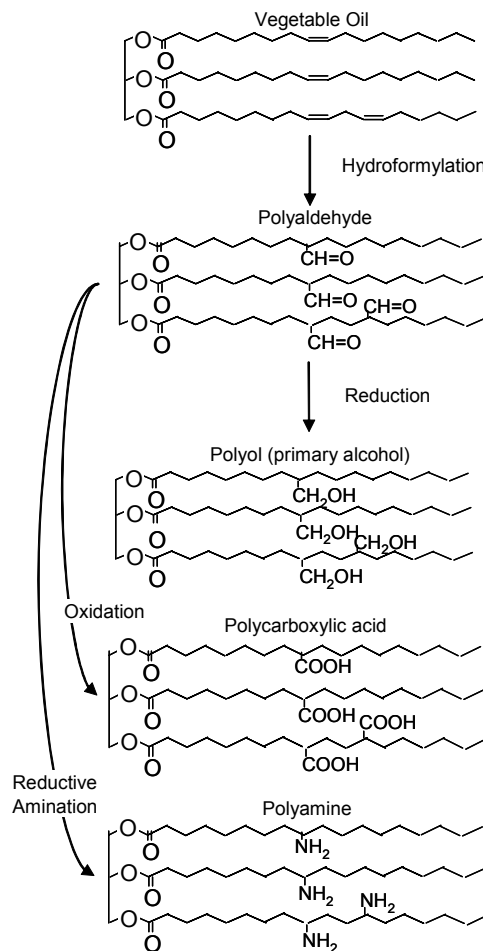
Vegetable oils are a potential feedstock for polymers because their fatty acid molecules can be modified to serve as polymer building blocks. This project is developing catalyst systems for chemistries such as hydroformylation to convert the vegetable oils to polyaldehydes and subsequent chemistry to convert the polyaldehydes to polyols, polyacids, and polyamines. By adding functional groups to the vegetable oil molecules, the reactivity of the vegetable oil is increased creating the potential for polymerizing the modified vegetable oil.

These processes were originally developed for fossil feedstocks that are less viscous than vegetable oils and easier to separate from the catalysts at the end of the reaction. Researchers are developing new catalyst systems that have high efficiencies towards the conversion of vegetable oils such as soy oil and allow efficient catalyst recovery and easy product separation from the vegetable oil derivatives. The relationship between the desired product performance and the process chemistry will be explored.

R&D Pathway

Research activities include: (1) optimizing catalyst activity and recovery; (2) exploring

hydroformylation at lower pressures with cobalt catalysts; (3) exploring the oxidation of polyaldehydes to polycarboxylic acids; (4) scaling up of polyol synthesis to generate sufficient quantities for industrial testing; and (5) conducting an economic feasibility study of the related conversion technologies.



Benefits

- Offer biobased alternatives to conventional polymers in certain applications
- Provide a high-value outlet for oilseeds

Applications

The knowledge gained through this project will advance the state-of-the-art for oilseed products and provide an additional product pathway for future oilseed biorefineries.

Project Partners

Pittsburg State University
Cargill, Inc.

Project Period

FY 2001 – FY 2004

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

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