

Process Development for Transportation Biofuels

Microalgae and agricultural oilseed crops have effective natural processes for utilizing solar energy to sequester carbon dioxide into energy oil resources. Southwest Research Institute® (SwRI®) has developed processes to convert these renewable natural oil feedstocks including seed crop oils, waste vegetable oil, algae oil and animal fats into clean and sustainable transportation fuels.

To support these alternative renewable energy technologies, SwRI has extensive laboratory facilities in organic and inorganic chemistry for analysis, synthesis, and development. In addition, SwRI is equipped with the resources to support the full range of utility, maintenance, and other infrastructure needs of pilot plant and semicommercial scale demonstration operations.

Capabilities

SwRI's expertise in advancing renewable biofuels includes:

- Biofuel process development
- Bench scale testing, including engine tests
- Pilot and demonstration plant design and operation
- Feedstock life cycle analysis
- Process modeling
- Catalyst evaluation and development
- EPA emissions testing for new fuel certification

Biodiesel

SwRI developed production of biodiesel by an automated continuous supercritical methanol (SCM) transesterification process (patent pending) which converts triglycerides from diverse feedstocks into fatty acid methyl esters (biodiesel). Laboratory-developed nanostructured heterogeneous catalysts were used to lower the temperature and pressure of the transesterification reaction, with over 99% conversion at a residence time of 7 minutes. The continuous SCM process is designed to operate in a temperature range of 250–400 °C and a pressure range of 1,500–4,000 psig.

Advantages of the SCM process compared to conventional biodiesel processes include:

- Less toxic waste generated
- Tolerant of free fatty acid and moisture content: No saponification byproducts produced
- No pretreatment of feedstocks required
- No post-purification of biodiesel products necessary



D018404



D018405



D018406

The 40,000-square-foot Chemical Engineering building contains 9,200 square feet of high bays and 4,000 square feet of analytical, process and biological laboratories.



D018422

Alternative fuel demonstration plant



D018407

Continuous supercritical methanol process

