

Andrew West

Senior Division Energy & Transportation

Regenerative Diesel Fuel Production In A Flex Fuel Vehicle Utilizing Vegetable Oil And Catalytic Hydrocracking

Previous experimentation by this author demonstrated the feasibility of producing high-grade diesel fuel hydrocarbons from vegetable oil. Vegetable oil was cracked using low temperature catalysis on a palladium catalyst with hydrogenation of the resultant fractions. Independent laboratory analysis verified the feasibility of fuel production using this method by analyzing the fuel using gas chromatography and flame ionization detection. This current series of experiments seeks to demonstrate the feasibility of using the exhaust gas of a diesel engine and a palladium reaction bed to produce sufficient heat required to boil vegetable oil and produce a hydrocracked fraction real-time. The resultant fuel is collected and used to power the vehicle. A prototype device has been engineered using standard off-the-shelf materials allowing an easy retrofit of any exhaust gas system. This device incorporates a stainless-steel reaction vessel, palladium pellets from a GM type mid-1980s catalytic converter, and a custom engineered exhaust gas heater. Used vegetable oil from deep-fat fryers is filtered and metered into the hydro-cracker while the engine is operating. Hydrocracked vegetable oil is hydrogenated and condensed after passing over the super-heated catalyst. The resultant diesel fuel is separated from any water condensate and used as a fuel source while the engine is running.