Biodiesel Fuel Production via Mild Chemical Recycling of Thermosetting Polymers

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Biodiesel has attracted considerable attention during the past decade as a renewable, biodegradable, and nontoxic fuel. In general, biodiesel is obtained from oils and animal fat; however, harvesting fuel from polymeric waste can both alleviate fossil fuel depletion and environmental pollution. The above challenge is tackled by producing biodiesel via a mild chemical recycling of thermosets, which are polymers with heat-resistant properties that make them irrecyclable. Epoxy thermosets derived from epoxy oligomer and multifunctional carboxyl acid can be decomposed by a monoalcohol-Zn(Ac)2 solution at relatively mild temperatures via transesterification. The recycled oligomer of diester can be obtained as biodiesel. The catalyst can also be reclaimed and reused. The effects of catalyst concentration, and temperature on epoxy dissolution in the alcohol-catalyst solution were systematically studied. This research presents a new method to produce biodiesel by recycling epoxy-based thermoset under mild conditions.

Awards Won:
Fourth Award of $500