Public Abstract
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Title: CATALYTIC CONVERSION OF GLYCEROL AND SUGAR ALCOHOLS TO VALUE-ADDED PRODUCTS

The burgeoning US biodiesel industry collects millions of gallons of crude glycerin per year as a by-product, most of which is disposed as waste—glycerin refining is not feasible at their small production scales. The primary focus of this research is to develop a technology to convert crude glycerin to propylene glycol that can be easily produced, refined and marketed by the existing biodiesel facilities.

Current research emphasis was placed on production of propylene glycol by hydrogenolysis of glycerin. Novel reaction mechanism for converting glycerin to propylene glycol via acetol intermediate was identified. Applying this proposed reaction mechanism, a novel reactive distillation approach has been identified which enables us to achieve unprecedented high yields of propylene glycol at mild reaction conditions of temperature and pressure.

Effect of various reaction parameters on overall yields of propylene glycol were studied. In addition, the effect of organic and inorganic impurities, present in crude glycerin, on catalyst performance and ways to minimize the catalyst poisoning and optimal conditions to regenerate the spent catalysts were also evaluated.

The proposed products are renewable alternative to toxic petroleum based ethylene glycol antifreeze, which is non-renewable. Moreover, it would have significant impact on the economics of biodiesel industry by reducing the overall production cost of biodiesel.