

Summer Research Program 2011/2012

Project Title: Conversion of Cellulose to value added biofuels over metals supported nanocatalysts

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Objective

This research project aims to convert sugars derived from waste cellulosic biomass into a high performance liquid biofuel which can be blended with gasoline up to 70% in the current car engines.

Description

This research project aims at conversion of cellulose derived from lignocellulosic biomass, which is the most abundant form of biomass on earth, into renewable biofuels. Wood, for example, contains approximately 50% cellulose, which is a natural polymer of glucose molecules bonded by glucosidic bonds. Cellulose can therefore be extracted from waste biomass streams such as agriculture waste, perennial grasses and Pongamia pods grown on marginal lands. The glucosidic bonds of cellulose can be cleaved by the hydrolysis reaction using various technologies to produce constituent C6 and C5 sugar monomers. This project will develop new nanomaterial catalysts and processes to convert cellulose directly into levulinic acid (LA) which can be converted to Methyl Tetrahydro Furan (MTHF). MTHF can be used as a gasoline additive with up to 70% blend in the current engines. Main objective in this project is to achieve high yield of MTHF from cellulose using a simple batch reactor system which can be translated to a continuous stirred tank reactor system for making it commercially viable. These reactions are carried out at low temperatures (100-200°C) and high pressure to maintain liquid phase conditions.

Pre-requisites - CHE3164 Reaction engineering