

Hydrodeoxygenation of fatty acid esters for biofuels

The research concerns hydrodeoxygenation (HDO) of fatty acid esters for hydrocarbon biofuels, particularly the use novel catalysis mechanism and kinetic modeling.

Catalytic hydroprocessing is a promising technology for the conversion of liquid biomass to paraffin based biofuels via oxygen removal, because biomass is highly oxygen containing. This process, also called HDO, is operated at high temperature and hydrogen pressure and with solid supported catalyst.

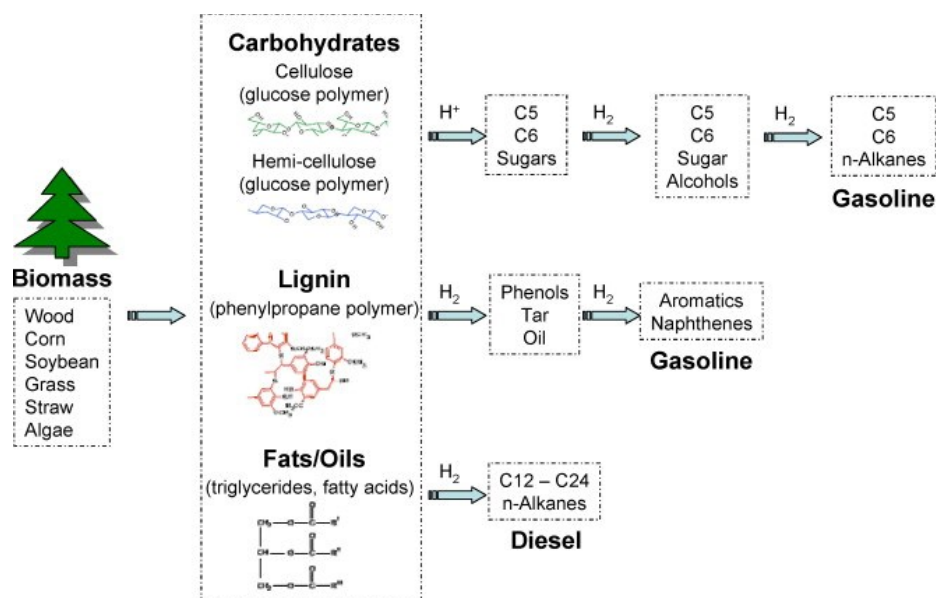


Figure. Route from biomass to biofuels

Vegetable oil and related feedstocks are very promising raw materials or HDO process to produce paraffin based jet fuel and diesel. Oil and fat is comprised of mainly triglycerides (TG) as well as various concentrations of free fatty acids, monoglycerides and diglycerides. The length of the carbon chain and the degree of saturation can vary. The products, hydrocarbons, possess superior fuel properties than biodiesel (fatty acid methyl esters), e.g. higher cetane number, higher stability, better cold flow properties. One of the main issues for this technology is related to the availability and the cost of feedstock. In this sense, use of wasted and residues, such as algae oil, wasted oil, fish oils and canola oil, can make this process cheaper. The focus of this research is TG-based feedstocks.

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Project-related publications:

Hötyläinen, L. (2017) Production of dihydrolevoglucosenone, M.Sc. thesis, Aalto University, 54 p