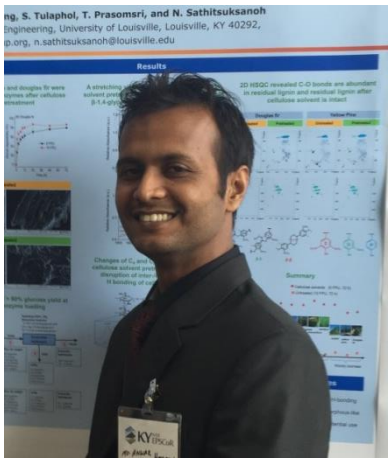
Novel bio-derived solvents for biofuels production

Md. Anwar Hossain and Noppadon Sathitsuksanoh
Department of Chemical Engineering, University of Louisville

Abstract

Current transportation fuels are derived from crude oil. With limited supplies and increasing demand for transportation fuels, the search of renewable feedstocks is important. Lignocellulosic biomass has a great potential as renewable feedstocks for production of bioethanol, a compound that is currently blended with gasoline. However, due to its complex chemical structure, extracting sugars from lignocellulose is a difficult task. We have synthesized 20 bio-derived solvents that are cost-effective, renewable, and able to release sugars from biomass' complex structure. We used the invasive water hyacinth as our model lignocellulose and process it with the synthesized bio-based solvents at various temperatures and times, followed by the enzymatic hydrolysis of the processed water hyacinth. We obtained a high sugar yield of 70% within 48h. The synthesized solvents were characterized by Thermogravimetric analysis (TGA) to investigate their decomposition temperature. The processed water hyacinth samples were characterized by X-ray Diffraction (XRD) and Fourier-transform Infrared Spectroscopy (FTIR) to investigate the dissolution mechanism of water hyacinth samples in synthesized solvents.

Biography of Presenter

Anwar Hossain is a Ph.D. candidate in the chemical engineering department at the University of Louisville. He received his B.S. in chemical engineering from Shahjalal University of Science and Technology, (Bangladesh) in 2012. He took a stroll in the oil/gas industry after graduation. Then he realized that crude oil was not renewable and he would like to learn more about renewable energy. He joined UofL in 2016 and currently is working on renewable fuels and chemicals from natural resources.