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Pyrolysis of Agricultural Biomass for Production of Refinable Crude Bio-Oil

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Friday 11/13/15 • 1:30 PM • Sweigart 115

The USDA's Agricultural Research Service (ARS) has been investigating distributed, on-the-farm scale fast pyrolysis technologies as a platform for farmers to participate in the production of advanced biofuels to meet the 2022 Energy Independence and Security Act (EISA) goals. Fast pyrolysis, the rapid heating in the absence of oxygen, has been proven to be one of the most efficient methods for the liquefaction of lignocellulosic biomass into intermediates for the production of renewable fuels, chemicals and bio-based products. However, the utilization of these fast pyrolysis bio-oils has been inhibited by some undesirable properties of the liquids, including thermal instability which makes further processing and handling problematic.

This presentation will describe current efforts at the ARS-USDA towards mitigating these problems, by manipulating the pyrolysis technology to produce more stable liquids that may contain high concentrations of marketable renewable chemicals. A particular key chemical challenge is to achieve these goals while maintaining atom (carbon and hydrogen) efficiency. This presentation will discuss our research group's efforts to better understand the role of biomass composition on the properties of resultant pyrolysis oils, our use of catalytic processing over various zeolite-based materials and reactive co-reactants, and the post-production processes (separations and hydrotreating) we use to transform the bio-oils into final usable products.



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