

Catalyst-assisted pyrolysis of renewable feedstocks

A. What is this research project?

Pyrolysis is the thermochemical conversion of biomass into char, liquid, and gas. The value of char is currently limited to soil amendment and adsorbent, but the liquid and gas fractions contain compounds of interest for use as fuels, commodity chemicals, and fine chemical precursors.

Our research focuses on the development of solid inorganic catalysts that can be added to the pyrolysis reactor, which influence the types and quantity of compounds found in the liquid and gas fractions. This technology could be used to develop fuels and fine chemicals from renewable feedstocks such as agricultural or forestry waste and from industrial waste such as plastics.

B. What problem does it address?

- Is pyrolysis a viable route to bio-based fuels and fine chemicals?
- Is the value of the fuels and chemicals produced great enough to justify the high energy input needed for the pyrolysis process?
- What are the parameters (i.e. feedstock, temperature, time, desired compounds, undesired compounds) that must be met to make pyrolysis cost effective?

C. How is the project different from or how does it enhance other projects?

Our benchtop pyrolysis system allows for rapid screening of catalysts on a small scale. From this screening, proper catalyst choice will lead to greater product selectivity and reduced energy input.

D. What are the benefits of partnering with ARS on this research?

We have the capability to perform bench-scale pyrolysis reactions to screen catalysts and feedstocks. The liquid and gas fractions can be quickly analyzed to determine the best catalyst attributes for forming the desired pyrolytic products.

E. Who are the potential customers?

Our research could potentially be used by grain processors who are looking to increase return on excess biomass like DDGS or corn stover by adding value to these waste streams. Others with excess carbon waste may include food processors and plastics manufacturers.



Stage of Development

Preliminary data have been obtained indicating that commercially available catalysts can affect the formation of the pyrolytic compounds.

Moving Forward

Process and chemical engineering assistance is needed for energy and process cost analysis and for scale-up.

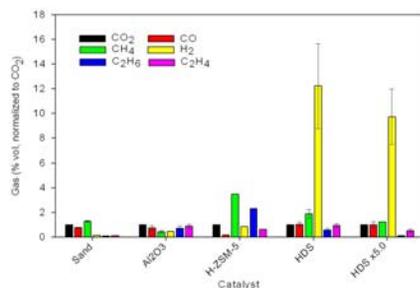


Researchers

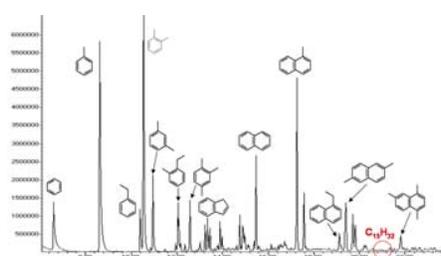
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Catalyst effect on the gasses formed during the catalyst assisted pyrolysis of soybean oil



Chemicals and precursors formed during the catalyst assisted pyrolysis of soybean oil

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