

Improving Biofuel Production and Combustion



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Site Information

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Mission is...

“To innovate technologies for cleaner and efficient combustion of fuels for power generation and propulsion to promote sustainability”



Showcasing the microreactor I built for small batch testing in hydrothermal liquefaction processes

Impact

Through my work at the Combustion Lab...

- ❑ We chose the best algal species to use in CO₂ extraction
- ❑ We were able to quickly test different factors at high heating rates in my HTL microreactor
- ❑ We had an auger design that could be scaled up for industrial applications

My work helped increase heating rates and yields while reducing charring and impurities in bio-oil, contributing to biofuel optimization for combustion and potential fossil fuel replacement.

I'm grateful for my time at the Combustion Lab, where I applied and expanded my knowledge in a field with far-reaching impacts. Research like ours pushes the energy sector toward a cleaner, more accessible future.

Introduction/Issues

From Spring through the Summer, I've worked at the University of Maryland's Combustion Laboratory.

With biofuel, it's important to consider all that factors that could affect product yields/quality. These include feedstock, solvents, catalysts, heating rates, and other factors.

During my stint, we were trying to optimize our bio-oil yields/quality from HTL and CO₂ extraction. Previously, we had been dealing with low bio-oil yields and high impurities/water content.

These issues make bio-oil less than ideal for real-world application in combustion engines and less sustainable as well.

Future Work

With my contributions, I hope the Combustion Lab can quickly test out different factors and be able to get closer to scaling up their work for industrial energy production.



Working on a reactor vessel cover so that we can add a rupture valve to it

Activities

Some of my work included

- ❑ Creating a database of algal species and their chemical compositions in order to select an optimal feedstock
- ❑ Designing, simulating, and building a microreactor for HTL processes
- ❑ Designing and simulating an induction-heated auger reactor for pyrolysis processes



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