

GENERAL ABSTRACT

Kathleen Moyer

National Renewable Energy Laboratory

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The Biosciences center at the National Renewable Energy Laboratory (NREL) focuses on developing technologies to convert biomass to renewable fuels and chemicals to reduce plastic consumption, decrease the amount of waste plastic in landfills, and minimize the nation's dependence on fossil fuels. Biomass is plant matter from different feedstocks (corn, pine, switchgrass, sugar cane, and woody plants) and can be refined into fuels as a renewable alternative to petroleum. My Science Undergraduate Research Internship (SULI) examines chemical and catalyst science to enhance the production of renewable fuels and chemicals from biomass.

Catalysts are chemical reaction accelerators used to promote reactions. I designed a template-assisted catalyst preparation method for making economically competitive, renewable catalysts. Template-assisted synthesis is a common method for enhancing surface area and introducing a controlled number of pores and surface make-up to catalyst particles to enhance catalyst performance and improve the conversion of biomass to renewable fuels and chemicals. I then imaged the catalyst particles using scanning and transmission electron microscopy to evaluate the size and structure of the particles. Overall, this project has confirmed that using bio-derived materials as a catalyst template is economically advantageous and is a novel method to make stable and efficient catalysts to enhance the production of renewable fuels and chemicals from biomass.

My second research experience as part of the SULI program has cemented my decision to pursue a PhD at Vanderbilt University in Materials Science and Engineering with a focus on energy storage mechanisms. The skills and experiences that I have acquired at NREL have helped me develop the unique skillset of a researcher, have fostered my intrinsic curiosity to comprehend the underlying phenomena of the universe for scientific principles, and has inspired me to use my technical and critical thinking abilities to pursue sustainable materials engineering solutions that benefit society.