DEPARTMENT OF CHEMICAL AND ENVIRONMENTAL ENGINEERING
COLLEGE OF ENGINEERING AND APPLIED SCIENCE

RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students

APPLICATION DEADLINE: April 29, 2024

PROJECT TITLE: Developing a High Precision Sorting Process for Waste to Energy

Physical Requirement : Must be able to lift 20lbs
Project's Technical Skills Requirement : Chemical, Environmental, mechanical engineering
Project's Available Positions : 1

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Project Description

Developing a High Precision Sorting Process for Waste to Energy
Faculty Advisors:
Maobing Tu, Ph.D., Chemical and Environmental Engineering

The objective of this project is to develop an advanced sorting and fractionation technology to separate organic fraction waste from non-recyclable municipal solid waste (MSW) and to blend, formulate, and densify organic waste with lignocellulosic biomass for biochemical conversion. In the U.S., approximately 268 million tons of MSW was generated per year and more than 139 million tons of MSW were landfilled. MSW disposal has created significant adverse impact on the environment and human health. MSW represents a source of low-cost feedstocks for biofuels and bioproducts. The existing research on biofuels development from lignocellulosic biomass can be leveraged to make the MSW-to-energy processes more economically viable. In the MSW, only organic fraction of waste can be used in biochemical conversion. Plastic, metal and other impurities in MSW must be sorted and separated to produce high-purity organic stream as conversion-ready feedstocks.
Fractionation, size reduction, sorting and preprocessing of MSW must be efficient to separate and obtain valuable high-quality fractions, and minimize clogging and jamming caused by impurities and contaminants. In this project, we will develop high-precision sorting of organic waste using integrated disc screen and milling technology and determine the process parameters for efficient separation, and to use biomass blending, formulation, and densification to reduce feedstock variability of the sorted organic material from MSW. This technology has great potential to reduce the preprocessing cost and produce conversion-ready feedstocks that will meet a

required cost of $73/dry ton.

This research project will be completed at UC Center Hill facility Bioenergy lab. Students will work with graduate students and postdoc together to operate the big equipment system.
Preferred skills include:
• Experience with chemical and environmental processes.
Training provided:
• Hands-on experience of how to operate pilot scale equipment.
• Knowledge of mass balance and chemical composition.
• Inter-disciplinary collaboration with national laboratory scientists.
• Potential for research publication and presentation at AIChE conference.