



BIOFUEL RESEARCH LABORATORY



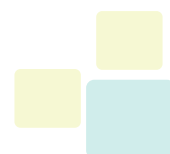
Assess and optimize the pathways of producing liquid, gaseous, and solid biofuels and value-added bioproducts via thermochemical conversion (pyrolysis, gasification, fermentation and extraction processes). The Biofuel Lab was the first lab established in 2012, being the pioneering lab of Center for Advance Studies Energy (USPCASE), NUST. Biofuel Lab has been part of different collaboration projects with industries as well as other educational institutions. Recently, Biofuel lab has worked on an R&D project titled “Production Methane from Potato Peel using Anaerobic Digestion” in collaboration with FFCL, Pakistan, and USAID. Under the Umbrella of Biofuel research lab, the research projects of MS, Detection and Applied industrial projects have been conducted during the life of the projects in the domain of Bioenergy. We also run the fuel cell car on Hydrogen produced from Fruit and Vegetable waste. The laboratory also aims to promote public understanding, acceptance, and use of biofuels by promoting research, development, and improvement of biofuels technologies, production, marketing and delivery; and by promoting the sustainable development, cultivation and processing of biofuels crops, agricultural residues and organic waste.

LAB MISSION

The Biofuels Research Laboratory explores advances in feedstock production and energy conversion to support the development of biomass as an energy resource.

RESEARCH PORTFOLIO

Conversion of Waste to Energy, Micro Algae Cultivation, Biomass Gasification, Production of Biodiesel, and Lifecycle Assessment of Biofuel



RESEARCH EQUIPMENT

Equipment	Description	Specification
High-pressure liquid Chromatography (HPLC)	An analytical technique used to separate, identify or quantify each component in a liquid mixture.	Temperature ran:10 -80 °C: Recommended: 1.0 – 12.5, pH range Standards Available: Formic Acid, Propionic Acid, Acetic Acid, Butyric Acid
Gas Chromatography (GC)	It is a chromatography technique that can separate and quantify volatile compounds in gas phase.	Injection Method: Split ratio: 1:300 Injection Volume: 0.2 µL Column: Restek MS50A Gas Detection: CH4, CO2, CO, H2 etc.
Supercritical Fluid Extractor	Supercritical Fluid Extraction (SFE) Systems extract chemical compounds using supercritical carbon dioxide instead of an organic solvent	Max. Pressure: 10,000 psi. Temp. Range: Ambient to 200°C. Supercritical Agent: CO2 Sample Vessel : 2 Liters
Polymerase Chain Reaction (PCR)	It is used to rapidly make millions to billions of copies of a specific DNA sample thus amplify it to a large enough amount to study in detail.	Temp. range: 4°C–99.9°C. Reaction Vol. 10–30 µL.
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Anaerobic Glove Box	Used to create an oxygen-free environment inside the chamber. Used for Anaerobic Digestion reactions	Environment : 5 % H2, 5 CO2, and 90 % Nitrogen Temp. Range: 60 °C.
COD Analyzer	It measures the chemical oxygen demand of the sample. Used in the characterization of biogas producing samples	Measuring Range 50 – 3,000 mg/l Measuring unit: mg/Ltr
Incubators	Incubates the sample at a certain temperature, humidity.	Temp Range: +5C - 50C Enviroment: CO2