Biofuels Research Facility

The biofuels and environmental engineering laboratory facilities at Old Dominion University is in the Kaufman Hall Room 243, 258, and 259 (Civil and Environmental Engineering) and is equipped with fume hoods, advanced analytical instruments, and small equipment. The laboratory possess high temperature/high pressure batch and continuous reactors for conducting experimental studies related to biofuels and biochar production from lignocellulosic biomass / microalgae. This facility is well-equipped for studying different conversion processes including thermochemical, catalytic, hydrothermal (sub-and supercritical water), and anaerobic digestion.

Equipment

The overall research facility comprises following important equipment/instruments for the experimental studies, product analysis, and characterization:

- A bench scale continuous flow reactor connected with online sampling arrangement connected to a gas chromatograph (TCD & FID) for the gas analysis,
• A computer controlled 500 ml volume high temperature (500°C) and high pressure (5000 psi) batch reactor (Parr Reactor),

• Customized Dionex model: ICS-5000 ion chromatography system with auto sampler having Conductivity and electrochemical detectors. The IC system is equipped with AminoPac PA10, CarboPac SA10, and IonPac AS18 4 mm Analytical Columns,
• Tecator digestor 2508 with integrated programmable unit connected with a distillation unit (KJELTEC 8100),

• BET surface area and pore volume analyzer (Quantachrome NOVA 2200e),
• Gas chromatograph (SRI Instruments)

• UV-Vis spectrophotometer (Varian)
• Total carbon/nitrogen (TOC/NOC) analyzer with autosampler (Shimadzu),

• Closed photobioreactor for Algae Cultivation
• Moisture analyzer

Precision balances, Centrifuge, Fraction collectors, High speed centrifuge, Shaker etc., Particle size analyzer (Coulter multisizer), Zeta potential (COULTER DELSA 440SX). High pressure pumps.

Software

• HSC Chemistry 7.0, SuperPro Designer v9.0, MS Project, MS Visio 2010, EndNote.

Computer

• Analytical instruments are connected to the individual computer for instrument control, data acquisition and analysis. Separate computer are available for office use (e.g., word processing and figure preparation). These computers are linked to a local area network for e-mail, printing and Internet access. Communication and data exchange within the research group is to be done through the local network and the Internet.

Other ODU Facilities:

• Major Equipment (Chemistry, Oceanography, and Engineering): The research facilities in the Department of Chemistry and Biochemistry include a Sunset Laboratory OCEC Carbon Aerosol Analyzer(Model 3), a Varian Saturn 2000 GCMS equipped with a FOM-5LX Curie-point pyrolysis unit, a Dionex ion chromatography system, Go-Flo bottles, a clean room, a 400MHz NMR, radio isotope counting equipment, a cold room, an ICP-MS, three atomic absorption-emission spectrophotometers, photo-oxidation unit (Ace Glass), two tissue culture rooms, two automatic incubators, a number of UV-Vis
spectrophotometers including a rapid scan device capable of doing kinetic studies and a diode array instrument, a research grade spectrofluorometer, several centrifuges including a refrigerated ultra-centrifuge, titrators, polarographic analyzers, five FTIRs (one with an integrated microscope with specular, diffuse, and ATR objectives), an FT-Raman spectrometer, a dispersive micro-Raman spectrometer, state-of-the art electrochemistry equipment, a differential scanning calorimeter, a Scanning Tunneling Microscope, an Atomic Force Microscope.

- Computer Network at ODU. In addition to the computer equipment listed above, each faculty office is equipped with a networked personal computer and the graduate and undergraduates have access to network computer facilities in a departmental computer room. These computers are linked to ODU’s main-frame computer.

- Shop Resources at ODU. Shop facilities for the construction of field equipment are readily available on campus. A full-time electronics technician is employed by the Department of Chemistry and Biochemistry for equipment repair and maintenance.

- The Engineering program at ODU housed extensive imaging facilities associated with the Applied Research Center (www.eng.odu.edu/arc/files/Analytical.shtml) and included in these facilities is a JEOL JSM 6060LV scanning electron microscope, a high resolution transmission electron microscope (JEOL JEM-2100F), and an atomic force microscope.