The Biopolymers & Biocomposites Research Team facilities are designed to develop, test, and scale-up new biobased materials. Through the use of our unique facilities and equipment, we are able to take bench-scale formulations to full-scale manufacturing production.

Approximately 8,000 square feet of lab space provides ample bench room for workers, equipment, and supplies. The labs include state-of-the-art equipment and offer a full range of thermal analysis and mechanical characterization services.

Pilot plant space includes 3,000 square feet for industrial products processing. The pilot plant equipment includes a plastic film and sheet extruder, compression and injection molding machines, glue depositing, and mechanical testing equipment.

Our researchers also have access to and expertise in small angle x-ray and neutron scattering for in situ nanoscale structural characterization.
PROCESSING EQUIPMENT

Extruder, twin screw, barrel L:D 20:1 (diameter D = 18mm), throughput 0.2-40 kg/hr, Leistritz Group
Extruder, single screw lab scale, barrel size L:D 18 (diameter 20 mm), throughput 0.5-5 kg/hr, max temp 300-450 °C, Brabender
Extruder, counter rotating twin screw, barrel L:D 16:1 (diameter 25mm), throughput 0.5-60 kg/hr, Brabender
Extruder, single screw with string extrusion die or sheet extrusion die, sheet take off device, L:D = 25 (screw diameter 30 mm), throughput 0.5-15 kg/hr, max temp 300-450 °C, Brabender
Extruder, fully-intermeshing twin screw, Leistritz Group ZSE-27
Extruder, co-rotating twin screw with main throat feed and downstream “side stuffer” feed, barrel L:D 40:1, throughput 20 kg/hr, screw speed 300 rpm, up to 500 possible, Leistritz ZSE-27
Extrusion system, single and two stage PC controller, barrel L:D 25 (diameter 20mm), Brabender
Compression mold, both plates heated and cooled, plate size 0.5m×0.5m, 150 tons, Wabash
Compression mold, both plates heated and cooled, plate size 0.25m×0.25m, 20 ton, Wabash
Compression molding machine, 50 ton
Injection molding machines, 22 ton, Boy Machines, Inc. (2)
Injection molding machine, table top, multi-press
Reactive casting
Vacuum thermal forming equipment, C.R. Clarke Vacuum Former 1820

CHARACTERIZATION EQUIPMENT

DSCs including a modulated DSC system with an autosampling robot, TA Instruments Q20 and Q2000
Dynamic mechanical analyzer, TA Instruments Q800
Thermomechanical analyzer, TA Instruments Q400
Thermogravimetric analyzer, TA Instruments Q50
Stress rheometer, with an environmental temperature control oven, TA Instruments AR2000ex
Universal testing machine for tensile, compression, and flexural testing of polymers and composites, with an environmental testing chamber (for testing from -70 to 350 °C), Instron model 5569
High resolution video extensometer to measure both lateral and transverse strains
Gel permeation chromatography system with light scattering, Waters Breeze, rheometer, Rheometrics ARES
Cone and plate viscometer, Brookfield
Rotary evaporator
Microbalances, Mettler
Waters GPC with light scattering detector, glove box and IR are available, Perkin-Elmer DSC/TGA

Blow molding machine, Flex Blow Molder
Ultrasonic welding machine, 2200w, 20 kHz, Branson
Ultrasonic welding system, 1500w, 35 kHz, Hermann Ultrasonics
Ultrasonic Servo System ultrasonic welding machine, 20 kHz, MC 200, Branson
Impulse welding system
Power supply, 0-40 volt, 0-70 amp, Xantrex XFR 40-70
Recirculator, PolyScience model 340
Programmable logic controller, Omron ZEN 10 C1AR-A-V2
Power supply 1660 A, BKL Precision
Impulse sealer, 2600w, American International Electronics
Plastic notcher, Ceast Notch VIS
Blow film tower, Brabender
Rotational molders (2)
Pelletizer, Brabender
Pelletizer, Sheer Bay Company
Vibrating screen, Prater-Sterling
Glue spreader, Black Bros. Co.

Drop tower instrumented impact machine, Dynatup
NMR — Bruker DRX-400 NMR; Tecmag AC-200 NMR; Varian VXR-300; Varian VXR-400; Anasazi EM-380 NMR (2); Bruker ER-200 EPR; Bruker DRX-500 NMR (Biological NMR Facility); Bruker Avance-600 solids/solution; Bruker Avance-700 solution (Biological NMR Facility)
Mass Spectrometry — Finnigan TSO-700 Triple Quadrupole GC-LC-MS; Finnigan MAGNUM Ion Trap GC-MS; Finnigan LCQ Ion Trap LC-MS-MS; Kratos MS-50 Magnetic Sector MS; Bruker Proflex II MALDI-TOF MS; Micromass GCT Accurate mass GC-MS; Shimadzu LCMS-2010 Electrospray/APCI MS
Spectrophotometry — Agilent 8453 diode array UV-Vis; Bruker IFS-66v FT-IR; JASCO J-710 CD spectrophotometer
Elemental analysis, Perkin Elmer 2400 Series II CHN/S analyzer
XS-ray diffraction — Bruker SMART 1000 CCD single crystal; Scintag XDS-2000 powder diffractometer
Melt flow indexer, Custom Scientific Instruments, Inc.
Tensile testing machine, load frame with 5 kN load cell, Instron model 4500
Tear tester, Oakland Series ME
Impact tester, 2 ft, 2 lb, SSI Satec Systems Inc