

MICHIGAN STATE
UNIVERSITY



College of Engineering Testing Facilities

*For technical questions, quotations and pricing, please consult the
MSU contact listed in this document.*

For Other Comments or Questions:

Dr. Peggy Wade
Director, Division of Engineering Research
Michigan State University
3428 Engineering Building
East Lansing, MI 48824
517/353-9492
E-mail: wadem@egr.msu.edu

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Prepared and Updated by Peggy Wade and Mike Rich

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1855-2005

ADHESION TESTING FACILITY

Test instruments for measurement of physical, chemical, and mechanical properties of composite fiber:matrix interphase, as well as adhesively bonded structures

| Equipment | MSU Contact | MSU Information |
|--|--------------------------|--|
| Cahn Dynamic Contact Angle Apparatus | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| Indentation Test System for Interfacial Adhesion | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| Patti Coatings Adhesion Tester | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| Plasma Sciences 500 Surface Treatment Reactor | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| Ramé-Hart Contact Angle Goniometer | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| Single Fiber Fragmentation Test Station | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |



BIOMECHANICAL EVALUATION

Nearly any mechanical device that interacts with the human body can be evaluated and tested in the Biomechanical Design Research Laboratory. The activities of this group use technologies including motion measurement systems, pressure mapping, force transducers, and human modeling to assess, provide design guidance, and validate the design objectives of products

| Equipment/Test | MSU Contact | MSU Information |
|---|---|--|
| Motion analysis system to measure movement of people and of mechanical devices (such as automotive or office seats), including joint angles, translations and rotations | Dept. of Mechanical Engr. Dr. Tamara Reid-Bush | Phone:517/353-9544 reidtama@egr.msu.edu |
| Multi Axis Load cells to measure loading in the X,Y,Z directions and corresponding moments about these axes for sports biomechanics and seating evaluations | Dept. of Mechanical Engr. Dr. Tamara Reid-Bush | Phone:517/353-9544 reidtama@egr.msu.edu |
| Spinal articulation measurement; Ability to monitor spinal flexion | Dept. of Mechanical Engr. Dr. Tamara Reid-Bush | Phone:517/353-9544 reidtama@egr.msu.edu |
| Tekscan Pressure mapping: Evaluation of the distribution of contact pressures | Dept. of Mechanical Engr. Dr. Tamara Reid-Bush | Phone:517/353-9544 reidtama@egr.msu.edu |



CHEMICAL ANALYSIS

Equipment to measure not only chemical compositions, but also the orientation and structural information of chemicals of interest, is available. See also the equipment listed under ELECTRON MICROSCOPY, SURFACE CHEMISTRY AND MORPHOLOGY INSTRUMENTATION.

| Equipment/Test | MSU Contact | MSU Information |
|---|---|---|
| Fluorescent and Radiographic Gel and Blot Imaging | Dept. of Chemical Engr. and Materials Science Dr. Pat Walton | Phone: 517/432-8733 E-mail: spwalton@egr.msu.edu |
| FTIR for Analytical Analyses | Dept. of Chem.. Engr. and Materials Science Dr. Andre Lee | Phone: 517/355-5112 E-mail: leea@pilot.msu.edu |
| Perkin-Elmer Spectrum ONE FTIR | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |



CIVIL INFRASTRUCTURE LABORATORY

Equipment and instruments for testing concrete, pavements, building materials and structures.

| Equipment/Test | MSU Contact | Contact Information |
|----------------------------------|---|---|
| 15 Kip Actuator, 6" Stroke | Dept. of Civil and Environmental Engineering Mr. Sia Ravanbakhsh | Phone:517/432-4913 E-mail: ravanbak@egr.msu.edu |
| 220 Kip MTS Actuator, 48" Stroke | Dept. of Civil and Environmental Engineering Mr. Sia Ravanbakhsh | Phone:517/432-4913 E-mail: ravanbak@egr.msu.edu |
| 6 GPM Pumping System | Dept. of Civil and Environmental Engineering Mr. Sia Ravanbakhsh | Phone:517/432-4913 E-mail: ravanbak@egr.msu.edu |
| 90 GPM Pumping System | Civil and Environmental Engineering Mr. Sia Ravanbakhsh | Phone:517/432-4913 E-mail: ravanbak@egr.msu.edu |
| Abrasion (ASTM C779) | Dept. of Civil and Environmental Engineering Mr. Sia Ravanbakhsh | Phone:517/432-4913 E-mail: ravanbak@egr.msu.edu |



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| Compression (ASTM C39) | Dept. of Civil and Environmental Engineering Mr. Sia Ravanbakhsh | Phone:517/432-4913 E-mail: ravanbak@egr.msu.edu |
| Compression on Core Sample (ASTM C39) | Dept. of Civil and Environmental Engineering Mr. Sia Ravanbakhsh | Phone:517/432-4913 E-mail: ravanbak@egr.msu.edu |
| Data Acquisition System | Civil and Enviro.Environmental Engineering Mr. Sia Ravanbakhsh | Phone:517/432-4913 E-mail: ravanbak@egr.msu.edu |
| Flexure (ASTM C78) | Dept. of Civil and Environmental Engineering Mr. Sia Ravanbakhsh | Phone:517/432-4913 E-mail: ravanbak@egr.msu.edu |
| Forney Compression Testing Machine | Civil and Enviro.Environmental Engineering Mr. Sia Ravanbakhsh | Phone:517/432-4913 E-mail: ravanbak@egr.msu.edu |
| Freeze-Thaw | Dept. of Civil and Environmental Engineering Mr. Sia Ravanbakhsh | Phone:517/432-4913 E-mail: ravanbak@egr.msu.edu |



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| Hydraulic Cylinder | Civil and Enviro.Environmental Engineering Mr. Sia Ravanbakhsh | Phone:517/432-4913 E-mail: ravanbak@egr.msu.edu |
| Impact | Dept. of Civil and Environmental Engineering Mr. Sia Ravanbakhsh | Phone:517/432-4913 E-mail: ravanbak@egr.msu.edu |
| Impact on Cement Board | Dept. of Civil and Environmental Engineering Mr. Sia Ravanbakhsh | Phone:517/432-4913 E-mail: ravanbak@egr.msu.edu |
| Load Frames | Civil and Enviro.Environmental Engineering Mr. Sia Ravanbakhsh | Phone:517/432-4913 E-mail: ravanbak@egr.msu.edu |
| MTS Universal Testing Machine | Civil and Enviro.Environmental Engineering Mr. Sia Ravanbakhsh | Phone:517/432-4913 E-mail: ravanbak@egr.msu.edu |
| Scaling (ASTM C672) | Dept. of Civil and Environmental Engineering Mr. Sia Ravanbakhsh | Phone:517/432-4913 E-mail: ravanbak@egr.msu.edu |



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|---------------------------|---|---|
| Sorptivity | Dept. of Civil and Environmental Engineering Mr. Sia Ravanbakhsh | Phone:517/432-4913 E-mail: ravanbak@egr.msu.edu |
| Split Tensile (ASTM C496) | Dept. of Civil and Environmental Engineering Mr. Sia Ravanbakhsh | Phone:517/432-4913 E-mail: ravanbak@egr.msu.edu |
| Tensile on Rod | Dept. of Civil and Environmental Engineering Mr. Sia Ravanbakhsh | Phone:517/432-4913 E-mail: ravanbak@egr.msu.edu |



COMPOSITE AND POLYMER PROCESSING EQUIPMENT

Equipment and instruments for the manufacture of plastics, polymers, and composites and evaluation of physical properties as a function of aging and environmental conditioning

| Equipment/Test | MSU Contact | Contact Information |
|---|--------------------------|--|
| Atlas ES25 Weather-O-Meter | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| Cincinnati Milacron Sentry 85 Injection Molder | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| Killion .75 in Single Screw Extruder | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| Research Tool Hot-Melt Prepregger | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| Tetrahedron Programmable Smart Press | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| UV Curing Chamber | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| Werner-Pfleidderer ZSK 30mm Twin Screw Extruder | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |



ELECTROMAGNETICS TESTING

General RF or microwave electromagnetic measurements can be made.

| Equipment/Test | MSU Contact | MSU Information |
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| Material analyzer | Dept. of Electrical and Computer Engineering Dr. Leo Kempel | Phone: 517/353-4499 E-mail: kempel@egr.msu.edu |
| Wideband signal sources and automatic network analyzers; fast pulse generators and sampling oscilloscopes | Dept. of Electrical and Computer Engineering Dr. Leo Kempel | Phone: 517/355-1771 353-9944 E-mail: nyquist@egr.msu.edu mpel@egr.msu.edu |



**ELECTRON MICROSCOPY, SURFACE CHEMISTRY,
MORPHOLOGY, and DIFFRACTION INSTRUMENTATION**

Equipment for the study of delamination, fractography, chemical contamination, adhesion, oxidation state, corrosion, crystal structure and crystal orientations of materials, characterization of various powders (metal, ceramic and glass), and surface and interfacial tension measurements is available.

| Equipment | MSU Contact | MSU Information |
|--|---|---|
| CamScan 44 FE FEG-Scanning EM; high resolution SEM with EBSP and SACP Diffraction capabilities and extra large chamber and stage | Dept. of Chem. Engr. and Materials Science Dr. Marty Crimp | Phone: 517/355-0294 E--mail: crimp@egr.msu.edu |
| Digital Instruments Scanning Probe Microscope | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| Electron Backscattered Diffraction Equipment | Dept. of Chem. Engr. and Materials Science Dr. Carl Boehlert | Phone: 517/353-3703 E-mail: boehlert@egr.msu.edu |
| ElectroScan Environmental Scanning EM Model 2020 | CMSC Dr. Per Askeland | Phone: 517/353-9939 E-mail: askelando@egr.msu.edu |
| Growth, Tension and Compression Testing Machine with Environmental Chamber | Dept. of Chem. Engr. and Materials Science Dr. Carl Boehlert | Phone: 517/353-3703 E-mail: boehlert@egr.msu.edu |



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| Hitachi H-800 Transmission EM with Gatan Wide Angle TV camera, tensile and heating stages | Dept. of Chem. Engr. and Materials Science Dr. Marty Crimp | Phone: 517/355-0294 E-mail: crimp@egr.msu.edu |
| Hitachi S-2500C Scanning EM with Thin Window and Windowless EDS detector for Light Element Analysis | Dept. of Chem. Engr. and Materials Science Dr. Marty Crimp | Phone: 517/355-0294 E-mail: crimp@egr.msu.edu |
| Instron Axial/Torsion Hydraulic Testing Machine with Environmental Chamber | Dept. of Chem. Engr. and Materials Science Dr. Tom Bieler | Phone: 517/355-9767 E-mail: bieler@egr.msu.edu |
| Kruss Dynamic Interfacial Tensiometer | Dept. of Chem. Engr. and Materials Science Dr. Robert Ofoli | Phone: 517/432-1575 E-mail: ofoli@egr.msu.edu |
| MATEC System 8000 ESA for Zeta-potential Analysis Colloidal Dynamics Zeta Sizer for zeta potential and particle size analysis | Dept. of Chem. Engr. and Materials Science Dr. Melissa Baumann | Phone: 517/432-1243 E-mail: mbaumanncrimp@egr.msu.edu |
| PHI 5400 Small Spot X-ray Photoelectron Spectrometer | CMSC Dr. Per Askeland | Phone: 517/353-9939 E-mail: askelando@egr.msu.edu |

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| PHI Auger Electron Spectrometer Model 660 | CMSC Dr. Per Askeland | Phone: 517/353-9939 E-mail: askelando@egr.msu.edu |
| X-ray Diffraction Analysis (Scintag XDS 2000), Including Residual Stress and Crystallite Size | Dept. of Chem. Engr. and Materials Science Dr. Tom Bieler | Phone: 517/355-9767 E-mail: bieler@egr.msu.edu |
| X-ray Diffractometer with Pole Figure Goniometers for Crystal Orientation Distribution Analysis | Dept. of Chem. Engr. and Materials Science Dr. Tom Bieler | Phone: 517/355-9767 E-mail: bieler@egr.msu.edu |

ELECTRONIC AND SURFACE PROPERTIES OF MATERIALS

Equipment and facilities for plasma-aided manufacturing.

| Equipment/Test | MSU Contact | MSU Information |
|---|--|--|
| Deposition of Diamond-like Carbon Materials | Dept. of Electrical and Computer Engineering Dr. Tim Grotjohn | Phone: 517/353-8906 E-mail: grotjohn@egr.msu.edu |
| Diamond Deposition on Trial Substrates | Dept. of Electrical and Computer Engineering Dr. Tim Grotjohn | Phone: 517/353-8906 E-mail: grotjohn@egr.msu.edu |



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| Electrical Testing of Electronic Materials and Devices | Dept. of Electrical and Computer Engineering Dr. Tim Grotjohn | Phone: 517/353-8906 E-mail: grotjohn@egr.msu.edu |
| Etching of Materials | Dept. of Electrical and Computer Engineering Dr. Tim Grotjohn | Phone: 517/353-8906 E-mail: grotjohn@egr.msu.edu |
| Optical characterization of materials (Raman, Absorption, Transmission) | Dept. of Electrical and Computer Engineering Dr. Tim Grotjohn | Phone: 517/353-8906 E-mail: grotjohn@egr.msu.edu |
| Oxygen Plasma Treatment of Plastic Parts | Dept. of Electrical and Computer Engineering Dr. Tim Grotjohn | Phone: 517/353-8906 E-mail: grotjohn@egr.msu.edu |
| Particle size analysis of polydisperse suspensions Malvern Mastersizer 2000 | Dept of Civil and Enviro. Engr. Dr. V. Tarabara | Phone: 517/432-1755 E-mail: tarabara@egr.msu.edu |
| Particle Size Distribution and Particle Zeta potential Brookhaven Zetapals Analyzer | Dept of Civil and Enviro. Engr. Dr. V. Tarabara | Phone: 517/432-1755 E-mail: tarabara@egr.msu.edu |
| Streaming Potentials of macroscopic surfaces with Brookhaven EKA Electro-Kinetic Analyzer | Dept of Civil and Enviro. Engr. Dr. V. Tarabara | Phone: 517/432-1755 E-mail: tarabara@egr.msu.edu |

EMISSIONS MEASUREMENTS

Equipment and facilities for U.S. EPA emissions for certification of off-highway engines using dynamometers and emissions measurements equipment

| Equipment/Test | MSU Contact | MSU Information |
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| CFR 90 Emissions test | Dept. of Mechanical Engr. Dr. Giles Brereton | Phone: 517/432-3340 E-mail: brereton@egr.msu.edu |

ENVIRONMENTAL ENGINEERING

Laboratory studies, plant/field assessment, pilot testing, and the associated chemical/physical/biological analyses can be performed, including testing in support of environmental remediation of ground water and sediments.

| Equipment/Test | MSU Contact | MSU Information |
|--|---|---|
| Feasibility assessment, testing and evaluation of industrial waste treatment equipment/processes, site remediation technologies, pollution control strategies, and contaminant fate in the environment | Dept. of Civil and Environmental Engineering Dr. Thomas Voice | Phone: 517/353-9718 E-mail: voice@msu.edu |



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| <p>Ion Chromatography by EPA 300.1 (Dionex 2000i)</p> | <p>Center for Microbial Ecology & Dept Civil and Environmental Engineering Dr. Michael Dybas or Mr. Yan Pan</p> | <p>Phone: 517/355-2254 E-mail: dybas@egr.msu.edu Phone: 517/353-1836 E-mail: pany@egr.msu.edu</p> |
| <p>HPLC analysis of volatile fatty acids (Perkin Elmer Series 200 with Waters 2487 detector)</p> | <p>Center for Microbial Ecology & Dept Civil and Environmental Engineering Dr. Michael Dybas or Mr. Yan Pan</p> | <p>Phone: 517/355-2254 E-mail: dybas@egr.msu.edu Phone: 517/353-1836 E-mail: pany@egr.msu.edu</p> |
| <p>GC/MS Purge and Trap Measurement of chlorinated ethenes and ethanes (Techmar/Dormann 3100 Purge and Trap, Agilent 5973 GC-MS)</p> | <p>Center for Microbial Ecology & Dept Civil and Environmental Engineering Dr. Michael Dybas or Mr. Yan Pan</p> | <p>Phone: 517/355-2254 E-mail: dybas@egr.msu.edu Phone: 517/353-1836 E-mail: pany@egr.msu.edu</p> |
| <p>RT-PCR measurement of <i>Dehalococcoides</i> in Environmental Samples (In conjunction with the MSU Genomic Support Facility)</p> | <p>Center for Microbial Ecology & Dept Civil and Environmental Engineering Dr. Michael Dybas or Mr. Yan Pan</p> | <p>Phone: 517/355-2254 E-mail: dybas@egr.msu.edu Phone: 517/353-1836 E-mail: pany@egr.msu.edu</p> |

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| <p>Microcosm Testing of Contaminant Degradation (Coy Anaerobic Chamber/ controlled environment)</p> | <p>Center for Microbial Ecology & Dept Civil and Environmental Engineering Dr. Michael Dybas or Mr. Yan Pan</p> | <p>Phone: 517/355-2254 E-mail: dybas@egr.msu.edu</p> <p>Phone: 517/353-1836 E-mail: pany@egr.msu.edu</p> |
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MECHANICAL PROPERTY ANALYSES

Strength, stress, strain, fatigue, impact, and wear properties of polymers, fibers, and composites; mechanical tests for fatigue, lifetime analysis, strength, viscoelastic responses, creep, etc. can be performed at temperatures of up to 200°C.

| Equipment | MSU Contact | MSU Information |
|--|--|---|
| <p>ATS Creep/Stress Relaxation Testing Machine</p> | <p>Dept. of Chem. Engr. and Materials Science Dr. Tom Bieler and Dr. Carl Boehlert</p> | <p>Phone: 517/355-9767 E-mail: bieler@egr.msu.edu</p> <p>Phone: 517/353-3703 E-mail: boehlert@egr.msu.edu</p> |
| <p>DuNouy Ring Tensiometer</p> | <p>Dept. of Chemical Engr. and Materials Science Dr. Robert Ofoli</p> | <p>Phone: 517/432-1575 E-mail: ofoli@egr.msu.edu</p> |



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| Instron Axial Screw Driven Testing Machine | Dept. of Chem. Engr. and Materials Science Dr. Tom Bieler and Dr. Carl Boehlert | Phone: 517/355-9767 E-mail: bieler@egr.msu.edu Phone: 517/353-3703 E-mail: boehlert@egr.msu.edu |
| Gas Gun to Characterize Perforation Resistance at Speeds up to 100 m/s | Dept. of Mechanical Engr. Dr. Dahsin Liu | Phone: 517/353-6716 E-mail: liu@egr.msu.edu |
| Impact Testing Machine (Dynatup) with Instrumented Impactor at Speeds up to 9 Miles/hour | Dept. of Mechanical Engr. Dr. Dahsin Liu | Phone: 517/353-6716 E-mail: liu@egr.msu.edu |
| <i>In Situ</i> Tensile and Tensile-Creep testing performed inside Scanning Electron Microscope | Dept. of Chem. Engr. and Materials Science Dr. Carl Boehlert | Phone: 517/353-3703 E-mail: boehlert@egr.msu.edu |
| INSTRON 50K, Model 1127, 2-Screw UTM | CMSC Mr. Michel Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| Krouse VSP 150 Fatigue Station | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| Miniature Materials Tester | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| Servohydraulic Testing Machines | Dept. of Chem. Engr. and Materials Science Dr. Andre Lee | Phone: 517/355-5112 E-mail: leea@pilot.msu.edu |



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| ServoHydraulic Fatigue, Creep, Fatigue Crack Growth, Tension and Compression Testing Machine with Environmental Chamber | Dept. of Chem. Engr. and Materials Science Dr. Carl Boehlert | Phone: 517/353-3703 E-mail: boehlert@egr.msu.edu |
| Single fiber Tensile Tester | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| UTS Screw Drive Test Frame | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |

POLYMER RHEOLOGY AND PROCESSING

| Equipment/Test | MSU Contact | MSU Information |
|--|--|--|
| Capillary Rheometer (Dynisco Instruments) | Dept. of Chem. Engr. and Materials Science Dr. K. Jayaraman | Phone: 517/355-5138 E-mail: jayarama@egr.msu.edu |
| Dynamic Rheology and Thermal Analysis for Composites, Nanostructured Materials and Curing Resins | Dept. of Chem. Engr. and Materials Science Dr. K. Jayaraman | Phone: 517/355-5138 E-mail: jayarama@egr.msu.edu |
| Permeability testing of fiber performs | Dept. of Chem. Engr. and Materials Science Dr. K. Jayaraman | Phone: 517/355-5138 E-mail: jayarama@egr.msu.edu |
| TA Instruments ARES Rheometer | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |

PROTEIN EXPRESSION LABORATORY

The Protein Expression Laboratory (PEL) was established to assist scientists with production of recombinant proteins using microbial expression systems – more details at <http://www.egr.msu.edu/PEL/>

| Equipment/Test | MSU Contact | MSU Information |
|--|---|--|
| Fermentation - Brunswick Bioflo 3000 bioreactors (1-L or 10-L scale) and plans to add a 100-L bioreactor. | Dept. of Chem. Engr. and Materials Science Dr. Mark Worden | Phone: 517/432-1920 E-mail: worden@egr.msu.edu |
| Molecular biology – cloning, DNA Gel electrophoresis and vector selection guidance | Dept. of Chem. Engr. and Materials Science Dr. Mark Worden | Phone: 517/432-1920 E-mail: worden@egr.msu.edu |
| Downstream processing- post-fermentation processing services, including cell concentration, lysis using a French press and freeze-drying; Protein recovery and purification via affinity binding. | Dept. of Chem. Engr. and Materials Science Dr. Mark Worden | Phone: 517/432-1920 E-mail: worden@egr.msu.edu |



RAPID PROTOTYPING LABORATORY

A facility is available for providing rapid prototypes in three dimensions, with single pieces being a maximum of 10 x 10 x 9.5 inches. An ".stl" file format is required.

| Equipment/Test | MSU Contact | MSU Information |
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| Stratasys Fused Deposition Modeling 1650 Machine | Dept. of Mechanical Engr. Mr. Bob Chalou | Phone: 517/432-5260 E-mail: chalou@egr.msu.edu |

RHEOLOGY AND THERMAL ANALYSIS

Rheological and thermophysical evaluation of polymers and composites

| Equipment | MSU Contact | MSU Information |
|--|---|--|
| Brookfield Model HBTDBII and Model DV-II Digital Viscometer | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| DSC, to measure thermal phase transition or isothermal kinetics of chemical reactions | Dept. of Chem. Engr. and Materials Science Dr. Andre Lee | Phone: 517/355-5112 E-mail: leea@pilot.msu.edu |
| MOCON Oxygen, Carbon Dioxide, or Water Vapor Gas Permeability Units Rheometrics RMS 800 | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu Phone: 517/353-4696 E-mail: rich@egr.msu.edu |



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| Rheological measurements, determine complex flow properties of polymer solutions, melts (in steady-state and dynamic oscillatory flow) | Dept. of Chem. Engr. and Materials Science Dr. Andre Lee | Phone: 517/355-5112 E-mail: leea@msu.edu |
| TA Instruments Thermal Analysis System with DSC, TGA, TMA, and DMA | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| TMA, to determine the linear thermal expansion coefficient | Dept. of Chem. Engr. and Materials Science Dr. Andre Lee | Phone: 517/355-5112 E-mail: leea@pilot.msu.edu |
| X-ray Diffraction and Scattering, determine morphology of materials. | Dept. of Chem. Engr. and Materials Science Dr. Andre Lee | Phone: 517/355-5112 E-mail: leea@msu.edu |

SPECIMEN PREPARATION EQUIPMENT

| Equipment | MSU Contact | MSU Information |
|---|--------------------------|---|
| Ball Mill and Trost Impact Pulverizer | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| Buehler Ecomet IV and Struers Abramin Polisher/Grinders | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |



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| Buehler Isomet Low Speed Diamond Saw (2 Units) | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| Buehler Petro-Thin Sectioning System | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| Buehler Vibromet Polisher | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| D. R. Bennett Floor Model Diamond Saw | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |
| Sample Preparation, including electropolishing, EDM, diamond saws, dimpler, ion mill | Dept. of Chem. Engr. and Materials Science Dr. Marty Crimp | Phone: 517-355-0294 E-mail: crimp@egr.msu.edu |
| Sample Preparation, including electropolishing, diamond saws, mounting equipment, automatic polishing machine, abrasive saw | Dept. of Chem. Engr. and Materials Science Dr. Carl Boehlert | Phone: 517/353-3703 E-mail: boehlert@egr.msu.edu |
| Tensilkut Model 10-88 | CMSC Mr. Michael Rich | Phone: 517/353-4696 E-mail: rich@egr.msu.edu |



TURBULENT SHEAR FLOWS LABORATORY

| Equipment/Test | MSU Contact | MSU Information |
|---|--|---|
| Aerodynamic and Under Hood Measurements for Automotive Applications | Dept. of Mechanical Engr. Dr. John Foss | Phone:517/355-3337 E-mail: foss@egr.msu.edu |
| Air Flow Testing for HVAC Systems and Automotive HVAC Registers | Dept. of Mechanical Engr. Dr. John Foss | Phone:517/355-3337 E-mail: foss@egr.msu.edu |
| Axial Flow Fan testing | Dept. of Mechanical Engr. Dr. John Foss | Phone:517/355-3337 E-mail: foss@egr.msu.edu |
| Body Leakage Measurements for Transportation Vehicles | Dept. of Mechanical Engr. Dr. John Foss | Phone:517/355-3337 E-mail: foss@egr.msu.edu |
| General Fluid Mechanics | Dept. of Mechanical Engr. Dr. John Foss | Phone:517/355-3337 E-mail: foss@egr.msu.edu |
| Hot-wire Anemometry | Dept. of Mechanical Engr. Dr. John Foss | Phone:517/355-3337 E-mail: foss@egr.msu.edu |
| Mass Air Flow Sensors with Sonic Nozzle Test Stand | Dept. of Mechanical Engr. Dr. John Foss | Phone:517/355-3337 E-mail: foss@egr.msu.edu |
| Wind Tunnel Studies | Dept. of Mechanical Engr. Dr. John Foss | Phone:517/355-3337 E-mail: foss@egr.msu.edu |



For Additional Information about Testing in the College of Engineering, please contact Dr. Peggy Wade [wadem@egr.msu.edu; 517-353-9492] or visit: <http://www.egr.msu.edu/egr/research/testing.php>



For More Information on the College of Engineering Facilities and Research

Composite Material and Structures Center – <http://www.egr.msu.edu/cmssc/>

Dept. of Chemical Engineering and Materials Science-
<http://www.chems.msu.edu/abet/dept.facil.htm>

Dept. of Civil and Environmental Engineering -
<http://www.egr.msu.edu/cee/research/index.shtml>

Dept. of Computer Science and Engineering – <http://www.cse.msu.edu/rgroups/>

Dept. of Electrical and Computer Engineering –
<http://www.egr.msu.edu/ece/research/>

Dept. of Mechanical Engineering - <http://www.egr.msu.edu/me/research/>

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