Focus Areas of Our Lab

• Primary role: hands-on undergraduate education

• Students learn
  – Materials processing
  – Sample testing and characterization

• Work for external parties is part of education
  – Work with industry, medical, and other parties
  – Students learn on real world projects

• Senior Design Projects, other student projects
UML Resources- Microscopy

• Optical Microscopy
  – Stereozoom, 10X – 120X
  – Compound, 5X – 600X
    • Inverted metallographs with polarization
    • Upright with brightfield/darkfield
  – Digital cameras
    • 5 MP advanced camera
    • 3 MP camera, basic measurements
    • Image Pro Insight image analysis software

• Scanning Electron Microscopy
  – JEOL JCM-5000 Neoscope bench-top
    • ~50X – 15kX Secondary Electron Imaging
    • High and Low vacuum modes
    • Tolerant of uncoated nonconducting samples
UML Resources - Mechanical Testing

• Mechanical Testing
  – Instron Merlin Bench Top Machine
    • 2000 N/450 lbf frame capacity
    • Load Cells: 10 N/2.2 lbf, 500 N/114 lbf
    • Tension, compression, 3 point and 4 point flexural testing (1” x 2” x ~1/16” or 25 mm x 50 mm x 1-2 mm samples)
  – United Test Systems Floor machine
    • 132 kN/30 klbf frame capacity
    • Load Cells: 8.8 kN/2 klbf, 132 kN/30 klbf
    • Tension (flat & round parts), compression, 3 point and 4 point flexural testing (2” W x 6”-11” L x ~1/2” T or 50 mm W x 50 mm x 1-2 mm samples)
UML Resources- Optical Characterization

- Optical spectroscopy
  - Two spectrometers
  - UV-NIR light sources
  - 300 nm – 1100 nm
  - Fiber optic, USB based
  - Several optical fibers
  - Fiber optic collimators
  - Diffuse “cosine corrector” fiber inputs

- Transmission/reflection
  - Multifiber bundle for R
  - Adjustable T & R fixture

- R vs incident angle
  - Fiber in/out, adjustable angle of incidence

- Optical bench hardware
  - Polarization control
  - Incident angle control
  - Integrating sphere
UML Resources - Electrical and Thermal

- Electrical Characterization
  - Resistance and resistivity
    - 4 point probe
    - Precision millohm meters
    - Precision volt meters
    - Temperature dependent

- Thermal Characterization
  - Optical pyrometers
  - Heat flux sensors for thermal conductivty
Contact Information

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