Advanced Materials Research
(innovation at nano- and microscales for enhanced performance at macroscales)

Advanced Materials and Mechanics Lab

Processing-Structure-Property Relationships

- **Ceramics**
  - Nanostructured/ biomimetic ceramic thin films/coating
  - Hybrid systems (inorganic/organic, inorganic/organic/ polymer, etc.)
  - TiO_2, ZrO_2, SiO_2, $BaTiO_3$
- **Polymers**
  - Protective thin films/ coatings, encapsulating polymers
  - Mechanical behavior
  - Viscoelastic behavior
  - Structure modeling
  - Parylene, PDMS, Parylene/PDMS, Teflon
- **Metals**
  - Oxidation of metals (pure indium)
  - Pb-free solders
  - Bonding pad/solder joint metallurgy
  - Nanoindentation
  - Mechanical behavior
  - Microstructure engineering

Research Tools

» Contact mechanics/surface probing (nanoindentation, AFM)
» Mechanical Testing (MTS w/ env. chamber, Instron)
» Microstructure characterization (SEM, TEM, STEM, AFM)
» Other characterizations (XRD, XPS, FT-IR, ellipsometry)
» Computational materials science (atomistic, finite element analysis, solid, fluid)