

## Measurement Facilities: *Cell and Tissue Mechanics*

The Materials Reliability Division has established several capabilities for measuring the response of living cells and tissues to mechanical stimulation. These include the ability to culture cells, handle tissues, and employ a wide range of biological assays. In addition, we have applied our expertise in mechanical testing of conventional materials to biology, developing custom instrumentation to apply controlled, dynamic loads and quantitatively measure responses.

### **Cell Culture Laboratory**

Our cell culture laboratory contains all of the features needed for maintaining cell lines and handling biological tissue samples: laminar flow hood, refrigerator, low temperature freezer, cryogenic storage, incubators, centrifuge, plate reader, optical microscopes, etc. Several cell lines have been established including fibroblasts, adrenal cells, and vascular smooth muscle cells, among many others.

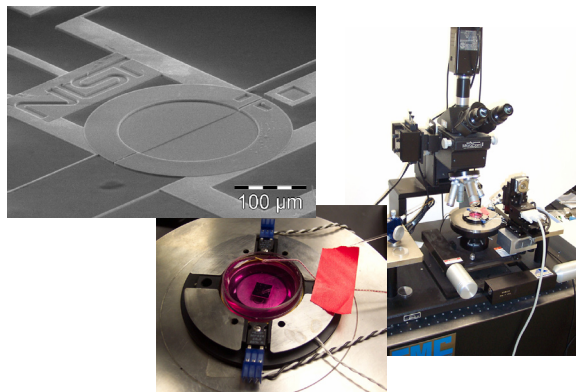


*A laminar flow hood used to handle biological samples without risking contamination by microorganisms in the air.*

### **Mechanical Testing of Cells and Tissues**

Our capabilities include:

- MEMS-based single cell puller (custom; measures dynamic properties of live adherent cells)
- Instrumented bioreactors (custom; measures mechanical properties, applies controlled mechanical stimulation, and assesses histological properties)
- Tissue inflation test (custom; applies axial loads to small tissue samples)
- Scanning acoustic microscope
- Bionix servohydraulic low-force loadframe

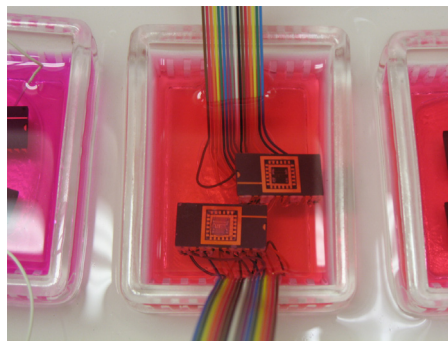


*Custom platform for tensile testing of a single adherent cell.*

### **Other Metrologies**

In addition to our mechanical test capabilities, we have several additional tools including:

- Environmental chambers, optical inspection equipment, and multiplexed electronics for accelerated life testing of discrete electronic components
- Simulated anatomical fluid baths for testing conformally coated electronics.
- A scanning electrochemical microscope system (custom; capable of measuring cell metabolism in complex systems)



*Fluid baths for individual testing of conformal coatings.*

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