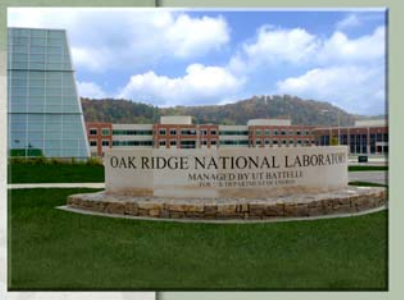
OAK RIDGE NATIONAL LABORATORY
MANAGED BY UT-BATTELLE FOR THE DEPARTMENT OF ENERGY

Microelectronic Systems Research Group

Enabling Next Generation Biomedical Technologies



Biomedical Instrumentation and Measurements

Purpose: The MSR Group partners with other organizations to deliver advanced electronic technologies to meet the nation's health care challenges.

Sponsors: Department of Energy, Office of Basic Energy Sciences, National Institutes of Health, and Department of Defense.

Users: Scientists and engineers from universities, industry, and government laboratories.

Complementary ORNL Facilities:
- Nanoscale Science and Technology Laboratory.
- Center for Nanophase Materials Sciences.

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MSSE

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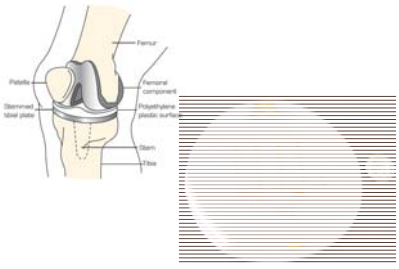
The field of biomedical instrumentation and measurements is an application domain rich with opportunity for the expertise and interests of the Microelectronic Systems Research (MSR) Group. Biomedical engineering represents a unique blend of engineering and scientific disciplines and has a strong overlap with some of the MSR Group's core competencies. The group recognizes the powerful synergies possible, both inside and outside Oak Ridge National Laboratory (ORNL), by nurturing and bringing focus to a biomedical engineering technology base.

Health care is a major issue facing this country. Advances in diagnostics and treatment are critical to increase successful outcomes when dealing with diseases like cancer and improving the quality of life for wounded soldiers and others who have been afflicted by injury or disease. Members of the MSR Group, working closely with their research partners at ORNL, their clinical partners at a variety of research hospitals, and their partners in private industry, are delivering technologies that will help meet the health care challenges facing the nation.



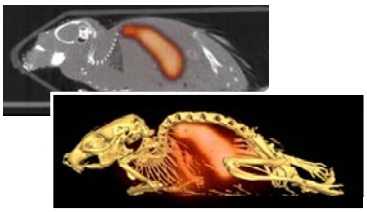
Biocompatible materials and fabrication for implantable orthopedic pressure sensor.

Capabilities/Facilities

In addition to the strong electronic device and systems capabilities inherent in the group, we have developed a strong base of knowledge in the following areas:

- Integrated biomedical sensors/ systems.
- Physiological measurements.
- Noninvasive biosensing and diagnostics.
- Orthopedic measurements.
- Medical imaging technologies.
- Application of nanostructured materials to neuronal and other cellular interfaces.

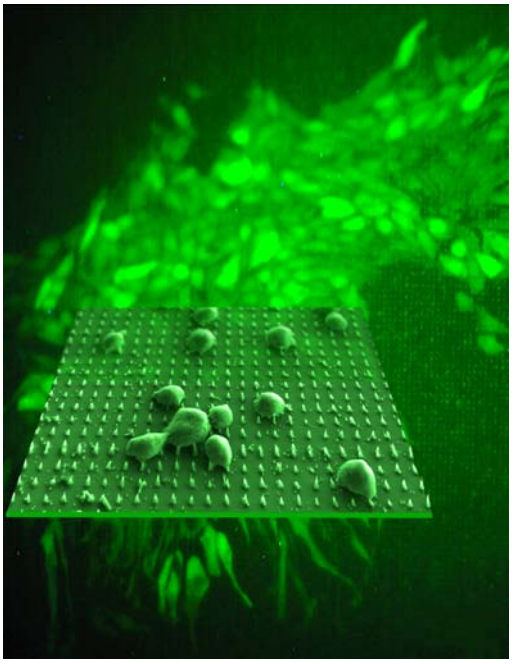
In addition to expertise in these technical areas, there are several facilities that support our biomedical research efforts. These include:



Coregistered CT and SPEC modes of imaging.

- The Nanoscale Science and Technology Laboratory, a user facility with roughly 1,200 square feet of clean room space and a variety of semiconductor processing systems.
- The Center for Nanophase Materials Sciences, a collaborative nanoscience user research facility for the synthesis, characterization, theory/modeling/simulation, and design of nanoscale materials.

- The Cell Culture Laboratory.
- The Medical Imaging Laboratory.
- The Physiological Measurements Laboratory.

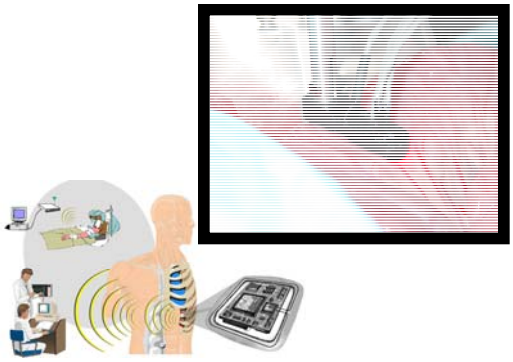


Chinese hamster ovary cells (CHO) following impalement on a nanofiber array.

Partnerships & Strategies

Because ORNL is not a clinical research institution, forming strategic alliances with clinical partners is a critical strategy for us. Examples include the University of Tennessee Medical School, the University of Pittsburgh VA Hospital, MD Anderson Cancer Center, Johns Hopkins University School of Medicine, and the Baylor College of Medicine.

With these partners, we pursue funding from various organizations and agencies, including the National Institutes of Health; the Department of Energy Office of Basic Energy Sciences; a variety of Department of Defense agencies; and small, private, biomedical companies. Additionally, we have formed key collaborations with university biomedical engineering departments. We also strongly encourage and nurture collaborations with researchers in other ORNL divisions working in related areas.



The development of a real-time blood perfusion monitor—a joint research effort with the University of Pittsburgh VA Hospital.

Contact Information

To find out more about our biomedical capabilities and how you can partner with us, please contact Gary Alley (alleygt@ornl.gov) at 865-574-5725.