

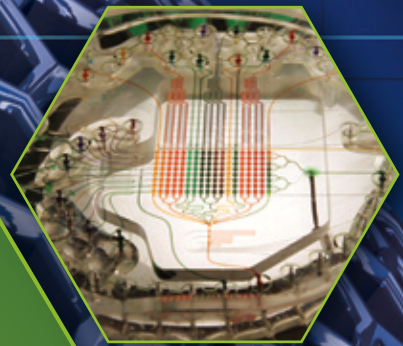
# Material Measurement Laboratory

The nation's reference laboratory for measurements  
in the chemical, biological and material sciences





The mission of the National Institute of Standards and Technology (NIST) is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards and technology in ways that enhance economic security and improve our quality of life. NIST comprises two metrology labs, the Physical Measurement Laboratory and the Material Measurement Laboratory; two technical labs, Engineering and Information Technology; and two user facilities, the Center for Nanoscale Science and Technology and the NIST Center for Neutron Research.



**T**he Material Measurement Laboratory supports the NIST mission by serving as the national reference laboratory for measurements in the chemical, biological and material sciences. Our activities range from fundamental and applied research on the composition, structure and properties of industrial, biological and environmental materials and processes, to the development and dissemination of tools including reference measurement procedures, certified reference materials, critically evaluated data, and best practice guides that help assure measurement quality. Our customer base includes established industrial sectors, emerging industries, government agencies, standards and trade organizations, and the academic and scientific communities.



To provide relevant measurement services, the Material Measurement Laboratory conducts research in:

- Analytical chemistry
- Biochemical science
- Ceramics
- Chemical and biochemical reference data
- Materials reliability
- Metallurgy
- Polymers
- Surface and microanalysis science
- Thermophysical properties of materials

We shape our programs based on national needs with input from industry and government. Our research base provides us with the flexibility to respond to the country's priorities and rapid advances in science and technology.

## Programs

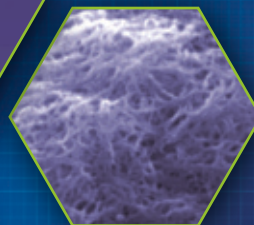
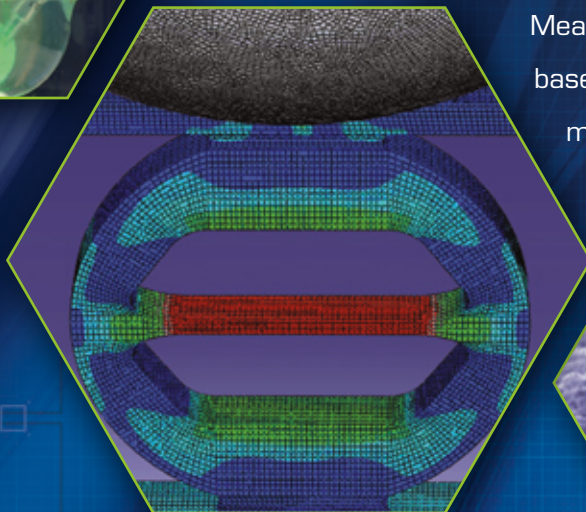
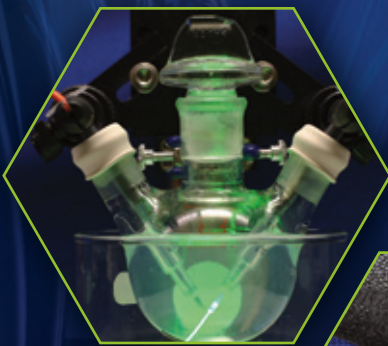
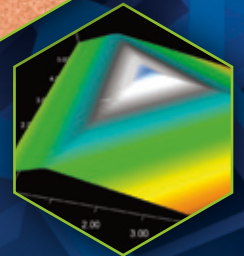
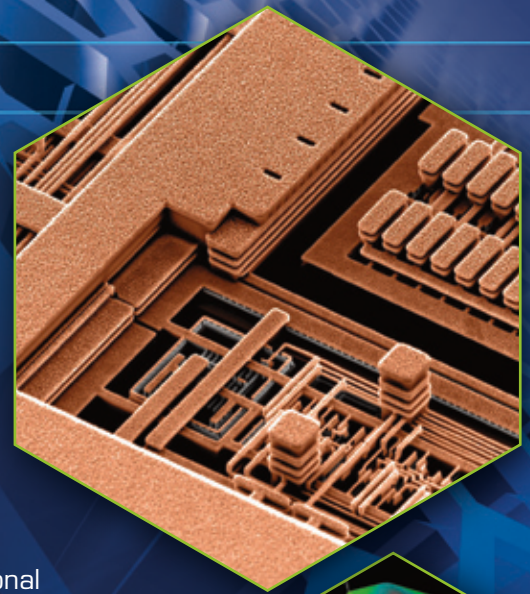
### *Advanced Electronics:*

The Material Measurement Laboratory engages in

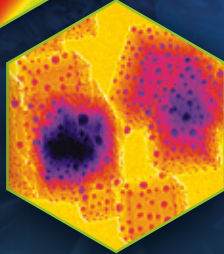
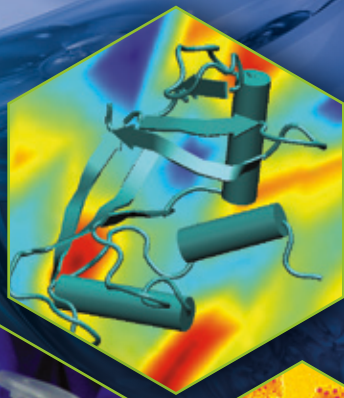
nanoscale dimensional metrology, nanoscale chemical and mechanical measurements, functional property measurements, and produces reference materials, reference data, and predictive models.

These support the manufacture of advanced electronics, including next-generation semiconductor devices, magnetic materials and devices for low-noise sensors and next-generation computer logic, and flexible organic electronic devices. In addition, we support tests and standards that help to ensure the safe and reliable long-term use of these products.

*Advanced Materials:* The Material Measurement Laboratory develops tools based on the science of materials and measurement. These tools enable reliable measurements of the structures and properties of advanced materials so that







or processes, necessary for the regulatory approval of follow-on biologics or generics. We also contribute to more efficiency and reliability in manufacturing processes for biopharmaceuticals in general.

In addition, we support the development of tissue engineering scaffolds and, in a collaboration with the American Dental Association, advanced dental materials, and we help determine the safety and reliability of implanted medical devices.

industries can design and develop

innovative products

incorporating them. Our work

allows for low-cost, reliable manufacture and use of advanced materials in products ranging from nanoscale sensors to energy-efficient automobiles.

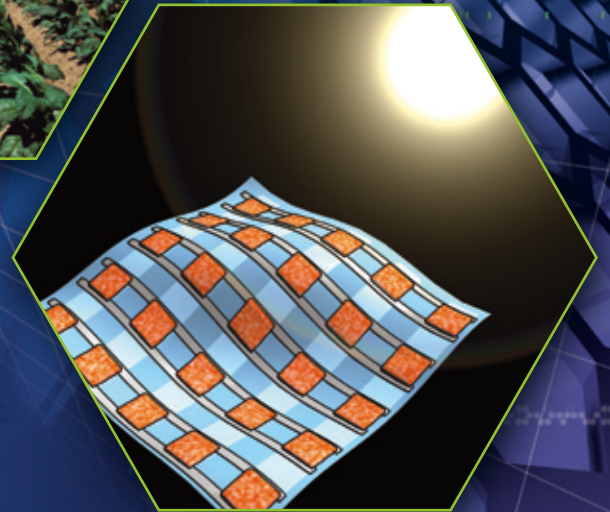
**Biomedicine and Health:** We develop the measurement science and the reference methods, materials and data needed to increase the accuracy, comparability and efficacy of measurements used in medical diagnostics and advanced therapeutics. We are advancing measurement science to assess the comparability of biologic drugs made by different manufacturers

**Environment and Climate:** Our standards programs support environmental contaminant measurement and monitoring programs, computational models, and technology to improve the reliability and comparability of measurements and assessments of environmental quality and climate. Our measurements and reference materials help assess the safety, toxicity and environmental impact of engineered nanomaterials, and we run an advanced specimen banking program for future retrospective analyses of contaminants in the environment, and for health research and monitoring.





**Food Safety and Nutrition:** The laboratory's analytical methods and reference materials help prevent contaminated food and water from entering the supply chain, improve the reliability of nutrition information provided on product labels, and allow consumers to make well-informed dietary choices.

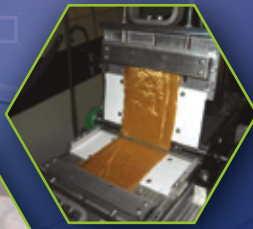
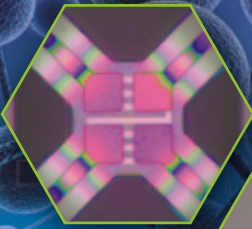


**Physical Infrastructure:** We develop measurement methods and standards, including nondestructive evaluation techniques, for assessing the health of aging physical infrastructure components and gauging their resilience in extreme environmental conditions. The laboratory provides reference materials and standards for assessing material strength and hardness; standards for fuel pipeline safety; and methods to assess the performance of plastic pipes for water and gas, and test and predict the health of critical connections and join-ends in bridges and buildings.

**Energy:** The Material Measurement Laboratory develops measurement methods, reference materials and data that support the development, manufacture and quality control of renewable energy sources and devices including biofuels, next-generation photovoltaics, and energy storage and heat-harvesting thermoelectric devices. In addition, we develop measurement techniques that support the manufacture of energy-efficient vehicles from lightweight materials.







marketing, distribution and customer service. The measurement services of NIST support U.S. industry through traceability to NIST and to the International System of Units (SI). Because our standard reference

programs are recognized as complying with the international measurement system, the need for additional testing is reduced. NIST distributes more than 1,200 different Standard Reference Materials® that assure the accuracy of millions of measurements made daily in medical clinics, manufacturing plants and industrial labs throughout the United States. Our measurement services programs also support federal and state agencies nationwide.

### ***Security, Safety and Forensics:***

The laboratory generates and disseminates measurements, standards and data that support national security. These include advanced instrumentation and reference materials to aid the accurate and reliable detection of chemical, biological, radiological, nuclear and explosive threats; standards and reference materials that support DNA-based human identity testing for forensics and biometrics; and measurement methods to assess the reliability of soft body armor.

### **Delivery of Measurement Services**

The Material Measurement Laboratory coordinates the NIST-wide Standard Reference Materials® and Standard Reference Data programs, which include production, documentation, inventory,

### **Supporting Global Comparability of Standards**

Barriers to international trade are diminished when trading partners mutually agree on systems of measurement. The Material Measurement Laboratory works with the International Bureau of Weights and Measures (BIPM) and our counterparts in other countries to help ensure that measurement standards are compatible worldwide.



NIST and the Material Measurement Laboratory participate in the development of documentary standards to ensure that standard methods, recommended practices and regulations have a sound technical and metrological basis. For example, we work with the International Committee on Standards (ISO) to develop guidance documents on the proper development and use of certified reference materials.

### People and Facilities

The Material Measurement Laboratory is home to more than 900 staff members and visiting scientists at locations in Gaithersburg, MD and Boulder, CO, as well as at the Hollings Marine Laboratory in Charleston, SC, the Institute for Bioscience and Biotechnology Research in Rockville, MD, and Brookhaven National Laboratory in Upton, NY.

### Opportunities and Interactions

- For job postings, visit <http://USAJobs.gov>
- Student employment programs
- Postdoctoral research opportunities
- Foreign and domestic research associate programs
- Summer Institute for Middle School Science Teachers
- Federal financial assistance
  - Technology Innovation Program
  - Small Business Innovation Research Program
  - Grants/Cooperative agreements
- Cooperative Research and Development Agreements







To learn more about us, including opportunities  
for employment and collaboration, contact:

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or visit <http://www.nist.gov/mml>

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