

Putting Science to Work

WINTER 2003/4

Newsletter

AWARDS AND REWARDS

ORNL Wins Four More R&D 100 Awards: Grand Total Is 116

ORNL researchers garnered four more R&D 100 awards from *R&D Magazine* this summer. These awards, sometimes called the "Oscars" of scientific research, are given to the 100 most significant innovations of the year. ORNL's total of 116 awards is second only to those earned by General Electric.

The following inventions were honored this year:

CF8C-Plus (joint entry with Caterpillar, Inc.). A new cast stainless steel for high-temperature performance, CF8C-Plus is designed to dramatically improve high-temperature durability, performance, and reliability based on a uniquely engineered microstructure alloy development methodology. The new alloy design method—based on studies of changes in a material's microstructure and microcomposition when alloying elements are added—allows CF8C-Plus to be used at temperatures of up to 850°C and to resist failure from

creep, mechanical fatigue, and thermal fatigue. The steel was developed to improve the performance and reliability of high-temperature exhaust components for advanced diesel engines in heavy-duty trucks.

Raman Integrated Tunable Sensor (RAMiTS). RAMiTS is a portable, fully integrated, battery-operated Raman monitor based on solid-state acousto-optic tunable filter technology. This device, meant to be used in the field, can analyze

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Phil Maziasz of ORNL (right) discusses CF8C-Plus stainless steel with DOE Secretary Spencer Abraham (left) and Senator Lamar Alexander.

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ORNL Technology Transfer & Economic Development (TTED) seeks to foster economic development and the growth of business and industry by making available the most innovative equipment, the latest technology, and the expertise of ORNL researchers to technology-based companies throughout the nation.

MESSAGE FROM THE DIRECTOR



Alex Fischer

This issue highlights many of the award-winning ORNL technologies honored over the past several months. The recognition that these awards represent is a direct reflection on the quality of our staff, research, and science at ORNL and offers a glimpse of the economic opportunities in leveraging ORNL technologies. Only General Electric surpasses ORNL in the number of R&D 100 awards—pretty impressive company!

The impact of “putting science to work” is sometimes not easily seen in a snapshot, but it was certainly very impressive as the Knoxville/Oak Ridge area celebrated the 20th anniversary of the Oak Ridge Technology Corridor, which is now home to more than 1,000 technology-based companies. The spotlight was also on ORNL during the very successful Tennessee Valley Corridor Summit and the annual Tennessee Venture Forum, both held in Chattanooga. And in Memphis, we celebrated the grand opening of the FedEx Institute of Technology, where TTEC now has an office.

We are also excited about new opportunities to recruit venture capital resources to partner with us in the commercialization of our technologies. The announcement of Battelle Ventures, a new venture capital fund with committed funding of \$150 million, and the increasing interest in the Venture Capital Forum are examples of venturing activities we want to continue to advocate and promote as we seek to put ORNL's science to work.

I hope you enjoy reading about these and other activities of our office through our quarterly newsletter.

The staff of TTEC join me in wishing you a very happy new year.

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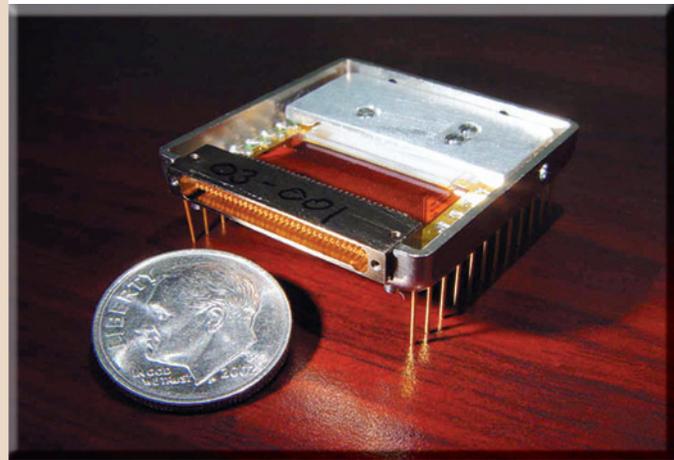
ORNL Wins FLC Excellence in Technology Transfer Award

The Southeast Region of the Federal Laboratory Consortium (FLC) presented ORNL with several Excellence in Technology Transfer Awards at its regional conference in Charleston, South Carolina, on September 18:

- the Excellence in Technology Transfer of the Year Award,
- two of the six awards for Excellence in Technology Transfer, and
- two of the four Honorable Mention awards.

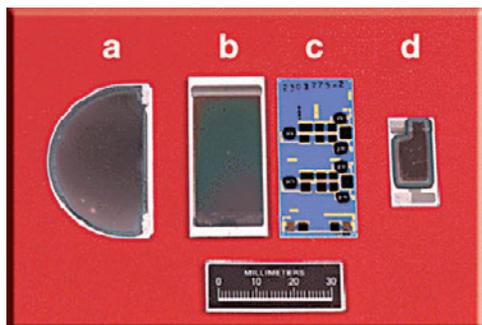
The *Excellence in Technology Transfer Award of the Year* was presented for ORNL's work in robust wireless technologies for extreme-environment communications. This technology allows highly reliable low-power communications devices to operate in harsh physical and atmospheric environments.

The two awards for *Excellence in Technology Transfer* recognized the work by ORNL



researchers on microcantilever-based biosensors and thin-film rechargeable lithium batteries. ORNL's microcantilever-based biosensors can be used in the diagnosis of disease or exposure to chemical warfare agents. When fully integrated with a device,

(AWARDS AND REWARDS continued from page 1)



ORNL's second regional FLC award for Excellence in Technology Transfer was for thin-film rechargeable lithium batteries: (a) medical implant battery; (b) battery to power the multichip circuit in (c); (d) standard lab test cell.

thin-film rechargeable lithium batteries (less than 10 micrometers thick) have energy and power densities surpassing those of other battery technologies, can be recycled thousands of times, and can be fabricated in any shape or size.

The Lab's two *honorable mentions* in the competition were for the Laboratory-on-a-Chip technology and the new ion exchange and regeneration technology for water. The Lab on a Chip is a microfabricated device that performs chemical and biochemical procedures under computer control, using minuscule quantities of the samples to be analyzed. The selective ion exchange and regeneration for water treatment research involves work on three separate technologies to remove and degrade the hazardous substance perchlorate, a component found in solid-fuel rockets that has contaminated water supplies in more than 24 states.

The Southeast FLC covers 40 federal laboratories in a nine-state region of the southeastern United States. "These awards represent a tremendous effort by our staff that not only signifies outstanding scientific achievement but an additional benefit to the American economy by providing marketable products and creating jobs," said ORNL Director Jeff Wadsworth.

Raman Integrated Tunable Sensor (cont.)

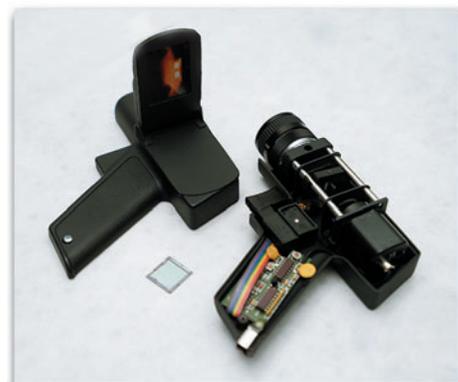
chemical and biological samples in seconds and, on the basis of information in its built-in computer library, can identify hundreds of substances, including toxic chemicals, by-products from explosives, biomedical markers, pharmaceuticals, and illicit drugs.



Raman Integrated Tunable Sensor (RAMITS)

Uncooled Micromechanical Infrared Camera (UMIR-Cam).

A sensitive miniature imaging and infrared photo-detection device, UMIR-Cam runs at room temperature and can be used in a number of endeavors, including night vision, industrial process monitoring, and medical imaging.



Uncooled Micromechanical Infrared Camera (UMIR-Cam)

MicroTrapMS (joint entry by ORNL and Protasis Corp.).

A highly miniaturized ion trap mass spectrometer, MicroTrapMS can be used for applications from on-line screening for toxins in municipal watersheds to detecting hazardous substances at airport checkpoints. MicroTrap MS will enhance real-time capabilities of field engineering to sweep many local areas for pesticides, drugs, explosives, and more, at a lower cost than that of conventional methods.



MicroTrapMS (joint entry by ORNL and Protasis Corp.)

Nevertheless, according to the East Tennessee Economic Development Agency, the Oak Ridge/Knoxville area now boasts 45,000 technology professionals, including 3,500 with Ph.D.'s.

Greater growth and new business spinoffs are likely in the future, given the growth of ORNL science projects, including the \$1.4 billion Spallation Neutron Source, a project to build the world's fastest supercomputer, and enhanced biology programs.

Among those present at the 20th anniversary celebration was U.S. Senator Lamar Alexander, who fostered the corridor concept when he was Tennessee's governor and was keynote speaker for the anniversary celebration. Alexander noted that while the corridor still has much progress to make, in his judgment "the Oak Ridge Corridor has made more progress in its first 20 years than the [N.C.] Research Triangle did in its first 20 years."



haven, the National Renewable Energy Laboratory, Oak Ridge, and Pacific Northwest) to commercialize technology and develop ventures.

ORNL Director Jeff Wadsworth states that he views Battelle Ventures "as another tool for ORNL's commercialization efforts. The initiative will provide our staff with . . . greater access to capital . . . and a sophisticated analysis of ORNL technologies, including advice and strategy for commercial opportunities. Together, these resources will be a significant asset to ORNL staff who are interested in commercialization opportunities."

Alex Fischer, director of ORNL's Office of Technology Transfer and Economic Development, is the ORNL point of contact for Battelle Ventures.

Southern Technology Council Meets at ORNL

UT-Battelle hosted a Southern Technology Council (STC) meeting on November 5–6. The STC, whose membership is a group of professionals in the science, technology, and economic development

fields, facilitates cooperative initiatives among regional science and technology organizations and conducts policy analyses on the linkages among science, technology, and economic development. The purpose of the Oak Ridge meeting was to inform the STC of ORNL's capabilities and UT-Battelle's

strong interest in regional economic development. In addition to a briefing on ORNL, members were given a tour of key ORNL facilities.

The STC provides advice on innovation and technology policy issues to the Southern Growth Policies Board, a nonpartisan public policy think tank based in Research Triangle Park, North Carolina. Formed in 1971 by southern governors, the board develops and advances economic development policies by providing a forum for partnership and dialog among a diverse cross-section of the region's governors, legislators, business and academic leaders and the economic- and community-development sectors.



Thomas Zacharia describes ORNL's supercomputing capabilities during an ORNL tour for members of the Southern Technology Council.

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(BUILDING ECONOMIC DEVELOPMENT continued from page 5)

Tennessee Valley Corridor Summit—October 2003

Chattanooga hosted another tremendously successful Tennessee Valley Corridor Summit, bringing together local, regional, and



Tennessee Senator Bill Frist addresses the October 2003 Tennessee Valley Corridor Summit meeting in Chattanooga.

national leaders to enable 21st-century growth and partnerships in the Tennessee Valley technology corridor. Tennessee's top political leadership—including U.S. Senate Majority Leader Bill Frist, U.S. Senator Lamar Alexander, and Governor Phil Bredesen—were featured speakers at the event.

The October summit, based on the theme “Where Technology Meets the Marketplace,” showcased some of the exciting developments taking place from northern Alabama to east Tennessee and up into southwest Virginia. Among these are the exciting advances in high-speed connections that are linking Chattanooga to the world’s most powerful computers at ORNL.

PEOPLE IN **TTED NEWS**

TTED’s Shepherd Helps Negotiate \$15M Agreement with Canada

Joyce Shepherd, a sponsored research manager in TTED, was instrumental in negotiating a Work for Others agreement for \$15 million from the Canadian government.

The funding, from the Canada Foundation for Innovation, will go toward design and construction of one of the beamlines at the Spallation Neutron Source (SNS) at ORNL. SNS will be the world’s most intense source of neutrons for beam research in materials science when completed in 2006.



Joyce Shepherd

Under this grant, Canada’s McMaster University in Hamilton, Ontario, will collaborate with ORNL and the University of Tennessee in the design and construction of the “Vulcan” beamline—a neutron diffraction instrument to be used for engineering materials applications.

“We’re delighted that the Canadian research community is going to be involved in building and using instruments at the SNS. It’s an indication of the tremendous scientific potential of the facility that it is attracting the attention of the research community worldwide,” says SNS Executive Director Thom Mason.

OUR **TECHNOLOGIES**

ORNL Signs License with Micro Systems TECH, LLC

ORNL, in conjunction with the University of Tennessee—Knoxville, has executed a license with Micro Systems TECH, LLC (MST), a small start-up company in Fairborn, Ohio, to commercialize the Bioluminescent Bioreporter Integrated Circuit (BBIC).

The BBIC technology is an example of collaborative research between UT and ORNL, integrating UT’s engineered bioluminescent microbe with ORNL’s micro-circuitry technology. BBIC can be used as a sensor for contaminants in liquids and air and has many applications, ranging from food safety to environmental cleanup. MST has received several grants to continue product development of BBIC to produce rugged, miniaturized prototypes for field applications.



The Bioluminescent Bioreporter Integrated Circuit

TENNESSEE **FOCUS** ON **TTED**

Noteworthy Happenings

SBIR Events

UT-Battelle recently coordinated several events focused on informing the small business community of the availability of \$2 billion in Small Business Innovation Research (SBIR) contracts/grants. These Chattanooga, Memphis, and Oak Ridge meetings were attended by representatives of approximately 60 small technology-focused businesses. Each event included discussions of funding opportunities as well as tips on submitting winning proposals.

Venture Forum

Many representatives of venture capital companies, including Battelle Ventures, attended the Tennessee Venture Forum in Chattanooga on November 17–18. ORNL was one of the event sponsors; in addition, several companies making presentations at the forum are licensees of ORNL technologies or have received some other form of assistance from ORNL.

FedEx Institute

The FedEx Institute celebrated its grand opening on the University of Memphis campus on November 19. The institute will provide technology-focused companies with resources needed to begin a

business. The \$23 million center is a joint venture of the University of Memphis and a group of companies led by the FedEx Corp., the Memphis-based owner of the world's largest cargo airline and a national leader in electronic commerce and supply management for business and industry. The institute's 250 researchers—in fields such as digital communications, artificial intelligence, and robotics—will conduct their own projects as well as work with colleagues at similar institutions around the country.



Recent grand opening of the FedEx Institute in Memphis.

TTED will have an office at the FedEx Institute, where staff will meet with businesses interested in obtaining assistance and technologies from ORNL.

TTED **EDUCATIONAL OUTREACH**

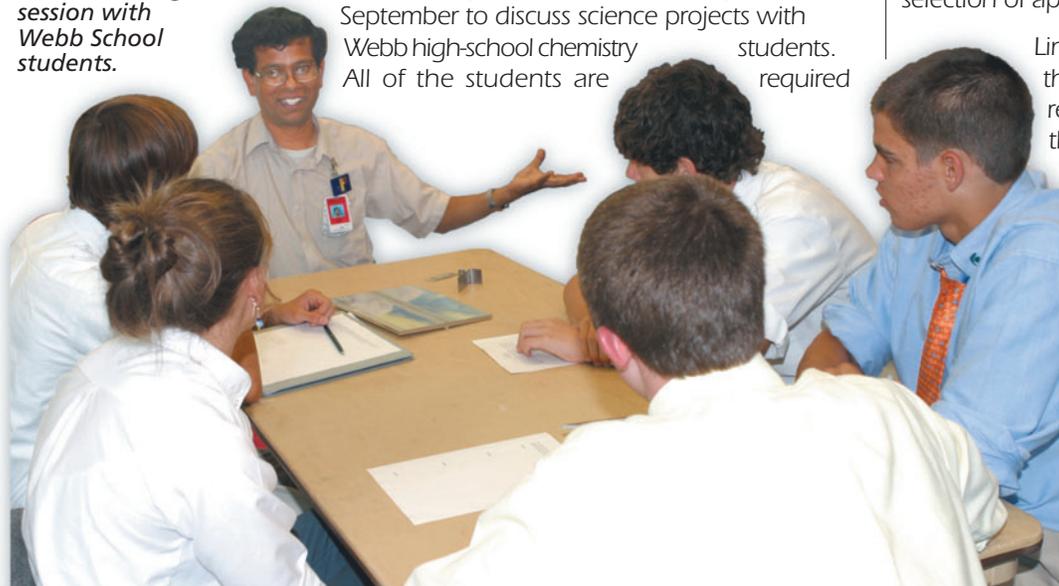
Sudarsanam Babu, from ORNL's Metals and Ceramics Division, at a mentoring session with Webb School students.

ORNL Staff Mentor Webb School Students

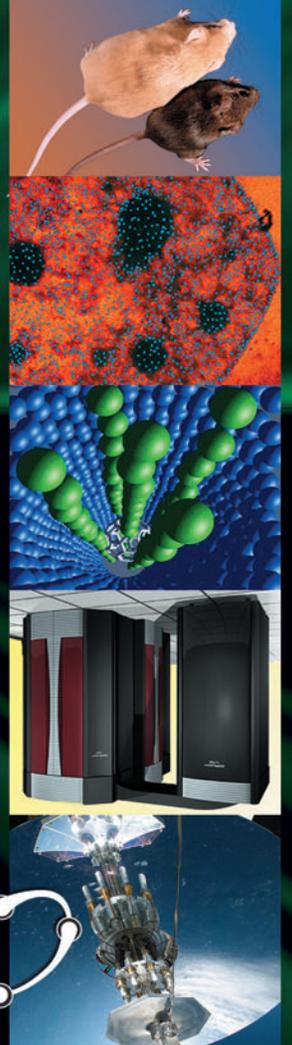
At the request of Webb School, a K–12 private school in Knoxville, TTED staff were instrumental in sponsoring four 1-hour mentoring sessions in September to discuss science projects with Webb high-school chemistry students. All of the students are required

to do an independent research project as part of their course grade. The purpose of the mentoring sessions was to introduce students to actual scientists and their research, inform students of some research areas, and guide their selection of appropriate research topics.

Linda Croff, of the TTED staff, took the lead in recruiting ORNL researchers for participation. More than 20 ORNL employees participated in this endeavor. Thanks to ORNL's participation last year, many students came away with excellent science projects, some of which were entered in a regional fair at UT and the Tennessee Junior Academy of Science program in Nashville.



TECHNOLOGY TRANSFER AND ECONOMIC DEVELOPMENT



UPCOMING EVENTS

- January 5-8
Medical Design and Manufacturing
Exposition and Conference,
Anaheim, California
February 23-26
Technology Transfer Conference and
Expo, Chicago, Illinois
- March 4-6
Association of University Technology
Managers Annual Meeting, San
Antonio, Texas
- April 26-29
National SBIR Conference, Atlanta,
Georgia



Technology Transfer and Economic Development
Oak Ridge National Laboratory
P.O. Box 2008
Oak Ridge, TN 37831-6499

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contact us by one of the following means:
E-mail: ORNLmeansbusiness@ornl.gov
Web site: www.ornl.gov/tted
Toll-free number: 866-221-2527