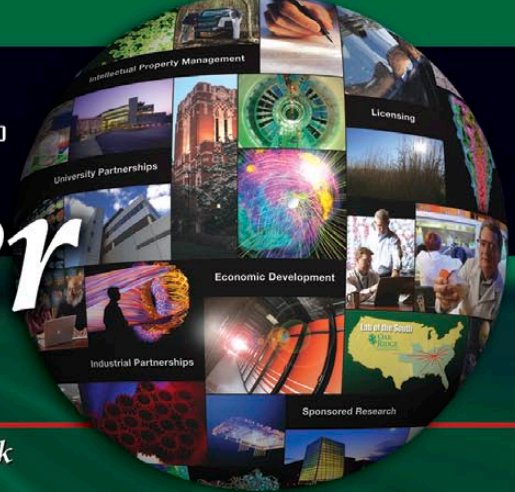


# Newsletter



*Putting Science to Work*

## DOING BUSINESS WITH ORNL

### ORNL, Industry to Collaborate in Advanced Battery Research



*ORNL's Jagjit Nanda assembles a lithium ion battery for performance testing within a controlled environment.*

Through new collaborations totaling \$6.2 million, ORNL and American industry will tackle some of the most critical challenges facing lithium ion battery production. After receiving \$3 million in American Recovery and Reinvestment Act (ARRA) funding in August through DOE's Office of Energy Efficiency and Renewable Energy (EERE) Industrial Technologies Program (ITP), ORNL issued a competitive solicitation to industry for proposals addressing key problems centered around lithium ion battery manufacturing science, advanced materials processing, quality control, and processing scale-up. An independent council comprising ORNL and DOE representatives selected proposals from companies across the country.

"While high-performance lithium ion batteries are projected to be an energy storage leapfrog technology, safety, service life, and costs are still concerns," said ORNL Director Thom Mason. "Forging synergistic collaborations between government and industry will help uncover the solutions that can advance battery technology and lead to stronger national energy security."

As part of ORNL's efforts to advance battery materials and processing technology under the ARRA funding, individual Cooperative Research and

(continued on page 3)

## PEOPLE AND EVENTS

### Secretary Chu Announces UT-Battelle Contract Extension

Secretary of Energy Steven Chu visited ORNL in late March, bringing with him welcome news for the management and staff of UT-Battelle, LLC, the laboratory's managing contractor since 2000.

Just prior to his speech "Meeting the Energy and Climate Challenge," the Secretary announced that the Department of Energy had decided to extend UT-Battelle's contract to manage the lab for another 5 years. Among those present to hear his announcement were Tennessee Governor Phil Bredesen and U.S. Congressmen Lincoln Davis and Zach Wamp.

(continued on page 4)



*Congressman Davis, Governor Bredesen, Secretary Chu, Lab Director Mason, and DOE Oak Ridge Office Manager Gerald Boyd opposite the Chemical and Materials Sciences Building construction site during an ORNL tour.*

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**MESSAGE FROM THE DIRECTOR**



*Tom Ballard*

The first half of calendar year 2010 has been an exciting time within the Partnerships Directorate and throughout Oak Ridge National Laboratory. Elsewhere in this edition of our newsletter, you will read about the recent decision by the Department of Energy to extend UT-Battelle's management contract for ORNL and the "best yet" Global Venture Challenge.

These are critically important milestones that we fervently celebrate. At the same time, however, the day-to-day work of the directorate continues. We frequently describe our role at ORNL as "connecting the lab to the outside world and the external world to ORNL." Our activities acceler-

ated in 2009 in direct relation to the American Recovery and Reinvestment Act and have continued at a heightened pace in 2010.

The number of commercial entities that want to visit ORNL has reached record levels, and staff in our Industrial and Economic Development (IED) Division are scrambling to plan meaningful visits. The number of researchers who are asking our staff to help them engage commercial and university partners for a specific funding opportunity has reached new highs as well. These opportunities involve significant effort by the IED staff as well as those from our Technology Transfer (TT) Division.

In the case of the TT group, its members work with the partner enterprises to negotiate intellectual-property-sharing plans and process various sponsored research documents like CRADAs. One indication of the increased volume is the fact that we have already processed more CRADAs in the first 6 months of fiscal year 2010 than we do in a typical year.

This increased business volume is totally aligned with our plan to be a best-in-class organization. To achieve our goal, we must be more engaged with our scientists and at an earlier stage as they develop their research plans. We must also be more actively engaged with the commercial world so that we can bring the proverbial "voice of the market" to the work of these scientists. What does success look like? It is the number of ORNL technologies commercially deployed and the impact that these inventions have on America's competitiveness.

Yes, it's a busy time, but we say, "Bring it on." We relish every opportunity to be an effective matchmaker. The opportunities have never been better!

**AWARDS AND RECOGNITION**

**ORNL EARNS FLC PROJECT OF THE YEAR AWARD**

A technology that can enhance collection of data by studying the compositions on a material surface earned ORNL the 2009 Excellence in Technology Transfer Project of the Year Award from the Southeast Region of the Federal Laboratory Consortium (FLC) for Technology Transfer. Vilmos Kertesz and Gary Van Berkel of ORNL's Chemical Sciences Division developed the technology, which is a surface-sampling probe for mass spectrometry that enables researchers to obtain a more accurate analysis of the chemical components on the surface of a material. The process has benefits in the study of material and biological sciences and can be particularly useful in drug development through its ability to scrutinize biological tissue. ORNL is one of 52 laboratories within the FLC's Southeast Region, which encompasses nine states.



DOING BUSINESS WITH ORNL (continued from page 1)

## ORNL, Industry to Collaborate continued

Development Agreements (CRADAs) have been signed with A123 Systems, for domestic supply of anode materials; Dow Kokam, for processing and characterization of novel cathodes; Porous Power Technologies, for improved separator materials; and Planar Energy, for scalable processing of solid-state batteries. In each case the industry cost-share exceeds 50 percent of the total project cost.

“By leveraging our expertise in materials science and manufacturing, ORNL will assist these partners with their individual energy storage challenges and address opportunities to surpass nondomestic secondary battery manufacturers that dominate today’s market,” said ORNL’s Energy Materials Program Director Craig Blue. Secondary lithium ion cell manufacturing encompasses a broad range of disciplines including formulation chemistry, film casting, polymer processing, materials and composite design, interfacial science, and component engineering.

In addition to ITP and industry funding, EERE’s Vehicle Technologies Program (VTP) is contributing funding to directly support the CRADA efforts, each of which represents part of the battery supply chain. Two of the companies, A123 and Dow

Kokam, were awarded DOE battery manufacturing grants as well as Michigan refundable tax credits to construct battery manufacturing facilities in Michigan. Accordingly, the Michigan Economic Development Corporation (MEDC) is also providing funding to ORNL’s overall battery research effort to help ensure the success of the industry.

“The financial support from ITP, VTP, and MEDC symbolizes DOE and Michigan’s shared goal to advance energy technologies critical to the nation and the world through collaboration and leveraging of resources,” said ORNL’s Program Director for Energy Partnerships Ray Boeman. Boeman is currently assigned in Michigan to develop such collaborative programs among government, academia, and industry.

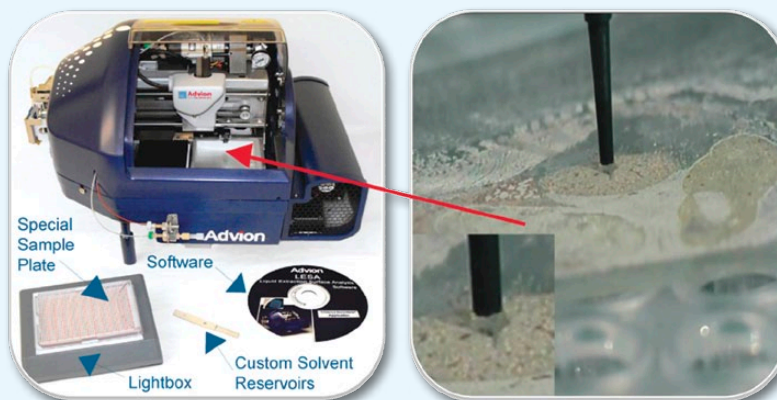
According to ORNL’s David Wood, co-principal investigator and technical lead on the project, collaborative research is expected to take place during the next 18 months. Wood added, “This is a unique and timely opportunity for ORNL to help government and industry set the course for a new generation of energy storage technologies.”

## AB SCIEX Partners with Advion BioSystems to Commercialize ORNL Sampling System



AB SCIEX, a global leader in life science analytical systems, has exclusively licensed a sampling system for mass spectrometry developed by researchers in Gary Van Berkel’s group at ORNL. AB SCIEX partnered with Advion BioSystems, Inc., a frontrunner in microfluidic systems, which recently launched a liquid extraction surface analysis (LESA) sample analysis system incorporating this ORNL technology. LESA, based on Advion’s chip-based nanoelectrospray platform, the TriVersa NanoMate®, will be used to provide direct mass spectrometric analysis of a variety of sample formats, including tissue and organ samples, thin layer chromatography plates, matrix-assisted laser desorption/ionization plates, and dried blood spots.

The direct analysis of surfaces by mass spectrometry is a growing and powerful technique. The novel approach and design of the Advion LESA system enable the ability to couple direct analysis of surfaces with the power and breadth of chip-based nanoelectrospray for the first time. This simple-to-use combination allows for soft ionization, thereby preserving fragile molecules such as phase 2 metabolites and allowing unrivalled detection of drugs and their metabolites in tissue and organ samples. Researchers developing new forensic devices, novel drugs, better biofuels, and



Left, LESA kit: software, solvent reservoirs, sample plate, lightbox, TriVersa NanoMate. Right, tissue surface sampling with LESA, TriVersa NanoMate.

technologies to strengthen homeland security now have a powerful tool for analyzing a variety of surfaces.

“The launch of this innovative sample analysis system is extremely strategic for our company,” said David B. Patteson, CEO of Advion. “This is the result of our working closely with ORNL and AB SCIEX dating back nearly 7 years to early discussions between Jack Henion, our chairman and CSO, and our partners. We expect significant impact from

our customers applying this technique to a myriad of sample types and conditions, which to date have been difficult to assay.”

ORNL and AB SCIEX have collaborated to advance this work under CRADAs for more than 14 years. They are currently drafting a fourth CRADA to continue to address critical needs in mass spectrometry that will impact work in energy research, drug discovery, forensics, food security, life science, and more. UT-Battelle has also supported the commercialization of this technology under the Privately Funded Technology Transfer program at ORNL and invested more than \$250,000 in maturation funds to meet the specific needs of industry, which ultimately led to the licensing of the technology to AB SCIEX and the novel LESA TriVersa NanoMate® sold by Advion.

(DOING BUSINESS WITH ORNL continued on page 4)

PEOPLE AND EVENTS (continued from page 1)



Chu signs the Cray X1E Phoenix supercomputer.

### Secretary Chu *continued*

Chu praised UT-Battelle's management of the lab, to which he attributed the extension. "We concluded that we need not go into a competition because of [ORNL's] being managed so very well," he said.

Governor Bredesen said the extension will allow the lab to continue to build on its "tremendous momentum." As Laboratory Director Thom Mason noted in his director's message to ORNL staff the day of the announcement, this momentum is evidenced by the successes of the previous 10 years of UT-Battelle's leadership. During those years ORNL became a hub for high-performance computing;

the home of the Spallation Neutron Source (SNS); and a national leader in climate-change and bioenergy research.

"Our laboratories are the primary asset of the Department of Energy," Chu said. As such, they are essential in the country's response to the pressing challenges of both climate and energy. "Developing today's energy technologies took 80 years," he said.

"If we take another 80 years for new [carbon-free] technologies, it will be too late."

ORNL and the other national labs are also key players in the current programs designed to aid economic recovery. While at ORNL Chu not only toured sites such as SNS and the Oak Ridge Leadership Computing Facility brought to fruition under UT-Battelle's leadership, but also ones made possible or accelerated through ARRA funding such as the Chemical & Materials Sciences Building construction project.

Such facilities, the world-class staff at ORNL, and the ongoing leadership of UT-Battelle position the lab to continue to be a center for scientific discovery. The lab is also part of the larger family of Battelle labs, offering a wide range of opportunities for collaboration and growth and for moving its science and technology into the marketplace.

With these opportunities come challenges, though. "In some respects, we have set a new bar of performance," Mason wrote in his message. "The challenge to UT-Battelle, and to each of us who work at ORNL, is to meet this higher standard in the delivery of our scientific mission, the operation of our laboratory, and our leadership among the local community."

DOING BUSINESS WITH ORNL (continued from page 3)

## PartTec to Market SNS-Developed Neutron Detector System

**PartTec, LTD**  
PARTNERS IN TECHNOLOGY



PartTec, an Indiana-based manufacturer of radiation detection equipment, has signed an agreement to manufacture and market an advanced neutron detector system developed at ORNL. The Shifting Scintillator Neutron Detector system was developed for DOE's Spallation Neutron Source (SNS) and High Flux Isotope Reactor complex, the world's most advanced neutron science facility. This system can determine the time and position of the neutron captured, enabling extremely accurate neutron time-of-flight measurements. It has large-area detector coverage, extremely low power requirements, and digital communication capability, all factors that made it attractive to PartTec.

"PartTec has supported the work of the Spallation Neutron Source's detector team for nearly 5 years with engineering, component manufacturing, and management expertise," said Herschel Workman, CEO of PartTec. "The detector is proving itself in the POWGEN and VULCAN instruments at the SNS."

Interest in the product ranges from neutron science facilities to security monitoring of land, air, and sea shipping for fissionable material. Recently, PartTec re-engineered the detector system as an alternative to existing helium-3 detectors, as helium-3 is in short supply.

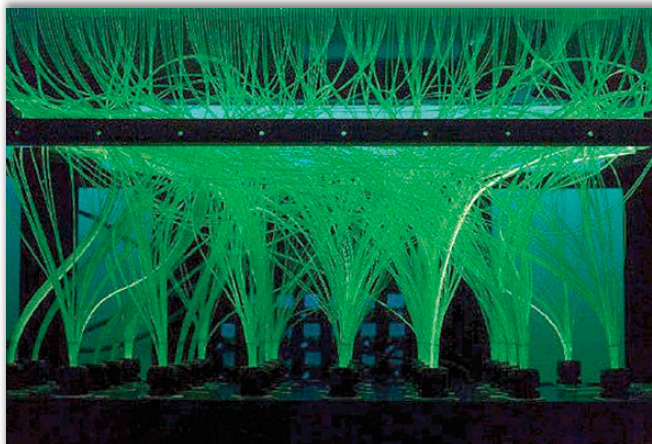
ORNL researchers developed the detector system to provide the very large detector areas (up to 45 square meters in the SNS POWGEN instrument) required by SNS. Advances were made in the neutron-capturing scintillator, light-collecting optics, and data-collection electronics. The data-collection electronics use a unique method

of determining the neutron event location by encoding single photon patterns.

"The system is modular so that very large detector arrays can be built," said Ron Cooper of the SNS development team. "You can have greater than 50 square meters of detector coverage. It has high rate capability, good position resolution, and features modern distributed personal computer-based electronics."

Developed by Richard Riedel, Lloyd Clonts, and Jason Hodges of ORNL's Neutron Scattering Science Division, and Ron Cooper, Lowell Crow, John Richards, and Bruce Hannan of ORNL's Neutron

Facilities Development Division, the neutron detector is the leading candidate to replace helium-3 detectors throughout the world.



Module of a fiber neutron detector similar to those manufactured by PartTec for use in SNS's POWGEN3 Powder Diffractometer and VULCAN Engineering Diffractometer.

## Dan Miller New IED Associate

Dan Miller joined ORNL in January 2010 as an associate in the IED Division. He leads technology commercialization, economic development, and industrial partnerships in the energy storage portfolio. He also manages ORNL's ventures with Oak Ridge Science & Technology Park companies and is recruiting new companies to locate there.

Prior to joining ORNL, Dan was a licensing associate in the Rice University Office of Technology Transfer, managing the patent portfolio of physical science technologies. He holds a BS in Mechanical Engineering from Kettering University and an MBA and MS in Industrial En-

gineering from the University of Tennessee and is a member of the Association of University Technology Managers.



Dan Miller



Bryan Couler

## Couler Named Business Manager

Bryan Couler, a finance officer at ORNL and more recently in the Partnerships Directorate, is now the directorate's business manager. He liaises between the directorate and the ORNL CFO, performing business analysis and overseeing the financial reporting in support of technology transfer and economic development.

Bryan joined the Partnerships Directorate as lead finance officer in 2007 to perform budget and cost analyses. He began his ORNL career in 2002 as a finance officer for SNS. Earlier, Bryan worked at the Y-12 National Security Complex in the Facilities Management Organization and Enriched Uranium Operations.

## LED North America Receives Exclusive Patent License for ORNL Technology

Light-emitting diode (LED) lamps are increasingly in demand in industrial and commercial applications because of their comparatively low energy consumption, compact size, and long life expectancy. They come with a high price tag, though, so to make them attractive to a broader consumer base, they will have to give the best performance for the dollar. One surprising way to increase their value is to lower their temperature.

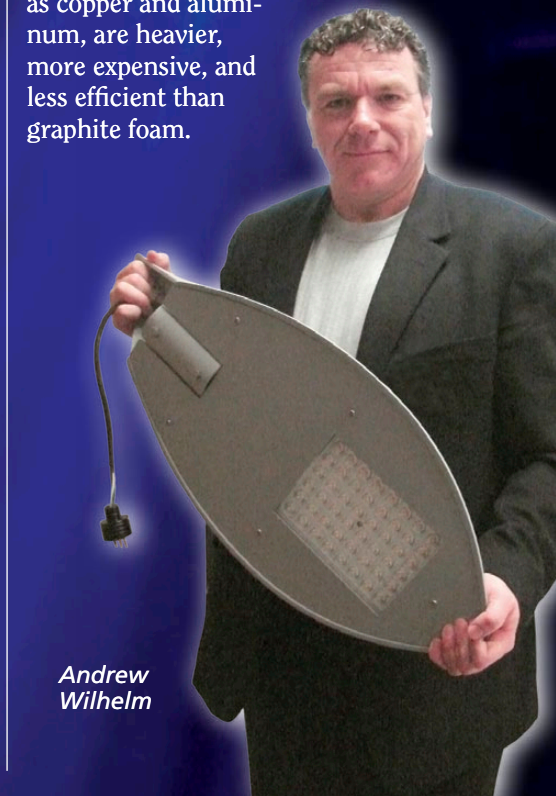
Heat is the primary enemy of LEDs. In fact, each 10-degree decrease in temperature can double the life of the lighting components. A graphite foam technology developed by James Klett of ORNL's Materials Science and Technology Division and currently being marketed by Koppers and Poco Graphite may soon make such cooling possible. By incorporating graphite foam, which has very high thermal conductivity and low weight and is easily machinable, important internal components of these lamps can be passively cooled to enhance their efficiency and longevity.

To commercialize this technology, ORNL has entered into an exclusive patent license with LED North America, which intends to use the graphite foam to cool components in LEDs used in street lamps and similar applications, enabling the company to offer longer warranty periods than its competitors.

Recently Andrew Wilhelm, one of the company's founders, decided to locate the company in Tech2020, a business incubator in Oak Ridge, Tennessee. That decision brought with it several advantages. One is that he is able to take advantage of the numerous resources offered by Tech2020's Center for Entrepreneurial Growth to its client companies, such as assistance in obtaining funding and access to experienced executives who can offer

valuable advice. Another is that by being in proximity to ORNL, he is able to work closely with Klett to further refine the integration of the graphite foam material into the LED lamps.

Other technologies for cooling of LED lamps are available, but LED North America chose the graphite foam due to its exceptional thermal conductivity and easy machinability, which greatly increase design flexibility. In addition, other materials used for heat sinks, such as copper and aluminum, are heavier, more expensive, and less efficient than graphite foam.



Andrew Wilhelm



Views of the LED light housing.

**PARTNERSHIPS EVENTS**

**TNInvestco GVC 2010 Draws Record 15 Venture Capitalists**

Venture capitalists play an important role in the annual Global Venture Challenge (GVC) competition. They serve as judges for the graduate students' team business competition, offering real-world perspectives on the challenges the teams will face as they form companies and begin to enter the marketplace with their ideas.

The investors are treated as special guests at the competition. During GVC 2010 a private waterfront dinner was held in Oak Ridge the night before the event, and the Partnerships Directorate organized a Venture Showcase so the venture firms better understand ORNL's research capabilities in solar energy, carbon fiber and composites, and energy storage.

The investors heard presentations from four companies with links to the lab: NellOne Therapeutics, Aldis, Confluence Solar, and TransSecurity Systems.

At this year's event ORNL hosted a record 15 venture capitalists from across the country. A number of these investors represented new companies funded by TNInvestco, six new early-stage venture funds established this year by legislation passed by the Tennessee General Assembly to increase the flow of capital to innovative new companies in Tennessee. One of the TNInvestco principals, Joe Cook, Jr., of the Limestone Fund, wrote to Tom Rogers, director of industrial partnerships and economic development at ORNL, "Bringing together funding sources with innovators is a great tool for solving many of the major ills facing our society today. We all



know the value of dreaming big, but such dreams often start from frugal beginnings. Connecting sources of funds with users early on can bring needed efficiency in the development process and ultimately more ideas to society. We are pleased to be working with you and the Oak Ridge National Laboratory in this important arena."

Each of the six TNInvestco funds was represented at GVC, and Partnerships is scheduling follow-up visits to the lab to explore specific early-stage investment opportunities, both with relationships to ORNL and other young companies in the Innovation Valley.

"One of the missions of the Department of Energy is technology transfer: transitioning the research it conducts into commercial application to help strengthen America's economy and competitiveness," said Rogers. "GVC works to identify entrepreneurially minded students and to give them inspiration, advice, and connections to help them become successful entrepreneurs of the future."

(PARTNERSHIPS EVENTS continued on page 7)

*AWARDS AND RECOGNITION (continued from page 2)*

**PLAQUE-HANGING CEREMONY RECOGNIZES ORNL INVENTORS**

On March 12, 2010, Laboratory Director Thom Mason, Partnerships Director Tom Ballard, award recipients, and others gathered to add 2009 awards to ORNL's wall of past winners. The addition of eight R&D 100 awards in 2009 brought the lab's total to 148, second only to General Electric's 173 wins.

"These awards highlight our ability to translate breakthroughs in fundamental science into applications that address important technological challenges," said Mason as he opened the ceremony. "Many of our awards are presented to teams that include partners from industry. These partnerships are a real plus in accelerating the movement of technology from the laboratory to the marketplace," he added.



**Gregory Hanson of the Measurement Sciences and Systems Engineering Division is the newest ORNL Battelle Distinguished Inventor, recognizing his achievement of holding 15 U.S. Patents for innovations in such areas as robust wireless communications in extreme environments, tagging and tracking hardware for safeguarding shipping containers, and a sensor system to measure wood drying.**



**Gerard Ludtka of the Materials Science and Technology Division hangs the R&D 100 award for a thermomagnetic processing technology developed and jointly submitted by a team from ORNL and industry. The technology could revolutionize the U.S. heat-treating industry with reduced energy and processing costs. Ludtka and Gail Mackiewicz-Ludtka led the ORNL contingent.**



## Solar Cells, Wound Repair Winning GVC Technologies

Graduate student teams from the University of Arkansas and the University of Maryland earned first place in the energy and security categories at the 2010 GVC hosted by ORNL March 24–26. The competition, in its fourth year, attracts students developing new technologies and venture investors with expertise in the market. The first-prize winners each received \$25,000.

Douglas Hutchings, Stephen Ritterbush, and Seth Shumate from Arkansas (pictured at right) won first place in the energy division for Silicon Solar Solutions. “Our method replaces the expensive top layer of solar cells with a thinner, large-grain polysilicon at lower temperatures, which reduces cost and is appealing to manufacturers,” said Ritterbush.

Matthew Dowling, Peter Thomas, and Oluwatosin Ogunsola of Maryland won first place in the security division for Remedium Technologies, Inc., which produces a sprayable hemostat. Dowling and Thomas, doctoral students in bioengineering, said that their Kytoclot technology is a portable, pressurized foam that compresses and protects internal wounds. Typically such wounds have required surgery. “The Department of Defense would be our first potential customer because this product quickly stops bleeding,” Dowling said.

Twenty-two teams from five countries were semifinalists. “We have expanded our reach globally with applications from

44 teams in eight countries, and that’s a record,” said Tom Rogers, director of industrial partnerships and economic development within the Partnerships Directorate. “Judges have said the technology this year is far superior to prior years.” More than 50 judges, including from 15 venture capital firms, selected winners.

Rogers said several past teams have formed companies; Remedium has capital from startup investors and Silicon Solar Solutions is talking to manufacturers.

Students met with Laboratory Director Thom Mason and attended a Venture Showcase highlighting new ORNL technology. Prize money and travel stipends were funded by DOE, the Department of Homeland Security, Oak Ridge Associated Universities, Battelle Ventures, the National Institute for Hometown Security, the National Venture Capital Association, the East Tennessee Economic Council, and Meritus Ventures, LP.

## ORNL Scientists Discuss Energy Technologies at GVC 2010

As the nation’s largest energy laboratory, ORNL has some of the brightest scientists now addressing the country’s pressing energy needs. Three of them took part in the Venture Showcase at GVC 2010.

**Chad Duty**, ORNL Solar Technologies Program manager, gave an overview of reducing the cost of manufacturing photovoltaic materials. He uses high-intensity plasma

arc lamps for the pulse thermal processing of various thin films, semiconductors, and photovoltaic materials. This technology is applicable to quantum dot solid-state lighting, flexible electronics, thin film batteries, and photovoltaics. Duty leads a \$3.5 million research effort for DOE’s Industrial Technologies Program and has been key in promoting, developing, and deploying solar technologies across ORNL.

**Cliff Eberle**, technology development

manager for ORNL’s Polymer Matrix Composites group, spoke about lower-cost, high-volume technologies for producing carbon fiber and carbon fiber composite materials. Reducing the price of commercial-grade carbon fiber would significantly advance its use in automotive and wind-energy applications. Eberle develops and manages carbon fiber, energy, and national security programs.

**Claus Daniel**, a materials scientist at ORNL working on advanced energy storage systems, spoke about mechanical degradation and fatigue behavior of battery materials and reducing cost through materials-processing technology. Developing reliable advanced battery solutions will promote hybrid electric and electric vehicles, solar cells, and windmills. Daniel plays a leading role in the development of advanced energy storage technologies and in advocating greater emphasis on materials and processing for energy storage solutions.

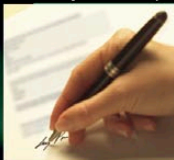


chad duty

cliff eberle

claus daniel

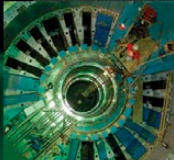
University Partnerships



Licensing



Intellectual Property



Sponsored Research



Industrial Partnerships



Economic Development

## UPCOMING EVENTS

### September 14–16

SSTI Annual Conference: Tech-Based Economic Development for the Next Economy, Pittsburg, PA. For more information: [www.ssticonference.org](http://www.ssticonference.org)

### September 15–17

AURP Annual Conference: Building the Innovation Engine, Minneapolis, MN. For more information: [www.aurp.net](http://www.aurp.net)

### October 13–15

NASVF Annual Conference: Funding Innovation—Accelerating the New Economy, Baltimore, MD. For more information: [www.nasvf.org](http://www.nasvf.org)

• MANAGED BY UT-BATTELLE FOR THE DEPARTMENT OF ENERGY •

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Toll-free number: 866-221-2527

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## RETIREMENT



### Russ Miller Retires

One of the Partnerships Directorate's longest-serving and best-known staffers has retired. Russ Miller, who played many roles in his 27 years at ORNL, accepted a senior business-development position at DOE's Kansas City Plant. The move will allow Russ and his wife to live in the same city as one of their grandchildren and be geographically closer to another.

"Russ Miller is about as irreplaceable as anyone in our group," Partnerships Director Tom Ballard said. "He has a unique experience base—business development, technology transfer, and large-scale alliance management."

Miller most recently served as the manager of Strategic Research Alliances, an expanded role he undertook earlier this year. In this position he worked closely with ORNL research directorates that were either leading or actively engaged as partners in consortia pursuing major DOE funding opportunities. His job included intellectual property planning that frequently involved multiple DOE labs, universities, and commercial partners.

The expansion to the ORNL position grew out of his significant work with the successful proposal to launch the BioEnergy Science Center and his role in helping manage that alliance, which includes about 20 partners.

## SAFETY REMINDER

### Yellow Jacket Wasps

Yellow jackets are active from late spring through autumn and are one of the most aggressive types of stinging insects. If you see non-fuzzy bee-like insects hovering around a small hole in the ground, you're probably near a nest. Disturbing it will cause the insects to swarm out and sting you repeatedly.



- Be very careful not to step on or get close to the nest.
- If a yellow jacket flies near or lands on you, don't swing or strike at it or run rapidly because quick movements may provoke it.
- Try not to strike or crush a yellow jacket on your body as the venom contains a pheromone that will drive nearby yellow jackets into a stinging frenzy and signal others farther away to come and join the attack.
- If you get stung, try applying a poultice of meat tenderizer to break down the venom. Antihistamine tablets or ointments may help reduce pain, swelling, and subsequent itching.

For more information see <http://ohioline.osu.edu/hyg-fact/2000/2075.html>.