Oak Ridge National Laboratory
# Reporter
UT-Battelle
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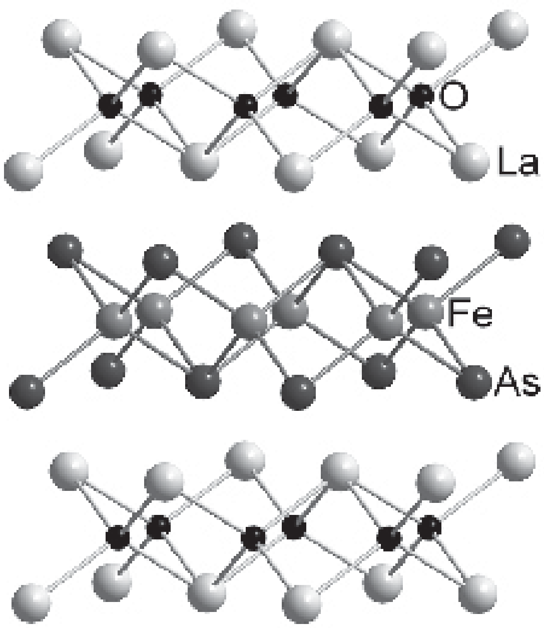
# Iron-ic developments

## ORNL research teams among first to analyze new high-temperature superconductor

Researchers at the High Flux Isotope Reactor have analyzed a newly discovered material with superconducting properties at relatively high temperatures, the first such class of materials to be identified in more than two decades.




**The structure of LaOFeAs, a prototype for the iron-based high-temperature superconducting class of materials. The interesting electronic and magnetic action takes place mainly in the Fe-As layer.**

The experiments with one of the HFIR's triple-axis spectrometers are among a spate of activities that follow the February announcement of the iron-based superconducting compound by Japanese researchers. The finding may sprinkle the so-far stymied field of condensed-matter physics with new clues to how high-temperature superconductors, or high-$T_c$, are able to conduct electricity with no resistance.

Practical applications of high-$T_c$ materials would alleviate a host of energy-related issues, including those related to power transmission and transportation.

"I was flabbergasted" is the reaction veteran neutron scientist and Corporate Fellow Herb Mook says he had when reports surfaced of the iron-based material that, when doped with fluorine, had superconducting properties at a relatively high temperature of 26 degrees Kelvin.

The only high-$T_c$ materials previously known have been cuprates, or copper based. Although the "high" temperatures are nevertheless indescribably cold, high-$T_c$ materials that perform at the easily attainable temperature of liquid nitrogen, for example, would be applicable in field conditions. In fact, some ORNL-developed high-$T_c$ power cables are already being used by utilities.

Conventional superconductors, which were identified a century ago, function only at near absolute zero and are thus impractical. But the higher the temperature, the more useful the material would be.

High-$T_c$ cuprate materials were reported in 1986, resulting in a flurry of near-future speculation about floating trains and super-efficient generators, The actual high-$T_c$ physics, however, has vexed scientists ever since. One line of thought has been that it's something about copper.

"We all thought the cuprates were key to superconductors in some way. Now all of a sudden we find another material," Herb says. "It's extremely important. It gives us another

**(See SUPER, page 2)**

**100th Issue Special**

***Reporter* interviews the deputy directors:**

**Jim Roberto, S&T, and Jeff Smith, Operations**

**Inside...**

# Wigner team first in U.S. to synthesize new HTS compound

An ORNL team in the Materials Science & Technology Division is the first in the United States to produce samples of the new iron-based superconducting materials initially reported by a Japanese team in February.

The Lab's quick response to the major scientific discovery is underscored by the key role that two early career researchers had in following up the initial findings.

"Two of our Wigner fellows, Michael McGuire and Athena Safa-Sefat, synthesized the lanthanum arsenic iron-oxide material in the Solid State Research Facility laboratory, representing the first group in the United States to make samples of the material," says David Mandrus of the Correlated Electron Materials group.

Like the sample Pengcheng Dai's team obtained from China, the MSTD-produced sample was analyzed at the High Flux Isotope Reactor with the help of the Triple-Axis Spectrometer group's Mark Lumsden and Shull Fellow Andy Christianson.

The two-year Wigner Fellowships are awarded to top young researchers in their fields. They are named after Eugene Wigner, ORNL's first scientific director and Nobel laureate. The Shull Fellowship is named for Clifford Shull, who

**(See WIGNERS, page 6)**

**Safa-Sefat**

**McGuire**

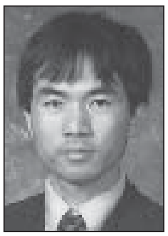
# Super

Continued from page 1

handle on this superconductivity problem."

A team of researchers from ORNL, the University of Tennessee and the National Institutes of Technology led by ORNL and UT researcher Pengcheng Dai published a paper in *Nature* on May 28 describing experiments that appear to support the theory that a very subtle magnetism is responsible for the high-$T_c$ effect.

"Although this doesn't prove that this new material works in the same way as the cuprates, it's a very strong hint that it might," says Pengcheng. "When the temperature of the material goes up, it becomes antiferromagnetic. But then you dope it, and the magnetism goes away. That is exactly what we see with cuprates."



**Dai**

The team obtained a sample of the lanthanum, oxygen, iron and arsenic material and rushed it to NIST and to HFIR for analysis.

"Neutron scattering is the only probe that can tell you the magnetic structure as well as the magnetic moment size. That's where our contributions come in, in determining the electronic state of the material," Pengcheng says.

The *Nature* research team consisted of Dai, lead author and UT-ORNL postdoctoral researcher Clarina de la Cruz, Mook and researchers at NIST, Ames Lab, the University of Maryland and the Chinese Academy of Sciences. Another ORNL team that included Neutron Scattering Sciences Division's Andy Christianson and Mark Lumsden and the Materials S&T Division's Brian Sales and David Mandrus also performed experiments and achieved similar findings with the parent LaOFeAs compound (see story, page 1).

"The triple-axis instrument shows there is magnetism in the parent compound," says Jaime Fernandez-Baca, who leads the Neutron Scattering Sciences Division's Triple Axis group. "Iron arsenide, the parent compound, is magnetic. When you dope it with fluorine, the magnetism goes away and the material becomes superconducting at relatively high temperatures."

In cuprate compounds where the parent compound contains, for example, copper, lanthanum and oxygen, magnetism goes away when an element such as strontium is applied and the material becomes superconducting.

> *"It's extremely important. It gives us another handle on this superconductivity problem."*

The record high temperature for cuprates is 138 degrees Kelvin; so far, the new iron-based material's top reported temperature is a colder 55 Kelvin. But the cuprates have had a 22-year head start.

Jaime's discussion of the experiments reveals the importance of specialized instruments in neutron scattering science.

"Complementary experiments were performed at NIST and HFIR because they wanted to get as much data as they could. NIST also has a high-resolution powder diffractometer, which does a very precise determination of crystalline structure. The triple-axis spectrometer has coarser resolution but higher intensity, which allowed researchers to see very weak magnetic peaks," he says.

**Fernandez-Baca**

High-resolution powder diffractometers, which drew experimenters to NIST's 20-megawatt research reactor, are being installed at both the 85-megawatt HFIR and the Spallation Neutron Source. When these instruments at HFIR and the SNS are complete, neutron scientists, armed with these new clues, will likely be lining up with experiments to solve the high-$T_c$ riddle. When completed, the SNS will have 24 neutron scattering instruments and the HFIR will have 15. The combination of these will make ORNL the world's foremost center for materials research with neutrons.

The LaOFeAs samples in the experiment described in the *Nature* article came from China. The Mandrus and Sales team used an ORNL-fabricated sample. Results were very similar, Jaime says.

On the surface, magnetism and high-$T_c$ are antagonistic. When a superconducting material is exposed to a magnetic field, the superconducting properties are disrupted. But magnetism may somehow be a key to the process.

One theory holds that electrons in a lattice structure may be coupled by extremely weak magnetism, forming in pairs that enhance superconductivity in materials. This "Cooper pairing" is present in conventional (extremely cold) superconductors that have been known for 100 years or more. The HFIR and NIST experiments support the controversial theory that similar physics may be involved in high-$T_c$ materials—that like-charged electrons, which should repel each other, are somehow held together.

**Mook**

Pengcheng notes that opposing theories have attributed high-$T_c$ properties to either some force of magnetism that overcomes the electrons' mutual repulsion or something almost magical about cuprates.

"The cuprate superconductors until now have been the only ones known at high temperatures. From this perspective, finding another example of a high-temperature superconductor which does not contain copper but also has magnetism is extremely important, and that's where our work lies," he says.—*B.C.*

## Wadsworth to lead Battelle

Former ORNL Director Jeff Wadsworth, now executive vice president of Battelle's Global Laboratory Operations, has been selected to be the next president and chief executive officer of Battelle when Carl Kohrt retires at the end of this year.

Jeff will take over on January 1.

Jeff became ORNL director in August 2003 during a period of rapid growth, just as the Lab's modernization campaign began to bear results with the completion of the new east campus, the Spallation Neutron Source and Nanoscience Center and the winning of DOE's Leadership Computing Facility competition.

He left ORNL in 2007 to lead Battelle's global lab operations from Columbus.

"Please join me in congratulating Jeff," says Lab Director Thom Mason.

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**Bill Cabage, editor,** 865/574-4399 or cabagewh@ornl.gov

**Deborah Barnes, associate editor,** 865/576-0470 or barnesds@ornl.gov

**On the Web:** www.ornl.gov/reporter

DOE Inspector General Hotline: 1-800-541-1625


### REDC project charts a 'first'

ORNL's Coupled End-to-End Demonstration Project for the Global Nuclear Energy Program has charted a first: a Nuclear S&T Division team has made the first mixed-oxide pellets from recycled spent nuclear fuel in a process that doesn't produce a separate plutonium stream.

NSTD's Elisabeth Walker and Ray Vedder made the mixed-oxide fuel pellets from the recycling of spent nuclear in an integrated process under development at the Radiochemical Engineering & Development Center,.

Conventional methods for processing spent nuclear pull Pu separately from the spent-fuel mix of actinides (uranium, neptunium and plutonium) and are a proliferation concern, explains program manager Jeff Binder.

"Historically, the PUREX reprocessing system, which was developed at ORNL, separates plutonium into a separate stream. One of the GNEP goals is to develop a technology where plutonium is not separate. This process takes it out with the uranium and neptunium, so you don't get a plutonium-only stream."

A technique developed at ORNL, called modified direct denitration, then converts the uranium-neptunium-plutonium nitric acid solution to a solid-oxide form. Traditionally, actinides taken out of a nitric acid solution are in a glassy structure that has to be processed with steps such as milling and grinding. The solid-oxide powder from the modified direct denitration process can go right to pellet form.

"This is the first separation of spent nuclear fuel where plutonium isn't pulled out by itself and then Elisabeth and Ray took the product material directly to making a pellet," Jeff says.

"Eventually, in an industrial process, these pellets would be in a mixed-oxide reactor fuel made by a process with decreased proliferation concerns," he says.

### High-tech water heater nears shelves

Andy Karsner, DOE's assistant secretary for energy efficiency and renewable energy, was at ORNL on June 5 for the unveiling of what promises to be a revolutionary water heater. The electric heat pump water heater, which pulls heat from a home's air to heat water, will be the first water heater ever to achieve the Energy Star rating, with a 50 percent reduction in emissions compared with traditional water heaters.

GE and ORNL, who are numbers one and two in R&D 100 awards won, have entered into a cooperative research & development agreement to market the new appliance. Developed at ORNL, the hybrid water heater technology represents a major component for affordable zero-energy homes. The involvement of a major commercial enterprise like GE, Karsner noted, helps to make this a reality.

**ORNL's Wellness Program kicked off its HealthFest on May 5 with "sneaker day" and a walk across the campus. (From left) Protocol officer Leigha Stewart, Lab Director Thom Mason and Neutron Sciences Associate Lab Director Ian Anderson put in their paces.**

"R&D is not an expense; it is an investment, and today we are celebrating a return on our investment," Karsner said.

Deputy Director for Science & Technology Jim Roberto noted that water heaters are the second largest consumers of energy in the home, and the use of the super-efficient water heater in Tennessee alone would save 1.5 billion kilowatt hours of energy per year, which at current electricity rates would correspond to $120 million in savings.

GE's Henry Eng noted that the units should be available to the public by late next year. —*S.W.*

### Scraps of history downtown

ORNL's history room recently donated a scrapbook from the Lab's earliest days to the Oak Ridge Public Library. Pearl Olsen, who worked at ORNL in the 1940s and later moved to Argonne National Laboratory, collected the trove of flyers and newspaper articles.

Later finding her old scrapbook, Olsen realized that the clippings represented an important historical record of social and political events in and around Oak Ridge as the town was being built, and she sent it back to ORNL for safekeeping.

The scrapbook eventually made its way into the hands of ORNL's History Room volunteers, accompanied only by a business card. When they called Olsen they were surprised to find that she was still working at Argonne. And she remembered collecting the flyers and going to the dances.

She also still felt that the scrapbook belonged in Oak Ridge. The History Room volunteers agreed, but they also thought that the memorabilia should be available to more than just the people at ORNL.

Recently the scrapbook was delivered to the city library, where it is available to the general public. ORNL-specific items, including some about the Manhattan Project, remain in the ORNL History Room under the care of retiree volunteers Charles Congdon, Bill Yee and Steve Stow.—*S.W.*

*Reported by Bill Cabage and Sarah Wright*

**History room volunteers (from left) Bill Yee, Charles Congdon, Communications and External Relations' Debbie Dickerson and Steve Stow present the scrapbook to Kathy McNeilly, director of the Oak Ridge Public Library.**

# Jim Roberto

## In an eventful four years as deputy director for S&T, he finds the Lab in a good spot

Jim Roberto came to ORNL from the Massachusetts Institute of Technology and Cornell University, rising through the ranks to become director of the former Solid State Division and help lead the Lab's reengineering campaigns of the mid-1990s. He was selected by UT-Battelle to be associate Laboratory director for Physical Sciences when the new contractor arrived in 2000 and became deputy director for Science & Technology in 2004. Jim enjoys the perspective of the longest ORNL tenure among the Lab's Leadership Team.

*What has been the biggest change at ORNL since you became deputy director for science and technology?*

Since 2004 ORNL has reinvented itself in virtually every major area of the Laboratory, including computing, neutron science, nanoscience, biology, energy and national security. The progress has been amazing. There has been incredible growth in both capability and science output in computing. With the DOE and the UT/ORNL National Science Foundation petascale systems currently coming on line, we are on our way to becoming the world's foremost center for high-performance computing.

With the successful completion of the SNS and the HFIR cold source, we have the world's highest intensity pulsed neutron source and unsurpassed steady-state neutron capabilities—well on our way to becoming the world's foremost center for neutron science.

We successfully completed DOE's first nanoscience center, and together with DOE's most comprehensive basic and applied materials research program we are strengthening our leadership in materials science and engineering.

We won one of three very highly competitive awards for DOE bioenergy research centers, substantially strengthening our life sciences program. We were selected to lead the billion-dollar U.S. contribution to ITER, substantially strengthening our energy R&D portfolio, and we successfully completed the Multiprogram Research Facility, providing needed facilities for our growing programs that support essential national and homeland security missions and nuclear nonproliferation.

So I don't know how you top that. A *lot* has happened since 2004.

*How did all of that happen?*

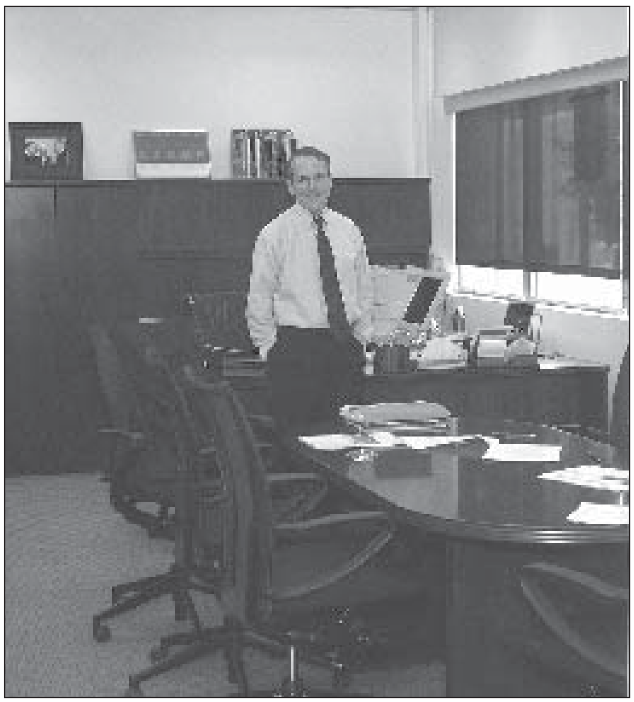
It's been a combination of vision, effective project and program management, successful engagement across disciplines and with our partners, effective recruiting of talent, and plain hard work at all levels. Strategic partnerships with UT and others have been essential. In the end it comes down to people, and I could not be more pleased with the performance and accomplishments of our staff across the Lab.

When you consider the breadth and potential impact of these accomplishments, there is no lab positioned better for the future than ORNL.

*Describe ORNL on your first day here.*

I came to ORNL in 1974 right after the 1973 oil embargo. Like many others at that time, I was attracted to pursuing science in an energy context. DOE and ORNL were in the process of reinventing themselves—ORNL from primarily a nuclear lab to a much broader energy lab, and DOE over a period of just a few years from the Atomic Energy Commission to the Energy Research & Development Administration to DOE. The staff responded extremely well to this challenge, laying the foundation for the very diverse Laboratory that we have today.

The difference today is that the new facilities and campus have transformed ORNL, making the opportunities even greater than they were in the 1970s.



Curtis Boles

*"In the end it comes down to people, and I could not be more pleased with our staff."*

*What takes up most of a deputy director's time?*

Most of my time is focused on facilitating science and technology programs at ORNL through engaging the staff, sponsors, the Lab leadership and our partners on current and future research opportunities; developing and strengthening strategic partnerships; and ensuring that ORNL is aware of important trends in science and technology and is prepared for the future.

*So you keep your ear to the ground, so to speak. Can you elaborate on how you facilitate?*

That's part of it, and part of it is helping and encouraging staff. Facilitating means helping to solve problems, overcome barriers and connect people in ways that allow them to accomplish their goals.

*What is the most important work ORNL is doing or should be doing?*

ORNL is a translational lab, meaning we are a laboratory in which our basic science informs our technology and our technology motivates our science. We sustain a significant connected effort across the spectrum from basic science to technology. Our mission is energy, and our most important work relates to R&D that underpins and executes that mission.

Energy is a very broad area and it encompasses virtually all major activities at the Laboratory. Our major facilities are tools that allow us to advance science and technology that supports the energy mission. Our basic science programs provide discovery opportunities and a rigorous underpinning for technology. Our technology programs inform our basic science programs and are a source of innovation.

Recent national and international developments have brought energy to center stage. Addressing the energy challenge will require breakthroughs in both science and technology. As a leading national laboratory, we have an opportunity and responsibility to make a difference.

*What areas of science would you like to know more about?*

I think we're just at the beginning of what high-performance com-

See ROBERTO, page 6

# Jeff Smith

## Deputy director for operations would like to see ORNL's tech on display, on campus

Jeff Smith has been ORNL's deputy director for Operations since day one of UT-Battelle's tenure in Oak Ridge, acquiring in the meantime a reputation for getting things done in a bold fashion.

And not just at work. He also flies his own airplane that he built himself.

Like the Lab over the past eight years, his job has grown, and he stays busy helping other labs—Pacific Northwest, Idaho, Argonne, Lawrence Berkeley, and Brookhaven—and is often at Battelle's Columbus headquarters. Accordingly, he has gained a rich perspective of not only ORNL but the overall national lab scene. With that comes a confident declaration.

"I can say," Jeff states, "we have the best laboratory in the system."

*With modernization pretty much winding down, what do you see as our biggest operational challenge? Where are you spending most of your time?*

Until we get to the point where nobody is getting hurt, we still have opportunities for improvement in safety. We need a 24-7 awareness of safety so that not only are we going home safely, but we are safe at home, too. We'd like for the safety culture to be one that gets carried home—that people take fewer risks, regardless of where they are.

Close to safety in terms of how I spend my time is efficiency. I'd like for the Lab to be more efficient. Understanding the cost drivers is a tough task and many of the efficiencies we've already captured have been turned into new investments. At some point I would really like to see us make a significant dent in our labor charge-out rates. The laboratories, including ours, are expensive places to get things done, and I'd like for ORNL to be a leader in cost effectiveness.

Our overhead rates are actually down, but we've invested in infrastructure, the LDRD program and a strategic hire program, doing positive things that have consumed more overhead.

We are not far off from a 50-50 ratio of support staff to researchers. That's a number I'd like to adjust because it has a big impact on our cost. We're also a little more expensive than other labs because we have several functions such as a fire department, steam plant and other services some labs don't have to provide. I've been spending time on these topics often lately.

*There is actually still more going on with modernization and new facilities. Describe the new building that will go up in the flagpole lot.*

Our goal is to take the wet chemistry laboratories in the 4500 complex and move them into a new facility that will be built across the street, and to convert over time the space vacated in 4500-North and South into office space. We're hurting for office space now. We're trying to vacate the central campus to make room for cleanup activities, so our long-term goal is to free up office space in 4500. This new building will be a state-of-the-art, dedicated laboratory facility. It will be built around the latest thinking, benchmarking from others, on state-of-the-art, multipurpose wet laboratory space.

That will have a big impact on the "haves and have-nots." People who are trying to execute their R&D programs in the 4500 buildings and other older facilities are the "have nots." I hope the new space will move them into the "have" category.

*I imagine it would be more efficient space too.*

Which is a third theme—energy efficiency. From an energy perspective, the 4500 buildings are the most inefficient at the Lab. We have a pretty aggressive plan. We have been the most aggressive in DOE to build LEED-certified facilities, and we set the pace for the state as well. We've done a lot of things to save water and energy, but there's more we can do.

We have a pretty significant energy-saving performance contract that will help make our infrastructure more energy efficient. One of the biggest features of that is to modify the steam plant from natural gas to biomass—wood chips. That's a big deal. We'll burn several semi-truck-loads of wood chips every day to produce the steam we need for the Lab.

*"I'd like for ORNL to be a leader in cost effectiveness."*

Another thing is to provide opportunities to demonstrate energy-saving opportunities developed by our researchers. A traffic light technology that's been developed here monitors traffic and gives you a green light when the way is clear so you're not sitting still and wasting fuel. The point being, we're demonstrating our own technologies. We ought to be a testbed. Our sponsors ought to be able to see what's being developed here when they visit.

*What progress might we see in the next five years in the central campus cleanup?*

The first thing we want to do is make the Oak Ridge Science and Technology Park real. All of the construction that you see now has been about getting the underground infrastructure set for only 12 acres of the upper northwest quadrant. Progress beyond that is waiting for demolition of facilities in the area. The first thing I'd like to do is get the 2000-2001 complex and some other buildings out of the way. The old cafeteria is gone. Building 2026 will be there for a long time, but the rest can come down. Sometime this summer we'll see a new building come out of the ground that will be home to the first tenant in the S&T park.

The goal, again, is to provide opportunities for people to come and collaborate and do research with us. I think that's an untapped source of R&D opportunity. I've been spending some of my time making that a reality. We're not quite there yet.

*Considering the SNS and nanoscience and user facilities, with the access restrictions we face, particularly with foreign nationals, do you think we've hit the right balance on being able to bring people in?*

We've recently completed an effort to improve the process for getting foreign nationals on site. We worked to improve our processes in collaboration with the other Battelle laboratories. The next step will

**See SMITH, page 6**

# Roberto

Continued from page 4

puting can do for science and technology. I'm extremely pleased that the Laboratory is in such a strong position in this area. Computing is not going to replace experimental science, but it is going to make it more efficient and allow us to deal with more complex systems. This chapter has yet to be written, but I firmly believe that leadership in the application of high performance computing in science and technology will be very important to our future.

**Roberto**

*If you were still doing research, what would it be?*

Most likely I would be engaged in nanoscience. We now have the experimental tools, the synthesis capabilities and the computational infrastructure that allow us to work at the scale where the properties of materials and the functions of biological systems are determined.

This is revolutionary. It provides the opportunity to create new materials and understanding that will be critical to our future.

*Were you thinking about these things when you were a researcher?*

I think many of the people at the Laboratory intuitively understood the impact that nanoscience was going to make, and we took deliberate steps in the early 1990s to encourage capability development in this area. Nanoscience was one of the first focus areas of the LDRD program, and investments that we made at that time were critical to our success in winning the nanoscience center.

To a large extent, the vision for nanoscience was originally laid out by Richard Feynman in the 1950s, but it took 50 years before the tools caught up with this vision. I believe that many of the solutions to the important questions we're asking in materials, biology, chemistry, energy and national security will have important nanoscale science and technology components.

*For instance, ORNL has already fabricated and analyzed, at HFIR, a new superconducting material just discovered in February.*

That's what you can do when you have world-class people and facilities.

# Smith

Continued from page 5

be to implement these improvements and hopefully staff will sense a difference. I don't expect significant changes in the way we currently process and grant access to staff, but we'll keep working on it.

**Smith**

There will be more and more people coming to this Lab from international destinations. We commissioned Tom Ballard to run a user process improvement effort. I've asked him to look at everything from when the users show up at the front gate for the first time until they leave: What does a user experience at this Laboratory, from getting on the site to getting computer access? We want to make sure the users have the best experience possible when they show up at the site.

*Growth in Lab programs has meant a growth in your job, apparently, as far as the Lab infrastructure goes.*

ORNL has become the world's leader in high-performance computing, and it has taken a tremendous amount of support on the infrastructure side to make that happen. As we speak, we're still putting in place chilled water and new electrical infrastructure to support these machines.

We even have visions for another facility, possibly located east of the 7000 maintenance area, to accommodate the next generation of high-performance computers. Those have all been significant challenges on the infrastructure side, to try to stay ahead of Thomas Zacharia's needs, which is difficult.

Looking back and seeing what we've done, I feel pretty good. There is a broad recognition that something special has happened—is happening—at Oak Ridge. I consider myself lucky to have a part in what has happened, but it has been possible only through the contributions from hundreds of people, both within the Lab and outside of the Lab.

*What do you find most enjoyable in your job?*

I don't think I'm any different than most people. I like making a difference; I like getting things done. Sure, there are days when it is tough not to get discouraged, but persistence, willingness to take on challenges, and being prepared to make tough decisions when you know not everyone will be happy, can bring great satisfaction when you see results.

Some of my friends think I'm crazy for building my own airplane, but it taught me a lot about what is possible through persistence. Some thought the vision we had for modernizing the Laboratory was impossible, but again, I think we've demonstrated what is possible through persistence.

# Wigners

Continued from page 5

received a Nobel Prize for his pioneering achievements in neutron scattering, which began at ORNL shortly after World War II.

The two Wigner Fellows, Michael and Athena, came to ORNL with accomplished backgrounds in solid-state chemistry and materials synthesis. In fact, they are both on their second postdoctoral tours—Michael completed a postdoc at Princeton while Athena worked at Ames Lab before coming to ORNL.

"These materials are tricky to make; the chemistry is not easy to get right," Michael says. "Here we have the right experimental tools such as furnaces with enclosed fume hoods, which are important when you are working with toxic materials like arsenic. Athena and I both are solid-state chemists by training, so we have experience with these types of materials and techniques."

Working with David, Brian Sales, Rongying Jin and the High Temperature Materials Laboratory's Jane Howe, Michael and Athena have spearheaded the group's synthesis effort, providing the new material for outside researchers, as well as their own group's in-depth experiments.

> *"As a synthetic-solid-state chemist it is exciting for me to be involved in this work."*

"Like the copper-based superconductors, there is renewed enthusiasm for the discovery of high-temperature superconductivity in the new iron-based ones. Much work remains, but as a synthetic-solid-state chemist it is exciting for me to be involved in this work at ORNL," Athena says.

MSTD theorist David Singh also performed some of the first calculations on first-principles electronic structure and the phonon densities of state on the new material. Papers based on the MSTD research have been published in *Physical Review B* and *Nature Letters*, with several other manuscripts currently in preparation by the group and their collaborators.

"These materials are a lot of fun to work with for a solid-state chemist, with four elements and the almost limitless substitutions you can make to form a huge family of compounds," Michael says. "We like to experiment with numbers of compositions and different doping to see if we can get the $T_c$ higher, but at the same time there are only so many hours in the day and so many you can make."—*B.C.*

# Service Anniversaries

**June 2008**

**40 years:** L.J. Turner, Materials Science and Technology; James L. Lively, Logistical Services; William H. Hopwood, Jr., Nuclear Science & Technology

**35 years:** Gwendolyn Teresa Banks, Business & Information Services Dir.; Stanley L. Milora, Fusion Energy; Jan S. Thomas, Laboratory Protection

**30 years:** William R. Nelson and David C. Giles, Information Technology Services; Wallace D. Porter, Materials Science and Technology; Steve Allen Richardson, NScD Research Accelerator; G. Randall Wetherington, Jr., and William H. Andrews Jr., Measurement Science & Systems Engr; Glenn F. Cada and Annetta Paule Watson, Environmental Sciences; Ronald A. Cain, Hal L. Jennings, Eric Craig Bradley and Leslie Kevin Felker, Nuclear Science & Technology; Paul E. Johnson, Computational Sciences & Engineering; Elias Greenbaum, Chemical Sciences; John Edgar Long, Fabrication, Hoisting & Rigging; Marti I. DeVall, Nuclear & Radiological Protection; Robert C. DeVault, Energy & Transportation Science

**25 years:** David J. Wesolowski and David R. Cole, Chemical Sciences; Diana Lynn Tucker and Leslie Robert Dole, Nuclear S&T; Gerald R. Sullivan, William Wayne Bolinger and John W. Shaw Jr., Nonreactor Nuclear Facilities; Patricia S. Hu, Energy & Transportation Science; David E. Williamson, US ITER Project Office; Samuel J. Freels, Campus Support & Instrumentation

**20 years:** Linda A. Lewis and David R. Mullins, Chemical Sciences; Dennis N. Hovey, Information Technology Services; Easo P. George and Karren Leslie More, Materials S&T; Kimberly R. Grubb and Frank E. Pierce, Jr., Energy & Transportation Science; Barbara J. Snow, Nuclear S&T; Robert A. Young, Environmental Sciences; Joel R. Lay and Cheryl D. Parks, Business & Information Services Dir.; Robert (Rob) F. Peacher, Nonreactor Nuclear Facilities; Steven D. Bridges, Facilities Management; Milton Nance Ericson, Measurement Science & Systems Engr; Don E. Maxwell, Center for Computational Sciences; Annetta M. Hendricks, Neutron Sciences Dir.; Robert L. Cummins, NScD Research Accelerator; Juanita Kay Hunt, National Security Dir.

## Chemist Ellison Taylor dies

Ellison Taylor, ORNL assistant laboratory director for three years and director of ORNL's Chemistry Division for 20 years (1954-74), died May 31 in Oak Ridge. He was 94.

Taylor joined ORNL's Chemistry Division in 1945. He carried out some of his research projects during his 20 years as director of the Chemistry Division. The *ORNL Review*, the Laboratory's research magazine, dubbed him "player-coach of chemistry."

His hobbies included playing tennis and acting in several plays at the Oak Ridge Playhouse.

## Reporting fraud, waste and abuse

UT-Battelle is committed to performing its business activities with the highest standards of integrity, honesty and professional competency. As a UT-Battelle employee, you play an important role in our commitment to maintaining the highest business standards through your individual commitment to excellence.

Further, you have the responsibility to provide notice of inappropriate activities which threaten our joint dedication to integrity in the workplace and which may prevent us from meeting the expectations of DOE and our other customers.

For work done under the DOE contract, UT-Battelle employees have a number of options for expressing their concerns about activities they may view as inappropriate on the job. Any employee with information about alleged fraud, waste, abuse, corruption or mismanagement relative to DOE programs, operations, funds or contracts may provide information directly to the following.

- Line management
- Scott Branham, director of the Audit and Oversight Directorate (241-7614) or http://home.ornl.gov/directorates/audit_assessment/form_fraud.shtml
- Steven Bonnett, staff concerns coordinator (241-2255) or http://home.ornl.gov/programs/employee_concerns
- The Office of Inspector General (IG), 1-800-541-1625. The toll-free hotline number is operated 24 hours a day to permit immediate access by any employee.

All such disclosures may be made without fear of employer reprisal. Employees are also free to refuse to engage in illegal or dangerous activities which the employee believes to be unsafe; to violate laws, rules or regulations; or to involve fraud, mismanagement, waste or abuse.

Also, it is important that all employees work cooperatively with internal and external auditors and investigators.

Scott Branham, director
Audit and Oversight Directorate

# New Staff Members

Sharon Marie Bourgeois, Logistical Services
Aaron Levi Chandler, NScD Research Reactors
Jonathan Garrett, Cecilia Dee Cook, Rick Arthur Lee, Terry Matthew Collins and Jonathan Ray Smith, NScD Neutron Scattering Science
William Robert Hicks III, Wei Lu and John Phillip Swezy, NScD Neutron Facilities Development
Teddy Ray Marler, John Daniel Estes, Michael Lee Gilmore, Seth Easton Robinson, Cassandra Dawn Woody (re-hire) Justin Wayne Garner, Willie D. Graham II, Matthew Justin Green, Cassie Lynn Lopez, Zackary Taylor Moore and Mendell Ray Carter, Campus Support & Instrumentation
Chadwick Clyde Plemmons, Kimberly Dawn Harper and Larry Ross Avens, Global Initiatives Dir.
Jason K. Richards, Communications & External Relations Dir.
Michael David Biegalski, Center for Nanophase Mat'ls Sciences
Kenneth Edward Bishop (re-hire) and Bobby Nicholas Sweet, Office of Chief Information Officer
Michael Joseph Cutts, Utilities
Matthew Anderson Jessee, Rick Ray Brown and Rose Ann Boll, Nuclear Science & Technology
Patricia Waldroup Payne, Vicki Vaughn Wheeler and Nicholas Daron Brabson, Computational Sciences & Engineering (all three are re-hires)
Vinod Tipparaju, Computer Science and Mathematics
David Lavelle Calhoun Jr., and Joseph D. Courtney, Information Technology Services
Jason Daniel Hardin and Deion Julius Brown, Asset Mgt & Small Business Programs
Matthew Shawn Koontz, Sung-Woo Lee and James Frank Mase, NScD Research Accelerator
Jeremy Lawrence Mead and Jacob Hunter Phillips, Contracts
Sara Jo Peak, Measurement Science & Systems Engr
John Joseph Smith Jr., Facilities Management
Larry Edward Thacker, Fabrication, Hoisting & Rigging
Ashley Paige White and Zackary Junis Jackson, Business & Information Services Dir.
Kukwon Cho, Energy & Transportation Science
Ranjeet Devarakonda, Environ. Sciences
Melissa Reneé Hope and Thomas Craig Rogers, Partnerships Dir.
Caroline Elizabeth Webb, Center for Computational Sciences

OAK RIDGE NATIONAL LABORATORY
Reporter
P.O. Box 2008
Oak Ridge, TN 37831-6266



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## *Reporter* hits 100

This is the 100th issue of *ORNL Reporter.* The most recent in the line of ORNL employee newsletters made its debut in March 1999 following a brief experiment with a joint ORNL and Y-12 house publication. The name *Reporter* was suggested by then-Lab Director Al Trivelpiece, who was featured in the initial issue.

The newsletter has changed somewhat in nine years (the original spot color, for instance, was a '90s-chic teal), although the news format is the same: Cover the niches in ORNL R&D and operations. *Reporter* came on the scene in time to document the contractor change from Lockheed Martin to UT-Battelle and the ensuing modernization campaign.

The staff is frequently asked why *Reporter* continues to print on paper in an age of e-journals. The reasons vary: For one thing, half the readership are retirees who often aren't Web-connected. We can also point to all the computer-related trade magazines and forward the question. At any rate, *Reporter* is on the Web at www.ornl.gov/reporter.

Topics in the first issue included the emerging Spallation Neutron Source construction project, reengineering, the calutrons' 50th anniversary and a profile on a newcomer named Thom Mason. If we make it to issue 200, who knows *what* we'll be writing about?—*B.C.*

ornl reporter

A conversation

ORNL's calutrons wrap up historic half-century of isotopes

Issue No. 1, March 1999