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News Release

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ORNL wins six R&D 100 Awards, pushing total to lab-leading 128

OAK RIDGE, Tenn., July 5, 2006 — Researchers and engineers at the Department of Energy's Oak Ridge National Laboratory have won six R&D 100 Awards, presented each year by R&D Magazine in recognition of the year's most significant technological innovations.

"I congratulate the researchers who have won these awards, which highlight the power and promise of DOE's investments in science and technology," Secretary of Energy Samuel W. Bodman said. "Through the efforts of dedicated and innovative scientists and engineers at our national laboratories, DOE is helping to enhance our nation's energy, economic and national security."

Gerald Boyd, manager of DOE's Oak Ridge Office, joined in congratulating the ORNL winners.

"These awards demonstrate how researchers at this Office of Science laboratory are conducting research that is respected and recognized by the scientific community," Boyd said. "We certainly congratulate the winners and the talent they bring to the Oak Ridge National Laboratory."

With this year's awards, ORNL's national lab-leading total increases to 128, second only to General Electric.

"ORNL's remarkable success in winning these awards is a reflection of our innovative research and outstanding staff," said ORNL Director Jeff Wadsworth. "We congratulate our recipients and take great pride in their accomplishments at the laboratory."

ORNL researchers were recognized for the following inventions:

Hybrid Solar Lighting System, developed by Jeff Muhs, David Beshears, Duncan Earl, Curt Maxey, Melissa Lapsa, Wes Wysor, Christina Ward and Randall Lind of the Engineering Science and Technology Division, John Jordan of ORNL Creative Media and Sunlight Direct of Oak Ridge.

This system uses a roof-mounted solar collector and small fiber optics to transfer sunlight to top-floor hybrid fixtures that contain electric lamps. With a control system, the two light sources work in tandem by dimming the electric lights when the sunlight is bright and turning them up as clouds move in or as the sun sets. The result is a dramatic improvement over conventional approaches to bringing sunlight into buildings.

One collector can power up to 12 fluorescent hybrid light fixtures or 30 to 40 incandescent accent lighting fixtures, which can illuminate about 1,000 square feet. The technology reduces energy usage not only for lighting but also for cooling because of the system's ability to block ultraviolet and infrared heat. Developers note that the savings can be dramatic, especially in areas of the nation blessed with abundant sunshine.

LandScan Global Population Database, developed by Eddie Bright, Phil Coleman, Amy King, Budhendra Bhaduri and Ed Tinnel of ORNL's Computational Sciences and Engineering Division.

LandScan is a high-resolution population distribution model for the world. At a 1-square-kilometer resolution, LandScan is the finest global population data ever produced and has 25 times higher resolution than the next best

global population database. This database is produced through an innovative, flexible and dynamically adaptable spatial model that refines the best available census data utilizing geographic information system and remote sensing technologies.

As the best global population database, LandScan has become the community standard for estimating population at risk and is useful for coordinating disaster response, humanitarian relief, sustainable development and environmental protection. In addition to U.S. federal agencies, thousands of users worldwide in government, education, research and commercial sectors use the LandScan database for scientific analyses and policy decision support in numerous areas of international significance. LandScan was an instrumental tool used during rescue and relief efforts after the Indonesian tsunami in December 2004.

Metal Infusion Surface Treatment (MIST), developed by researchers from C3 International, assisted by staff from ORNL's Materials Science and Technology Division.

Metal Infusion Surface Treatment, known as MIST, can infuse up to 51 elements into the surface of metals and alloys, and then secures these elements with a thin-nanostructure coating. Metalworking tools and catalytic devices have been treated resulting in increased lifetime or higher performance of the products, and the MIST process can be performed on site. In tests on cutting tools, MIST has yielded lifetimes 10 times better than conventional coatings. Customers report the treatment not only lengthens the life of the tool, but also increases production rates and reduces overall manufacturing costs. MIST has potential applications in improved spark plug and catalytic filter function, as well as in fuel cells.

NanoFermentation, developed by Tommy Joe Phelps of ORNL's Environmental Sciences Division, Lonnie Love of the Engineering Science and Technology Division, Adam Rondinone of the Chemical Sciences Division, former ORNL researcher Bob Lauf, now a consultant, and post-doctoral researcher fellows Yul Roh, Chuanlun Zhang and Ji-Won Moon.

NanoFermentation represents a fundamentally new approach for producing extremely fine, uniform and highly crystalline powders useful for magnetic media, ferrofluids, xerographic toner, catalysts, pigments, water treatment and coatings. The process works at or near room temperature using conventional industrial equipment and straightforward fermentation processes. In addition, NanoFermentation uses bacterial strains that are completely natural instead of those that have been genetically engineered. The inventors believe that by making tailored nanomaterials available in economic quantities their process will help stimulate interest in the development of new applications and eliminate a roadblock that has prevented the field of nanotechnology from reaching its potential.

TMA 6301 and TMA 4701, developed by Govindarajan Muralidharan, Vinod Sikka, Phil Maziasz, Neal Evans, Michael Santella and Christopher Stevens of the Materials Science and Technology Division, Duraloy Technologies, and Nucor Sheet Mill Group.

TMA 6301 and TMA 4701, two new heat-resistant cast austenitic stainless steels with improved durability and lifespan at higher maximum operating temperatures have been developed using a computer-aided design methodology. Use of the novel methodology reduced the time required for the development of new alloys from the six to 10 years typically needed with traditional trial-and-error methods to about 3 years. The new alloys will be used in various industrial equipment applications in the heat-treatment, steel, chemical, and petroleum industries. Since these alloys can be used at higher temperatures for longer times, energy savings and cost savings will be realized due to improved efficiency afforded by higher operating temperatures and increased component lifetime.

Trane CDQ, developed by Jim Sand, formerly of ORNL's Engineering Science and Technology Division in collaboration with the Trane Company.

Trane CDQ is an air conditioning-dehumidification device that controls temperature and humidity of buildings' interiors. The CDQ controls the ambient air to a desired 45 to 60 percent relative humidity, which is important for libraries, schools, offices and most importantly hospitals. Because regulating humidity limits the spread of infection, the CDQ can maintain the needed moisture content as well as function more efficiently than its competition. Medical institutions, including St. Vincent's Hospital in Alabama and Franklin Memorial Hospital in Maine, have installed the device. Unlike other air conditioning/dehumidifying units, the Trane CDQ effectively controls the humidity without adding heat to the system.

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