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ORNL scientists noted for nanotech

OAK RIDGE, Tenn., July 19, 2006 -- Two Oak Ridge National Laboratory inventions, NanoFermenation and a high-temperature superconducting wire technology, have won their first nanotechnology awards in separate contests.

R&D Magazine's inaugural MICRO/NANO 25 award recognized NanoFermentation, a 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 also is one of six ORNL technologies to receive the magazine's 2006 R&D 100 award.

The method works at or near room temperature and uses conventional equipment, a straightforward fermentation process and natural rather than genetically engineered bacterial strains. It promises to allow production of tailored nanomaterials in economic quantities, potentially stimulating interest in the development of new and expanded applications.

NanoFermentation was developed by Tommy Joe Phelps of the 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.

Early project funding came from the Department of Energy's Office of Biological and Environmental Research with more recent funding coming from DOE's Fossil Energy office and the Defense Advanced Research Project Agency.

ORNL's high-temperature superconducting wire technology, referred to as "HTS Wires Enabled via 3D Self-Assembly of Insulating Nanodots," has received a Nano 50 Award from Nanotech Briefs, a digital magazine for design engineers. The ORNL technology offers a method of sustaining high supercurrents in the presence of a large applied magnetic field.

The technique creates columns of self-aligned "nanodots," made of nonconductive material, within the superconductor. These nanodots, in effect, pin down the naturally occurring vortices caused by magnetic fields, which disrupt energy distribution and counteract the wire's superconductive properties. The technology could allow superconductors to be used in motors, generators, air defense systems and other applications where a large applied magnetic field is present.

Developers of this technology were Sukill Kang, Amit Goyal, Jing Li, Sung-Hun Wee, Keith Leonard, Patrick

Martin, Albert Agcaoili Gapud, Frederick Alyious List III, Eliot Specht, Lee Heatherly, Maria Varela del Arco, Anota Ijaduola, James Thompson, David Christen, Stephen Pennycook and Dominic Lee in the Materials Science and Technology Division, and Parans Paranthaman in the Chemical Sciences Division at ORNL.

The research was sponsored by the Department of Energy's Office of Electricity Delivery and Energy Reliability.

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