

Department of Physics & Astronomy

PHYSICS NEWS FLASH

UT Physicist Part of Nano 50 Award-Winning Team

November 14, 2006

[Physics Professor Jim Thompson](#) is part of a scientific team honored with a Nano 50 Award for their work on high-temperature superconducting wires. [Nanotech Briefs](#), a digital magazine for design engineers, chose “HTS Wires Enabled via 3D Self-Assembly of Insulating Nanodots” for recognition as one of the top 50 advances in nanotechnology in the past year.

Professor Thompson and his colleagues from the Oak Ridge National Laboratory Materials and Science Technology Division designed and characterized wires that can carry current, unimpeded, at high temperatures (well above absolute zero but still far below room temperature). The success of their approach involved tackling some troublesome “whirlpools.” For the wires to be useful in large-scale applications (electric power, for example) they need to superconduct in the presence of very high applied magnetic fields. The problem is that these fields generate small whirlpools (called vortices) of supercurrents. Like tiny, powerful tornadoes, their movement through the wires interrupts the flow of current and strips away their superconducting power. The ORNL team devised a technique using nanodots of nonconductive material that align themselves in columns, which pin down the vortices, holding them steady. (A nanodot, by definition, is only 100 nanometers or less in diameter; a nanometer is only about three to five atoms wide.) Potential applications include ultra-high density transmission of electrical power, advanced, compact generators and motors. Along with Dr. Thompson, other project scientists with UT ties are Sukill Kang (Ph.D. 2001) and Anotu Ijaluola (Ph.D. 2005).

Earlier this year, Dr. Thompson co-authored an article in *Science* that showed how adding barium zirconate to superconducting wires could stabilize the vortices that negate superconductivity in the presence of high magnetic fields.

Nanotech Briefs reports on nanotech innovations from government, industry and university research that can be used in electronics, materials, sensors, manufacturing, biomedical, optic/photonics, and aerospace/defense. The Nano 50 awards dinner was part of the [NASA Tech Briefs National Nano Engineering Conference](#) held November 9 and 10 in Boston.