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Superconductivity Web21

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# What's New in the World of Superconductivity (June)

## Power

### American Superconductor Corporation (June 1, 2005)

American Superconductor Corporation has received a wire order from Condumex, the largest wire and cable manufacturer in Mexico, for about 10 km of first-generation (1G) high temperature superconductor (HTS) wire. Condumex will use the HTS wire to manufacture and install an HTS power cable system, comprised of three 33-meter HTS power cables, in a Mexico City electrical substation. The project will demonstrate the ability of HTS cable to move increased amounts of power under the streets of Mexico City, helping to break grid bottlenecks and provide customers with reliable and secure electric power. The alternating current (AC) power distribution cable system will be able to transmit 47-megawatts of power.

A spokesperson from Condumex stated, "Condumex believes that HTS wire will revolutionize the energy cable business the same way optical fiber has revolutionized the telecommunication cable business." Condumex expects the cable system to be installed and operational by next year. The government of Mexico will fund one-third of the cable project.

Source

"Condumex to Build High Temperature Superconductor (HTS) Cable System with HTS Wire from American Superconductor"

American Superconductor Corporation press release (June 1, 2005)

http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=715485&highlight

### American Superconductor Corporation (June 28, 2005)

American Superconductor Corporation announced that its prototype 5-MW HTS ship propulsion motor it - designed, developed, and built for the United States Navy - has successfully completed the Navy's rigorous initial test program. Under the Navy's supervision, the motor successfully completed load and ship mission profile dynamic simulation tests. The tests were designed to evaluate three Navy goals: to establish the full power capability of the motor with several longer heat or endurance runs, to establish as accurately as possible important machine parameters by a variety of methods, and to investigate its dynamic performance in a simulated at-sea environment.

The positive test results represent another important benchmark for the development of HTS rotating machinery and provide important validation for the follow-on Navy's Office of Naval Research program, in which a 36.5-MW, 120 RPM HTS motor that is currently being built by AMSC and Northrop Grumman will be delivered to the Navy in the summer of 2006.

Greg Yurek, CEO of American Superconductor, commented, "the test results for this motor are drawing worldwide attention from both military and commercial ship builders. American Superconductor is meeting with prospective customers to identify their specific requirements for electric ship propulsion motors and we are targeting a launch customer in calendar year 2006."

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Source:
"5-Megawatt American Superconductor HTS Ship Propulsion Motor Passes Rigorous Load and Ship Mission Profile Dynamic Simulation Tests at the Center for Advanced Power Systems"
American Superconductor Corporation press release (June 28, 2005)
http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=724337&highlight

**THEVA (June 30, 2005)**

THEVA has fabricated a 37-meter long, 10-mm wide coated conductor based on a non-magnetic Hastelloy C276 steel tape with an inclined substrate deposition (ISD)-aligned MgO buffer layer. The conductor exhibited an average critical current of 158 A. This accomplishment is a step forward from THEVA's previous results: a 10-meter long tape with an end-to-end critical current of 200 A. Although, considerable fluctuations in the critical current of the present 37-meter conductor were seen, THEVA is confident that it will be able to achieve critical currents over longer distances that are comparable to its results over shorter distances (300 – 350 A/cm over a meter range, 500 A/cm over a centimeter range). The production of the 37-meter length marks the advancement from basic process development to commercial production for the company; THEVA presently expects an annual production capacity of 4 – 5 kilometers. THEVA hopes to roughly triple the processed tape length every year.
Source:
"THEVA FABRICATES 37 METER LONG COATED CONDUCTOR"
THEVA press release (June 30, 2005)
http://www.theva.com/redaktionssystem/news_and_press/pdf/presserelease_theva_300605.pdf

**THEVA (July 1, 2005)**

THEVA has been selected by a German consortium to supply about 5 km of second-generation HTS coated conductor tape for the construction of two prototypes of a new generation of compact, powerful linear motors being designed and built by the German OSWALD Elektromotoren GmbH. The smaller motor will consist of 18 double pancake coils using 30-meter lengths of coated conductors, while the larger motor will consist of 30 coils using 135-meter lengths. Delivery of the conductors will continue until the beginning of 2007, and this single order will account for about half of THEVA's production capacity. T Werner Prusseit, CEO of THEVA, commented, "this project is an important stepping-stone in bringing second-generation superconductor wire to the market. We are pleased to see that the inherent potential of the new material has been recognized by a medium - sized engineering company. Teaming up with an experienced system manufacturer like OSWALD provides the unique opportunity to optimize our material for the rugged conditions of a real-world application." The German Ministry of Education and Research is funding the linear motor project.
Source:
"THEVA TO DELIVER 5 KM OF COATED CONDUCTOR FOR MOTOR PROJECT"
THEVA press release (July 1, 2005)
http://www.theva.com/redaktionssystem/news_and_press/pdf/presserelease_theva_010705.pdf

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## Electronics

### University of Illinois at Urbana-Champaign (June 16, 2005)

Researchers at the University of Illinois at Urbana-Champaign have fabricated and examined a new type of superconducting nanodevice constructed from a scaffold of DNA molecules coated with a thin film of molybdenum – germanium. The resulting pair of nanowires exhibited a new type of quantum interference that could potentially be used to measure magnetic fields and to map regions of superconductivity. The nanostructures themselves consist of pairs of superconducting wires with a width of only 3 to 4 molecular diameters (5 – 15 nm). In the absence of a magnetic field, the wires exhibited nonzero resistance over a broad temperature range; the wires also remained resistive at temperature where thicker wires would have become superconducting. When the strength of the magnetic field applied to the device was tuned, however, a highly pronounced and periodic oscillation in resistance occurred over a range of temperatures in the transition region. Further investigation provided an explanation for this behavior. The applied magnetic field causes a small current to flow, the strength of which is controlled by the magnetic field and the width of the trench banks supporting the nanowires; this current causes a large change in resistance. The resulting periodic oscillation is a reflection of the wave nature of matter. Potential applications for these new nanowires include local magnetometry and the imaging of phase profiles created by supercurrents. Using the self-assembly of DNA scaffolds, complex scaffolds for electronic devices with molecular-scale dimensions could be created. In addition, electron-beam sculpting and crystallization to modify small segments of the nanowires could enable the fabrication of novel electronic nanodevices, such as single-electron transistors. The research was reported in the June 17 issue of *Science* and will be reported in the August issue of *Nanotechnology*. The US National Science Foundation, the Alfred P. Sloan Foundation, and the U.S. Department of Energy funded this project.
Source:
“Superconducting nanowires show ability to measure magnetic fields”
University of Illinois at Urbana-Champaign press release (June 16, 2005)
http://www.news.uiuc.edu/news/05/0616nanowires.html

## Communication

### ISCO International (June 22, 2005)

ISCO International has provided an $RF^2$-based solution to First Cellular of Southern Illinois, a regional wireless service provider, to enable First Cellular to combine CDMA, GSM, and analog technologies within its cell sites. The ISCO CDMA MultiCoupler Front End solution will enable First Cellular to integrate multiple air interfaces and OEM Base Stations, allowing diverse customer requirements and competitive measures to be met.
Source:
“ISCO INTERNATIONAL'S RF TECHNOLOGY INTEGRATION SOLUTIONS HELP FIRST CELLULAR OF SOUTHERN ILLINOIS STAY AHEAD OF THE FIELD”
ISCO International press release (June 22, 2005)
http://www.iscointl.com/

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## Basic

**Massachusetts Institute of Technology (June 22, 2005)**

MIT scientists have created a new type of matter: a gas of atoms that exhibits high-temperature superfluidity. This research is closely related to the superconductivity of electrons in metals, and observations of superfluids may help to answer questions about high-temperature superconductivity. The MIT team was able to view superfluid vortices in a gas of fermionic atoms (a lithium–6 isotope) cooled to about 50 nanoKelvin and held in place using the focus of an infrared laser beam. Spinning a green laser beam around the gas caused the superfluid to rotate and revealed the presence of vortices – thereby confirming that the gas was a superfluid. Scaled up to the density of electrons in a metal, the superfluid transition temperature of atomic gases corresponds to a higher than room temperature transition. The research was reported in the June 23 issue of Nature.

Source:

“MIT physicists create new form of matter”

Massachusetts Institute of Technology press release (June 22, 2005)

http://web.mit.edu/newsoffice/2005/matter.html

(Akihiko Tsutai, Director, International Affairs Department, ISTEC)

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