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What's New in the World of Superconductivity (April)

Power

American Superconductor Corporation (April 5, 2005)

American Superconductor Corporation (AMSC) was the only American company to exhibit its HTS products at Hannover Fair 2005, the world's largest showcase for industrial technology, held in Germany. AMSC presented a model of its 36.5 MW HTS ship propulsion motor as well as its HTS wire in the fair's special "SuperConducting City" exhibition complex. This was the first time that superconducting products were highlighted at the fair. Kevin Kolevar, Director of the Office of Electricity and Energy Assurance, commented, "Products that utilize HTS wires, such as dynamic synchronous condensers for power grid reliability, are entering the commercial marketplace based on technology development under many successful industry-government partnerships over the last 15 years. I am pleased to see these technologies and products highlighted at the prestigious Hannover Fair for the first time. This is another signal that our long-term investments in superconductor products are starting to pay off."
Source:
"American Superconductor to Showcase its High Temperature Superconductor Products at Hannover Fair 2005"
American Superconductor Corporation press release (April 5, 2005)
http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=692155&highlight

American Superconductor Corporation (April 6, 2005)

Hawi Renewable Development LLC (HRD) has selected American Superconductor Corporation (AMSC) and GE Energy, a business of the General Electric Company, to provide a voltage control system for the Hawi Wind Farm project on the island of Hawaii. The solution will include two of AMSC's D-VAR systems and ancillary equipment from GE. Once operational, the wind farm will be capable of generating.56 MW of energy using 16 Vestas V47 wind turbine generators. Construction is scheduled for completion in November 2005.
Source:
"American Superconductor and GE Energy Receive Order for Low Voltage Ride- Through (LVRT) Solution for Hawaiian Wind Farm"
American Superconductor Corporation press release (April 6, 2005)
http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=692404&highlight

Trithor (April 7, 2005)

Trithor exhibited a prototype of a novel induction heater at the Hannover Fair, the world's largest showcase for industrial technology. This was the first demonstration of this industrial production machinery. Inductive heating is a standard process in the metal working industry and involves exposing metal to an electromagnetic field; in this manner, electric power is converted

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to heat directly within the core of the metal. The application of high-temperature superconductors to this process dramatically increases energy utilization: for copper and aluminum, efficiencies in excess of 90% can be obtained, nearly twice the efficiency of conventional induction heaters. Regarding the advantages of the new heater, Carsten Bührer, Managing Director of Trithor GmbH, commented, “Apart form the apparent economic incentives such as cutting the running costs in half and improving the product quality, this system offers benefits such as the elimination of the typically massive water cooling, and – depending on the site specification – also elimination of reactive power compensation, as well as deferred need for substation upgrade when making the step from traditional gas firing to induction heating.” HTS induction heaters are expected to systematically displace both gas firing and conventional electric heating over the next few years. The HTS induction heater is being jointly marketed by Trithor and Bültmann.

Source:
“HTS Induction Heater First Time on Display at the Hannover Fair”
Trithor press release (April 7, 2005)
http://www.trithor.de/pdf/2005-04TrithorInductionHeater_ENG.pdf

American Superconductor Corporation (April 11, 2005)

A collaborative effort by four leading Chinese research and industrial institutions, the Institute of Electrical Engineering (IEE), the Chinese Academy of Science (CAS), the Technical Institute of Physics and Chemistry (TIPC, CAS), and the Changtong Power Cable Company Ltd., has successfully demonstrated a 75-meter, three-phase HTS power cable in a live distribution grid in northwest China. The cable, which has a “warm dielectric” design and was manufactured using American Superconductor Corporation (AMSC)’s HTS wire, has been operational since December 2004. Preliminary tests have yielded a rated voltage of up to 10.5 kV, conducting up to 1,600 Amperes (at 400 V) of AC current, a load that was limited only by the available power demand. The critical current was found to be as high as 5,300 Amps (DC) and up to 3,500 Amperes (AC).

Power consumption in China is growing at a double-digit rate in several major urban centers, and some provincial power grids have been forced to impose power blackouts on customers because of the surge in demand. Greg Yurek, Chief Executive of AMSC, commented, “There is … a growing recognition that the transmission and distribution system in China needs to expand significantly over the next several decades. We are delighted with the success of the Changtong cable project -- a project we believe will lead to larger demonstration projects and commercial deployment of high capacity HTS cable solutions in China during the remainder of this decade and beyond."

Source:
“High Capacity Power Distribution Cable Successfully Demonstrated in China’s Electric Power Network”
American Superconductor Corporation press release (April 11. 2005)
http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=693729&highlight

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American Superconductor Corporation (April 26, 2005)

The new Kingsbridge Wind Power project in Ontario, Canada, has ordered a D-VAR ® voltage regulation system from American Superconductor Corporation (AMSC) to provide centralized control for a zero-emission wind farm. Once operational, the 39.6 MW project will annually produce approximately 104,000 megawatt hours of renewable energy. This is the ninth wind farm in the U.S. and Canada and the tenth worldwide to utilize AMSC's D-VAR solution to connect wind-generated power safely and reliable to the transmission grid. AMSC expects to ship the system to Canada this July. Commented Greg Yurek, Chief Executive of AMSC, "On a global basis, wind energy has emerged in recent years as the energy source with the fastest rate of growth overall. And because of the inherent capabilities of D-VAR systems to manage voltage fluctuations on a highly reliable basis, they have become the preferred solution for integrating wind energy into the transmission grid."

Source:

"American Superconductor's Voltage Regulation System Tapped by Ontario Wind Farm in Zero-Emission Energy Effort"

American Superconductor Corporation press release (April 26, 2005)

http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=700932&highlight

NMR

Lawrence Berkeley National Laboratory (April 8, 2005)

A collaboration of researchers from the U.S. Department of Energy's Lawrence Berkeley National Laboratory (Berkeley Lab), the University of California at Berkeley, and the Institute for Technical Chemistry and Macromolecular Chemistry in Aachen, Germany, have developed a portable high-resolution NMR sensor, enabling NMR spectroscopy to be taken out of the laboratory and into the field. The sensor is based on an "ex situ" method that enables spectroscopy data to be obtained from samples in a grossly nonuniform magnetic field by applying a series of rf pulses with precise variations in energy, duration, and timing. In this manner, the device can produce an NMR spectrum with a resolution capable of detecting chemical shifts of eight parts per million within three minutes from the start of sample testing. The group's commercial goal is to obtain a resolution of one part per million. While the device does not compete with the superconducting magnets used to study proteins, its potential applications include homeland security, medical diagnosis, archaeological analysis, and the exploration of objects in space. The research appeared in the April 8th issue of Science. This research was funded the U.S. Department of Energy's Office of Science and by the Deutsche Forschunggemeinshaft.

Source:

"Portable High-resolution NMR Sensor Unveiled at Berkeley"

Lawrence Berkeley National Laboratory press release (April 8, 2005)

http://www.lbl.gov/Science-Articles/Archive/MSD-NMR-sensor.html

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Refrigerator

National Institute of Standards and Technology (April 21, 2005)

Researchers at the National Institute of Standards and Technology have designed and used a chip-scale refrigerator capable of reaching as low as 100 milliKelvin to cool bulk objects for the first time. The solid-state refrigerators, measuring 25 by 15 μm, comprise a normal metal, an insulator, and a superconducting metal sandwiched together. When a voltage is applied across the sandwich, the hottest electrons tunnel from the normal metal through the insulator to the superconductor, resulting in a dramatic drop in the temperature of the normal metal. In this manner, the refrigerator can drain the electronic and vibrational energy from the objects that are being cooled. The NIST researchers used four of these refrigerators to cool a silicon nitrate membrane with a cube of germanium glued on top. The cube was about 11,000 times larger than the combined volume of the refrigerators. Both objects were cooled to about 200 mK, and further improvements in refrigerator performance are expected. These tiny refrigerators may be applied in cooling cryogenic sensors in highly sensitive instruments for semiconductor defect analysis and astronomical research. The research appeared in the April 25th issue of Applied Physics Letters. This research was supported in part by the National Aeronautics and Space Administration and NIST's Office of Microelectronics Programs.
Source:
"Chip-scale refrigerators cool bulk objects"
National Institute of Standards and Technology press release (April 21, 2005)
http://www.nist.gov/public_affairs/techbeat/tb2005_0421.htm#chip_scale

Communication

ISCO International, Inc. (April 7, 2005)

Business Ethics Magazine has named ISCO International, Inc., one of the "100 Best Corporate Citizens." The magazine considers many factors when giving the award, including governance, environment, employees, diversity, and product. John Thode, President and CEO of ISCO, commented, "To stay competitive in the technology business, a company like ISCO must use every avenue available to differentiate itself from its competitors. In today's environment, it is critical to aspire to excellence in corporate integrity, which includes being a good corporate citizen in all aspects."
Source:
"ISCO INTERNATIONAL NAMED ONE OF THE "100 BEST CORPORATE CITIZENS" BY BUSINESS ETHICS MAGAZINE"
ISCO International, Inc. press release (April 7, 2005)
http://www.iscointl.com/

ISCO International, Inc. (April 20, 2005)

ISCO International, Inc. has announced its financial results for the first quarter of 2005, ending March 31, 2005. The company's consolidated net revenues increased to US $3.293 million for the first quarter, compared with $422,000 for the same period in the previous fiscal

year. The gross margin increased to 42% from 27% for the same period in the previous fiscal year, partly because of volume-related efficiencies. The consolidated net loss also improved to $482,000, compared with $1.958 million for the same period in the previous fiscal year. This improvement was mainly due to the improvement in revenue and the resulting gross margins. John Thode, CEO of ISCO, commented, "…the company has been able to generate a positive cash flow from operations, albeit a small one, during the first quarter, something it has never accomplished. We entered the second quarter with $1.5 million in order backlog, a number which we have continued to build upon during April."

Source:

"ISCO International Reports Financial Results for the First Quarter 2005"

ISCO International, Inc. press release (April 20, 2005)

http://www.iscointl.com/

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

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