

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

Power

Oak Ridge National Laboratory (April 3, 2006)

Researchers at Oak Ridge National Laboratory have developed a method of sustaining high supercurrents in wires subjected to large applied magnetic fields by creating columns of self-aligned, non-superconductive "nanodots" within the superconductor. These nanodots provide effective pinning, enabling high supercurrents even in the presence of high applied magnetic fields. This research, which was reported in *Science*, could greatly expand the practical application of superconductors in products like motors, generators, and air defense systems.

Source: "ORNL uses nanodots to boost superconductivity"

Oak Ridge National Laboratory press release (April 3, 2006)

http://www.ornl.gov/info/press_releases/get_press_release.cfm?ReleaseNumber=mr20060403-00

Intermagnetics General Corporation (April 3, 2006)

Intermagnetics General Corporation has announced its third-quarter financial results for the quarter ending February 26, 2006. Normalized net income from operations increased 14% to US \$8.2 million, compared with \$7.3 million for the same period in the previous fiscal year. Reported income from continuing operations increased to \$5.5 million, compared with \$4.8 million for the same period in the previous fiscal year. Revenues for the quarter increased by 12% to nearly \$77 million from \$69 million for the same period in the previous fiscal year. The company is on target to obtain its full-year objective of achieving a sales growth of greater than 15%, or about \$308 million, compared with that of the previous year.

Source: "Intermagnetics Reports Increased Q3 Sales, Net Income"

Intermagnetics General Corporation press release (April 3, 2006)

<http://phx.corporate-ir.net/phoenix.zhtml?c=88261&p=irol-newsArticle&ID=838301&highlight>

American Superconductor Corporation (April 4, 2006)

American Superconductor Corporation (AMSC) has successfully demonstrated the world's first full-scale superconductor-based degaussing cable. Degaussing cables are used on navy ships to reduce their magnetic signature, making their detection more difficult. AMSC's HTS degaussing cable demonstration is 40-meters long and is capable of producing 4,100 Amp-turns, which is comparable to the performance of conventional copper-based degaussing cables. However, the operating voltage of the HTS degaussing cable – less than 0.5 volts – is 1000 times lower than that of conventional copper cables. In addition, the HTS degaussing cable is only 20% of the weight of conventional copper-based cables. These reductions in weight, size, and the number of required terminations are expected to reduce the total installed cost by 40%, compared with conventional degaussing systems. Degaussing cable systems currently have a worldwide annual market of US \$100 million.

Source: "American Superconductor Demonstrates World's First Full-scale High-temperature Superconductor Degaussing Cable for Military Ships"

American Superconductor Corporation press release (April 4, 2006)

http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=838425&highlight

American Superconductor Corporation (April 5, 2006)

American Superconductor Corporation (AMSC) and the Tennessee Valley Authority have received the Technology in the Service of Science award from IEEE Spectrum and EE Times magazine for AMSC's SuperVAR® dynamic synchronous condenser. The award citation stated that SuperVAR was "the technology having the greatest potential to provide the most overall benefit to humankind." SuperVAR technology can be used to stabilize grid voltages, increase the reliability of the electrical supply, and maximize power transmission capacity – enabling grid bottlenecks to be broken. The SuperVAR technology was also recognized by a prestigious R&D award from R&D magazine in October 2005 and was one of IEEE Spectrum's five featured "Winners" in January 2006.

Source: "American Superconductor's SuperVAR® Dynamic Synchronous Condenser Wins Award for 'Technology in the Service of Science' from IEEE Spectrum and EE Times"

American Superconductor Corporation press release (April 5, 2006)

http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=839059&highlight

Intermagnetics General Corporation (April 11, 2006)

Intermagnetics General Corporation has announced that its subsidiary, Invivo Corporation, has been awarded a US \$500,000 grant from the U.S. Department of Defense to develop an integrated hardware and software system that will enable high-resolution magnetic resonance imaging of traumatic brain injuries, thereby promoting effective diagnosis and treatment in many difficult cases. The Invivo solution will be incorporated into high-field MRI systems, such as those powered by Intermagnetics' 3.0 Tesla magnets. Invivo will develop this technology in partnership with the Office of Naval Research. Evaluation models of the advanced imaging hardware and the analysis software will be developed within the present year; thereafter, naval neurologists, neurosurgeons, and traumatic brain injury specialists will conduct scientific and clinical evaluations of the prototypes.

Source: "Intermagnetics' Invivo Subsidiary Awarded \$500,000 Federal Grant to Develop Advanced MRI System to Diagnose, Treat Brain Injuries"

Intermagnetics General Corporation press release (April 11, 2006)

<http://www.igc.com/pdfs/Invivo-041106.pdf>

American Superconductor Corporation and GE Energy (April 18, 2006)

American Superconductor Corporation (AMSC) and GE Energy have received an order for an 8 megaVAR D-VAR system from Aquila, Inc. The device will be used to enhance the voltage stability of the Aquila transmission system; AMSC shipped the D-VAR solution in March 2006, and the device will be installed and energized in Aquila's Plainville substation in central Kansas in June 2006. Carl Huslig, Vice President of Electrical Transmission at Aquila, commented, "We

were impressed with the in-depth analysis of our transmission system provided by AMSC. They provided a proven solution that will assist us and other regional utilities in continuing to provide cost effective, efficient and stable power to the customer."

Source: "American Superconductor and GE Energy Receive D-VAR Order From Aquila, Inc."
American Superconductor Corporation press release (April 18, 2006)

http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=843628&highlight

HTS-110 Ltd. (April 19, 2006)

HTS-110 Ltd. and Long Electromagnetics Inc. exhibited a lightweight, portable HTS (BSCCO) generator at this year's Hanover Fair. The new 5-MW generator, when combined with a gas turbine and associated power electronics, will have a total weight of less than 1500 kg – a significant reduction when compared with conventional generators of the same power class. The entire system can be installed within a single shipping container or on a small truck, creating a compact, rapidly deployable emergency power supply for disaster relief or short-term industrial power usage. The generator will likely be commercialized within two years.

Source: "Lightweight generator a world first for emergency power"

HTS-110 press release (April 19, 2006)

<http://www.hts110.com/news/coverage/lightweight-generator.html>

American Superconductor Corporation (April 24, 2006)

American Superconductor Corporation (AMSC) has announced a new record for the electrical performance of its proprietary second-generation HTS wire: AMSC scientists have increased the electrical performance by an additional 10% to a value of 492 A-cm width. This achievement represents an increase of 44 Amperes over the previous record set by AMSC only a few months ago and is well above the threshold of 300 A-cm width required for commercial introduction. A threshold of 500 A-cm width is thought to be required for the broad commercial adoption of high-temperature superconductors. AMSC also announced that it achieved its objective of shipping 2,500 meters of '344 superconductor' by March 31, 2006: a total of 2,738 meters of this HTS wire was shipped to 19 customers in China, Germany, Japan, Korea, New Zealand, Norway, Switzerland, and the United States. AMSC expects to deliver an additional 10,000 meters of 344 superconductors in the present fiscal year, ending March 31, 2007.

AMSC has also added a new stainless steel-clad version of its 344 superconductor to its product line. The new wire, known as "344S", comprises a tape-shaped second-generation HTS wire clad on both sides with strips of stainless steel. This configuration provides the high-resistance electrical path required for applications in fault current limiters. Small quantities of the new wire have already been sold to companies and organizations developing such applications.

Source: "American Superconductor Announces Record Electrical Performance for Proprietary 2G High-temperature Superconductors"

American Superconductor Corporation press release (April 24, 2006)

http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=846129&highlight

Bültmann and Trithor (April 25, 2006)

Bültmann and Trithor have announced the start of operation of a LIMODRAW™ pilot plant. The LIMODRAW pilot plant will be used to draw copper tubes with a diameter of 20 x 1.4 into tubes with a diameter of 16.7 x 1.4 using non-contact, electromagnetic LIMODRAW™ technology. Within the LIMODRAW™ set-up, approximately half the force is used as a pushing force in front of the die and the other half is used as a drawing force behind the die. The system is capable of drawing the copper tubes at considerably higher line speeds than those attainable using conventional technology. LIMODRAW™ technology is now available from Bültmann to the general public in a demonstration form for performance and drawing tests. This technology was developed with the support of the European Union.

Source: "LIMODRAW pilot plant in operation"

Trithor press release (April 25, 2006)

http://www.trithor.com/pdf/press-en/2006-04%20LIMODRAW%20Kurznnotiz_en

American Superconductor Corporation (April 27, 2006)

American Superconductor Corporation (AMSC) has finalized an additional contract amendment with the US Navy's Office of Naval Research for a US \$13.3 million increase to AMSC's contract for the design, manufacture, and shipment of a factory-tested 36.5-MW HTS propulsion motor for use in electric warships. AMSC expects to deliver the 36.5-MW motor to a Navy test facility in Philadelphia in September 2006. At the moment, the first two phases of the three-phase development process, including a successful preliminary design and detailed design review, have been completed. AMSC is developing the motor in partnership with Northrop Grumman Marine Systems and Northrop Grumman Ship Systems.

Source: "American Superconductor Receives \$13.3 Million Contract Amendment from U.S. Navy's Office of Naval Research"

American Superconductor Corporation press release (April 27, 2006)

http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=848526&highlight

HTS-110 Ltd. (April 27, 2006)

HTS-110 Ltd. and Progression Inc. are partnering on a new joint venture, Progression HTS-110, to provide HTS magnets with unique capabilities. The new series of nuclear magnetic resonance (NMR) magnets will operate at 80 MHz and have a magnetic field strength of 2 Tesla. Target markets include refining applications in the oil and gas industry, educational research and development, and pharmaceutical and biochemical applications. The new company will likely be headquartered in Houston, Texas.

Source: "Progression Inc. joint venture announcement"

HTS-110 press release (April 27, 2006)

<http://www.hts110.com/news/coverage/progression-jv.html>

NMR

Oxford Instruments (April 23, 2006)

Superconductivity Web21

Published by International Superconductivity Technology Center
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Oxford Instruments has launched a new product: a compact actively shielded 700-MHz nuclear magnetic resonance (NMR) magnet that occupies no more space than a 500-MHz system. The product, known as EShield™, is also characterized by a 65% reduction in weight, a 70% reduction in cryogen running costs, and a small stray field (less than 1.0 meter radially). It is the only 700-MHz system that does not require a pit or hydraulic lifting system to perform cryogen refills, enabling users to upgrade their NMR spectrometer system without having to modify the existing building infrastructure. The magnet is composed of Oxford Instruments' proprietary ultra-high Jc superconductor and represents the next generation of superconducting high resolution NMR magnet designs. Thanks to the wire's enhanced critical current density performance, the superconductor can generate higher central fields using an extremely compact coil design. The magnet design also utilizes "femto Ohm" superconducting jointing technology, contributing to the stability of the system. The EShield operates at 4 K.

Source: "The worlds most compact actively shielded 700 MHz magnet for NMR is launched"
Oxford Instruments press release (April 23, 2006)

<http://www.oxinst.com/wps/wcm/connect/Oxford+Instruments/Internet/Press/Current+News/The+worlds+most+compact+actively+shielded+700+MHz+magnet+for+NMR+is+launched>

Bruker BioSpin Corporation (April 25, 2006)

Bruker BioSpin Corporation has announced the 950 US2 – the world's first actively shielded 950-MHz superconducting magnet. The 950 US2 magnet system offers a higher sensitivity and spectral dispersion but requires the same size of cryostat and cryostat performance as the 900 US2; The 950 US2 also has the same 5 Gauss stray field as the 900 US2. The complete Avance II NMR system, including a 950 US2 magnet, occupies an overall footprint of less than 600 square feet (56 m²), compared to the 3,600 square feet (334m²) of lab space required for an unshielded 950-MHz magnet. The 950 US2 also features enhanced suppression of external field disturbances and improved stability and NMR performance. Orders are now being accepted, with an expected delivery time of four to eight months.

Source: "The World's Highest Field Actively-Shielded NMR Magnet at 950 MHz"

Bruker BioSpin Corporation (April 25, 2006)

http://www.bruker-biospin.com/nmr/news/950usplus_release.html

Communication

ISCO International Inc. (April 27, 2006)

ISCO International Inc. announced their financial results for the first quarter ending March 31, 2006. Consolidated net revenues totaled US \$1.3 million, compared with \$3.3 million for the same quarter in the previous fiscal year. The gross margin decreased to 38% from 42% for the same periods, mainly because of volume-related efficiencies. The consolidated net loss for the quarter was \$1.7 million, compared with \$0.4 million for the same period in the previous fiscal year. The company recently received a letter-of-intent for more than \$5 million in products to be delivered during 2006; the letter came from a strategic customer that the company has done relatively little business with to date. Despite ongoing market volatility, ISCO remains confident that 2006 will see some of the best revenue quarters in the company's history.

Superconductivity Web21

Published by International Superconductivity Technology Center
5-34-3, Shimbashi, Minato-ku, Tokyo 105-0004, Japan Tel:+81-3-3431-4002, Fax:+81-3-3431-4044

ISCO International has also released three new products: a new digital ANF platform (DANF), a ground mounted amplifier (GMA), and a tower mounted amplifier (TMA). The DANF platform will enable ISCO to serve a significantly broader segment of customers, while the GMA and TMA represent standalone high-performance RF2 solutions in weatherized containers that can be externally interfaced with any OEM cell site.

Source: "ISCO INTERNATIONAL REPORTS FINANCIAL RESULTS FOR THE FIRST QUARTER 2006, NEW PRODUCTS, ADDITION OF STEVEN WETTERLING AS EVP SALES AND AN UPCOMING INVESTOR CALL"

ISCO International Inc. press release (April 27, 2006)

<http://www.b2i.us/profiles/investor/ResLibrary.asp?ResLibraryID=15335&f=1&BzID=826&Category=135&Nav=1&LangID=1&s=0>

Basic

Brookhaven National Laboratory (April 26, 2006)

Researchers from Brookhaven National Laboratory (USA), the Laboratoire Leon Brillouin (Saclay, France), the Institute for Solid State Physics (Karlsruhe, Germany), and Nagoya and Tohoku Universities (Japan) have published additional evidence supporting the existence of "stripes" in HTS materials. The report, which appeared in the April 27 issue of Nature, strengthens the theory that such stripes (a particular spatial arrangement of electrical charges), might contribute to the mechanism by which these materials carry current with no resistance. Earlier research had suggested that electron "holes" segregate themselves into stripes that alternate with antiferromagnetic regions. The researchers have since been looking for additional experimental signatures to support their hypothesis. In the present experiment, they examined the effect of the stripes on vibrations in the crystal lattice. Lattice vibrations, or phonons, are known to play a role in the pairing of electrons that occurs in conventional superconductors. Researchers at Saclay bombarded samples of superconducting materials and some stripe-ordered non-superconductors with beams of neutrons and measured how the beams scattered. When the superconducting materials were bombarded, the range of frequencies of the resulting lattice vibrations was wider than expected. This anomalous signature was most clearly observed in samples with a distinct stripe order, but it was also seen in samples of "good" superconductors. The presence of this feature in both samples suggests that the signature indicates the presence of dynamic stripes in the "good" superconductor. The researchers believe that such stripes are common to copper-oxide superconductors and may be important to the mechanism of high-temperature superconductivity.

Source: "More evidence for 'stripes' in high-temperature superconductors"

Brookhaven National Laboratory press release (April 26, 2006)

http://www.bnl.gov/bnlweb/pubaf/pr/PR_display.asp?prID=06-57

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

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