

## What's New in the World of Superconductivity (April, 2009)

### Power

#### LS Cable (April 7, 2009)

Korea's LS Cable has announced its new "Green Business R&D Strategy", a progressive 3-year R&D strategy through which the company plans to increase the percentage of its eco-friendly technology products from 55 % to 90 % by the year 2011. As part of its "Eco New Solution" effort, the company will focus on the development of Smart Grid Solutions, including intelligent transmission and HTS cables, and the development of new renewable energy solutions. HTS cables were one of 15 promising green energy areas announced by the Korean government in January 2009. The domestic application of HTS cables, beginning in 2010, is now in its planning stage. The commercialization of this technology at a national level is expected to enable more than KRW one trillion in annual savings.

Source: "LS Cable Announces Green Business R&D Strategies"

LS Cable press release (April 7, 2009)

[http://www.lscable.com/pr/news\\_read.asp?idx=2046&pageno=1&kType=&kWord](http://www.lscable.com/pr/news_read.asp?idx=2046&pageno=1&kType=&kWord)

#### Office of Naval Research (April 17, 2009)

The U.S. Office of Naval Research (ONR) has announced the successful demonstration of a revolutionary superconducting degaussing system for reducing the risk of naval mine strikes to U.S. Navy ships. Degaussing systems are used to neutralize the magnetic signature of ships. A prototype superconducting degaussing system was installed aboard the USS Higgins in July 2008; on April 1, the Higgins completed a pass over the U.S. Navy Magnetic Silencing Range, resulting in the first-ever measurement of an HTS degaussing loop installed on a naval combatant. George Stimak, ONR's lead program manager for HTS degaussing, commented, "As on land, mines at sea remain a lingering threat long after they are deployed. Finding better ways to mitigate the threat of naval mines is something the whole program team takes a lot pride in because we know our work will save lives. HTS degaussing technology will provide new options to the naval architect in designing future advanced degaussing systems." For ship classes with advanced degaussing systems, HTS degaussing systems are expected to realize a 50 – 80 % reduction in total system weight, offering a significant potential for fuel savings or allowing the option of adding different payloads.

Source:

"Office of Naval Research demonstrates revolutionary new counter-mine technology for ships"

Office of Naval Research press release (April 17, 2009)

<http://www.onr.navy.mil/article090417.asp>

#### American Superconductor Corporation (April 20, 2009)

American Superconductor Corporation (AMSC) has announced an order for approximately 80,000 meters of 344 superconductor (AMSC's proprietary brand of second-generation HTS wire) from Korea's LS Cable Ltd. The order represents the single largest commercial order for 2 G HTS

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1-10-13 Shinonome Koto-ku, Tokyo 135-0062, Japan Tel:+81-3-3536-7283, Fax:+81-3-3536-7318

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wire in the world. LS Cable will utilize the wire to manufacture a 22.9 kV cable system to be installed in a commercial power delivery network operated by Korea Electric Power Corporation (KEPCO). The installation will be made near the city of Seoul in 2010. The superconducting cable will be nearly a half-mile long, making it the world's longest distribution-voltage superconductor cable system. Joon Hyung Cho, Executive Vice President of LS Cable's Technology Development Group, commented, "We have chosen to work with AMSC on this landmark cable project based on the company's two decades of superconductor leadership, its contributions to LS Cable's past superconductor cable demonstrations, and the strength of its new 344 superconductors. We see a billion-dollar opportunity for superconductor cable technology and believe our alliance with AMSC and KEPCO establishes a market leadership position for LS Cable."

The cable project builds on the success of Korea's Development of Advanced Power Systems by Applied Superconductivity technologies (DAPAS) program, which has provided more than US \$100 million in funding for the development and commercialization of superconductor systems.

Source:

"American Superconductor Receives Wire Order for First Superconductor Power Cable to be Deployed in Korea's Commercial Grid"

American Superconductor Corporation press release (April 20, 2009)

[http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle\\_Print&ID=1277941&highlight](http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=1277941&highlight)

## Zenergy Power plc (April 20, 2009)

Zenergy Power plc has announced that its wholly owned subsidiary, Zenergy Power Inc., has been contracted by The Consolidated Edison Company of New York (Con Edison) to design, build and test a single-phase fault current limiter (FCL) to improve the stability and reliability of New York City's electrical system. Zenergy expects to deliver the prototype, which will be applicable to a number of substations within Con Edison's electrical grids, by the end of August 2009. Pat Duggan, a project manager and FCL specialist at Con Edison, commented, "Fault current limiters will be an essential element of the smart grid to maintain reliability and improve its resilience and flexibility. This is especially important as the load grows, including the move to electricity as a preferred source for new uses such as plug-in hybrids."

Source:

"Con Edison Working with Zenergy Power to Develop 'Smart Grid' Device to Protect New York City's Electrical System from Power Interruptions"

Zenergy Power plc press release (April 20, 2009)

[http://www.zenergypower.com/images/press\\_releases/2009-04-20-coned-contract.pdf](http://www.zenergypower.com/images/press_releases/2009-04-20-coned-contract.pdf)

## Zenergy Power plc (April 29, 2009)

Zenergy Power plc has raised £9.5 million (approximately £9.1 million net) by placing 7,916,667 new ordinary shares of 1p each ('Ordinary Shares') in the Company ('Placing Shares') at a price of 120p with a number of new and existing institutional investors (the 'Placing'). The Placing will provide Zenergy with additional working capital needed to expand its commercial activities in the United States while continuing with its ongoing research and development

activities. The company is anticipating a scale-up of its marketing, sales, manufacturing, and administration activities in the U.S. in response to the allocation of economic stimulus funding by the U.S. and other governments for energy efficient and renewable technologies. Such funding is expected to have clear implications for Zenergy's commercial prospects with regard to its fault current limiters and induction heaters.

Source:

"Institutional Placing to raise £9.5 million"

Zenergy Power plc press release (April 29, 2009)

[http://www.zenergypower.com/images/press\\_releases/2009-04-29-placing-april09.pdf](http://www.zenergypower.com/images/press_releases/2009-04-29-placing-april09.pdf)

## Scientific Instruments

### **Bruker Advanced Supercon, Inc. (April 3, 2009)**

Bruker Advanced Supercon Inc. has completed the acquisition of the research instruments portion of Varian Medical Systems' ACCEL Instruments GmbH subsidiary. Varian previously acquired ACCEL, including its research instruments and proton therapy businesses, in January 2007. In the new transaction, Varian retained the proton therapy business (which will operate as Varian Particle Therapy) while Bruker acquired essentially all the assets of the RI business, including the development and manufacturing of a wide variety of advanced superconducting and other subunits and systems for physics and energy research, plus other scientific applications. Products include electron and ion LINACs, superconducting and normal conducting accelerator cavities, insertion devices, other accelerator components, neutron source subunits, specialized superconducting magnets, superconducting (HTS and LTS) devices, X-ray and particle beamlines, as well as vacuum systems and cryosystems. Dr. Burkhard Prause, Chief Executive Officer of Bruker Advanced Supercon, Inc., commented, "This acquisition opens an important new chapter in the history of our Bruker Advanced Supercon business. It positions us for rapid revenue and margin growth in several exciting markets, including renewable energy research, the more stable and energy efficient electricity grids of the future, next-generation materials research and manufacturing, as well as components for cutting-edge medical devices. Bruker plans to expand their new business in growth markets such as HTS superconducting fault current limiters for energy grid stabilization, crystal growth magnets for next-generation semiconductors, and superconducting devices and other core RI technologies for large-scale scientific and energy research facilities. We also expect to continue to supply OEM products to Varian in support of its proton therapy business for advanced cancer treatment." The financial terms of the transaction were not disclosed. However, the newly acquired business is expected to generate revenue of more than \$25 million in the first year and to have significant growth potential in future years.

Source:

"Bruker Advanced Supercon, Inc. Acquires ACCEL Research Instruments Business from Varian Medical Systems"

Bruker Advanced Supercon, Inc. press release (April 3, 2009)

<http://www.advancedsupercon.com/accelri.html>

## Communication

### Hypres Inc. (April 13, 2009)

Hypres Inc., in collaboration with the Space and Naval Warfare Systems Center Pacific and ViaSat, have demonstrated the first all-digital Link-16 multi-net receiver prototype. The demonstration is the culmination of a multi-year development program sponsored by the Office of Naval Research and Space and Naval Warfare Systems Command. During the demonstration, the receiver simultaneously digitized signals from two Link-16 radios operating on two independent Link-16 networks. Digital-RF™ technology enables simultaneous, multi-net Link-16 reception in a single terminal using a new technique called “digital de-hopping.” In addition to Hypres’ superconductor analog-to-digital converter (ADC) chip, the prototype included a superconductor RF filter and a commercial off-the-shelf field programmable gate array. Thus, the demonstration also highlighted the level of integration that can be achieved in hybrid superconductor-semiconductor electronics. Richard Hitt, CEO of Hypres, commented, “This (demonstration) was an excellent opportunity to demonstrate our all-digital advantage addressing one of the most difficult RF challenges in military datalinks.”

Source:

“Hypres, ViaSat and SPAWAR Systems Center Pacific Demonstrate Industry’s First All-Digital Multi-Net Link-16 Receiver”

Hypres Inc. press release (April 13, 2009)

<http://www.hypres.com/>

Note: Link-16 is the primary high-speed airborne tactical link used by the United States and coalition forces for situational awareness and information exchange; it has been designed to be resistant to electronic countermeasures.

### Superconductor Technologies Inc. (April 20, 2009)

Superconductor Technologies Inc. (STI) has announced that it will be participating with a major wireless original equipment manufacturer (OEM) in a long-term evolution (LTE) field trial for a 700 MHz network on behalf of a tier-one U.S. wireless operator. The trial is scheduled for completion in the fourth quarter of 2009. Jeff Quiram, STI's president and chief executive officer, commented, “We believe there is a significant opportunity for our unique filtering technology to address the major interference challenges of the 700 MHz spectrum. This non-exclusive arrangement allows STI to demonstrate the value of our capabilities to our OEM partner. The successful completion of this trial should enable STI to participate in the upcoming 700 MHz network deployments with our SuperLink solution integrated into a state-of-the-art LTE network platform.”

Source:

“Superconductor Technologies Inc. and Major Wireless OEM Plan to Conduct a 700 MHz Field Trial for a Tier-One U.S. Wireless Operator”

Superconductor Technologies Inc. press release (April 20, 2009)

<http://phx.corporate-ir.net/phoenix.zhtml?c=70847&p=irol-newsArticle&ID=1278302&highlight>

## Accelerator

### CERN (April 30, 2009)

The final replacement magnet for the Large Hadron Collider (LHC) has been lowered into the accelerator tunnel, marking the end of the aboveground repair work that began following the incident last September that halted the operation of the LHC. Below ground repair work will continue, with the magnets being interconnected and new safety systems being installed to prevent a similar event from occurring in the future. Repair teams on the surface will also begin to replenish the LHC's supply of spare magnets. In total, 53 magnets were removed from the LHC; 16 magnets that had sustained minimal damage were refurbished and put back in place, while the remaining 37 magnets were replaced with spares and will themselves be refurbished and used as spares in the future. The LHC is scheduled to be restarted in the autumn and will then be operated continuously until sufficient data has been accumulated for the LHC experiments to announce their first results.

Source:

"Final LHC magnet goes underground"

CERN press release (April 30, 2009)

<http://press.web.cern.ch/press/PressReleases/Releases2009/PR06.09E.html>

## Basic

### Ames Laboratory (April 29, 2009)

Researchers at the U.S. Department of Energy's Ames Laboratory have demonstrated that the superconductivity mechanism in iron-arsenide superconductors is unique and unlike that in any other known superconductor. The group used a novel tunnel diode resonator (TDR) technique to measure the London penetration depth in a wide range of iron-arsenide samples, including large single crystals of barium-iron-arsenic with various amounts of cobalt substituted for some of the iron as well as neodymium-iron-arsenic-oxide and lanthanum-iron-arsenic-oxide. Surprisingly, the researchers observed that iron-arsenide superconductors exhibit a power-law (almost quadratic) relation between temperature variation and the London penetration depth, unlike conventional superconductors (which exhibit an exponential relation at low temperatures), high-temperature superconductors (which exhibit a linear relation), or magnesium-diboride superconductors (which exhibit an exponential relation but require two superconducting gaps to explain the data over a full temperature range). Since the London penetration depth is associated with the electron-pairing behavior, the group's findings suggest that iron-arsenides exhibit a form of electron pairing that is unlike that observed in any other known superconductor. In addition, the group obtained evidence that the full data set for iron arsenides can only be explained if two distinct superconducting gaps are present. These findings suggest that iron-arsenides exhibit properties similar to those of both high-temperature cuprates and magnesium diboride. As iron arsenide has a low anisotropy, the group's findings suggest exciting potential applications in zero-resistance power transmission. The group's results were published in a recent issue of *Physical Review Letters* and *Physical Review B: Rapid Communications*.

Source:

“Iron-arsenic superconductors in class of their own”

Ames Laboratory press release (April 29, 2009)

<http://www.external.ameslab.gov/final/News/2009rel/Ironarsenide.html>

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

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