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超電導 Web21 Superconductivity

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What's New in the World of Superconductivity

(March, 2009)

Power

Zenergy Power plc (March 9, 2009)

Zenergy Power plc announced that Southern California Edison (SCE) has completed the installation of Zenergy's fault current limiter (FCL) into its electricity grid in Southern California. The superconducting FCL is the first such device to be installed, activated, and operated in an electricity grid in the U.S. The significance of this event is apparent in view of the increasing power demands from U.S. consumers coupled with the demand for distributed power generation facilities. These factors along with security concerns and efficiency demands have led to ongoing investment in the development of a national 'smart grid'. Superconducting FCLs are expected to be an important component of such smart grids. The annual global market for FCLs has been estimated to be US $5 billion.

Source:
"First Grid Protection Device Installed and Operational in U.S. Electricity Grid"
Zenergy Power plc (March 9, 2009)
http://www.zenergypower.com/images/press_releases/2009-03-09-fcl.pdf

American Superconductor Corporation (March 10, 2009)

American Superconductor Corporation (AMSC) has received an order from Southern California Edison (SCE) for a pad-mounted Distribution Static VAR Compensator (dSVC) solution. The system will be utilized in SCE's "Circuit of the Future", a nationally recognized project that will employ leading-edge technology to deliver power to 1,420 residential and business customers by the summer of 2009. In addition to producing dynamic reactive power compensation to maintain a constant voltage, the dSVC solution also provides protection against voltage sags and flickers. The dSVC solution can respond much faster than conventional capacitor banks and voltage regulators, mitigating power quality issues that can cause inconveniences and lost productivity. Timothy Poor, AMSC's Vice President of Global Sales and Business Development, commented, "A spin-off from our larger-scale transmission SVC, our dSVC solution allows electric utilities to optimize power delivery directly at the grid's critical load-serving points by automatically adjusting the reactive power supply in real time to meet their customers' ever-changing electricity demands. Made possible solely with AMSC's unique thyristor valve design and proprietary controls technology, the product's novel pad-mounted construction is a breakthrough in compact SVC design that allows this FACTS technology to be applied outside of substations in areas previously considered impractical, such as underground distribution circuits. We are pleased to have SCE as a first adopter of this unique technology."

Source:
"Southern California Edison to Deploy AMSC's Smart Grid dSVC™ Solution in Its "Circuit of the Future"
American Superconductor Corporation press release (March 10, 2009)

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http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=1264524&highlight

Bruker HTS GmbH and Nexans (March 17, 2009)

Bruker HTS GmbH and Nexans have announced the successful conclusion of the Superconducting Coated Conductor Cable (Super 3C) Project, in which an HTS distribution-level power cable was developed and tested by a European consortium. The Super 3C project, which began in June 2004, ended with the successful testing of a 30-meter one-phase HTS cable system in December 2008; during this test, the cable successfully achieved its transmitted power target of 17 MW. The superconducting cable is one of the first to use second-generation HTS conductors. The cable was made from a proprietary HTS-copper hybrid conductor developed by Bruker HTS. This hybrid conductor facilitates the reliable manufacturing and operation of new power cables using HTS technology and enables the cable to work and interconnect smoothly with conventional network components. Nexans, in turn, manufactured the Super 3C cable, including the cryogenic envelope, and developed and manufactured the specific cable terminations. The €5.2 million project received €2.7 million in funding from the European Union under the 6th Framework Program for Research and Technological Development. In addition to Nexans and Bruker HTS, seven other partners participated in the project.

Source:

"Bruker HTS and Nexans Announce Successful Completion of European Superconducting Cable Project"

Bruker HTS GmbH press release (March 17, 2009)

http://www.advancedsupercon.com/index.php?id=2534

Nexans press release (March 17, 2009)

http://www.nexans.com/eservice/Corporate-en/navigatepub_142482_-20454_297_2579/Bruker_HTS_and_Nexans_Announce_Successful_Completi.html

Oak Ridge National Laboratory (March 23, 2009)

Oak Ridge National Laboratory announced that it has received $71.2 million from President Obama's American Recovery and Reinvestment Act for the construction of a new chemical and materials sciences research facility. This facility will replace an aging facility, built in 1952, containing several inefficient laboratories that are in need of repair. The new 160,000 square-foot building will house about 200 researchers working on projects that include solar batteries, corrosion-resistant materials, and superconducting transmission lines. Construction is expected to start within 8 to 10 weeks of the initial announcement. The new facility will be LEED certified by the Green Building Council for excellence in sustainability and low energy consumption. The funding is part of the $1.2 billion that has been allocated to the Department of Energy's Office of Science.

Source:

"Oak Ridge National Laboratory to receive $71.2 million in Recovery Act funding"

Oak Ridge National Laboratory press release (March 23, 2009)

http://www.ornl.gov/info/press_releases/get_press_release.cfm?ReleaseNumber=mr20090323-01

American Superconductor Corporation (March 31, 2009)

American Superconductor Corporation (AMSC) and the Shanghai Electric Cable Research Institute (SECRI) have expanded their strategic alliance to include distribution voltage cables; in addition, SECRI has placed a new order with AMSC for a quantity of HTS wire. The wire will be used to

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develop and manufacture a 30-meter-long, 35-kV cable system. Under the terms of the strategic alliance, AMSC will deliver the HTS wire and provide consulting services, while SECRI will develop the cable system with the support of the Shanghai government. The strategic alliance also stipulates that AMSC should be the preferred supplier of HTS wire to SECRI and the recommended preferred HTS wire supplier to SECRI's cable manufacturing licensees for all superconductor cables. Wei Dong, SECRI's General Manager, commented, "In addition to the transmission voltage superconductor cables we have been developing, we now are developing distribution voltage superconductor cable systems for the Chinese market. We are confident that our continued successful cooperation with AMSC will enable rapid adoption of superconductor cable systems. We expect the first superconductor cable deployment in China's power grid system to occur early in the next decade and that this will lead to widespread adoption of superconductor cables throughout China."
Source:
"Shanghai Electric Cable Research Institute Expands Strategic Alliance with American Superconductor"
American Superconductor Corporation press release (March 31, 2009)
http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=1271332&highlight

Magnet

HTS-110 (March 31, 2009)

HTS-110 has announced that the world's first synchrotron magnet fitted with HTS coils will soon be shipped from New Zealand to the Brookhaven National Lab (BNL) in New York. The new dipole magnet will be the most economical of its kind in terms of electricity use, using less than half of the energy utilized by an equivalent copper coil. The amount of cooling water required is also substantially less than that used by a conventional system. Donald Pooke, Chief Executive of HTS-110, commented, "With 70 synchrotrons built, or in the planning stages of being built, around the world, the market for these energy-saving magnets is substantial, and HTS-110 is well positioned to take advantage."
Source:
"HTS-110 magnet a world-first for "super microscope"
HTS-110 press release (March 31, 2009)
http://www.hts110.co.nz/wp-content/uploads/2009/03/hts-110-media-release-synchrotron-310309.pdf

MRI & NMR

Bruker BioSpin (March 25, 2009)

Bruker BioSpin has launched two new, unique Ultra-High-Field (UHF) NMR magnets: the 900 MHz WB US^2 NMR magnet (an actively shielded magnet with a wide bore of 89 mm), and the 850 MHz US Plus™ (a compact, actively shielded magnet with a standard bore of 54 mm). Both of these magnets represent the world's highest magnetic fields for their magnet classes. The 900 MHZ WB US^2 NMR magnet is a two-story magnet that will provide significant increases in sensitivity and resolution, while the 850 MHz US Plus™ is a one-story magnet that can be installed in a single story lab, improving site flexibility and dramatically reducing site preparation costs. Both of these magnets are

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made possible by a combination of Bruker's proprietary sub-cooling technology and the latest in superconductor wire technologies.
Source:
"Bruker BioSpin Announces Two New Ultra-High Field Actively Shielded NMR Magnets to be Introduced at ENC 2009"
Bruker BioSpin press release (March 25, 2009)
http://www.bruker-biospin.com/index.php?id=2542

Duke University (March 26, 2009)

Researchers at Duke University are using a modified MRI method to observe molecular changes inside the human body that could signal health problems, such as cancer. The technique involves the "hyperpolarization" of some atoms in a sample by adjusting the spins of their nuclei to drastically increase their magnetic signals. In doing so, large imbalances among the populations of the spin states in a molecule are created, making the molecules act as more powerful magnets. Using this hyperpolarization method and a technique known as "dynamic nuclear polarization", strong MRI signals from a variety of molecules besides water can be created. The hyperpolarizer used in this technique utilizes a superconducting magnet with a cryogenic cooling system. The group's research was reported in the March 27 issue of *Science*. The Duke researchers are now evaluating the potential of this technique to visualize other possible signaling molecules, such as those involved in Parkinson disease, osteoporosis, and bladder control.
Source:
"New MRI signaling method could picture disease metabolism in action"
Duke University press release (March 26, 2009)
http://news.duke.edu/2009/03/hyperpolar.html

Communication

Superconductor Technologies Inc. (March 10, 2009)

Superconductor Technologies Inc. (STI) has been awarded a contract modification from the U.S. Air Force for the next 12-month phase of the SURF program (Semiconductor-Tuned High Temperature Superconducting Filters for Ultra-Sensitive Radio Frequency Receivers). The modification increases the currently funded amount by $4.1 million. These additional funds were awarded based on the successful completion of milestones in the first phase of the program, in which STI demonstrated its adaptive, tunable filter. This filter increases the speed of receivers while reducing size and costs. During the program's second phase, STI will expand its contract R&D role with the Defense Advanced Research Projects Agency (DARPA) by developing test units.
Source:
"Award for Additional Work on DARPA-Funded SURF Program"
Superconductor Technologies Inc. press release (March 10, 2009)
http://phx.corporate-ir.net/phoenix.zhtml?c=70847&p=irol-newsArticle&ID=1264875&highlight

Superconductor Technologies Inc. (March 11, 2009)

Superconductor Technologies Inc. (STI) has reported its financial results for the fourth quarter

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and year ending December 31, 2008. Total net revenues for the fourth quarter were $1.3 million, compared with $4.9 million for the same period in the previous fiscal year. Net commercial product revenues were $686,000, compared with $3.3 million for the same period in the previous fiscal year. Government and other contract revenue totaled $592,000, compared with $1.6 million for the same period in the previous fiscal year. Net loss for the fourth quarter was $3.8 million, compared with $2.2 million for the same period in the previous fiscal year. Jeff Quiram, STI's president and chief executive officer, commented, “Although 2008 was challenging as operators reduced capital spending, we began pursuing additional applications of STI's world leading material science and radio frequency (RF) expertise to expand our total addressable market.” In December 2008, STI announced that it had entered a Cooperative Research and Development Agreement with the Department of Energy's (DOE) Los Alamos National Laboratory to jointly develop HTS products for next generation electricity distribution systems. STI believes that its proprietary deposition technique will enable industry to attain the production cost levels needed for the deployment of HTS products in the energy grid. In other areas, STI has demonstrated the capabilities of its re-configurable handset filter and is continuing to pursue opportunities for its interference elimination solution in the RF wireless arena. STI has also completed successful field trials for its TD-SCDMA solution in a new 3G network in China.

For the full year, STI’s total net revenues were $11.3 million, compared with $17.9 million for fiscal 2007. Net commercial product revenues for 2008 totaled $6.8 million, compared with $12.8 million for the previous year. STI recorded $4.5 million in government and other contract revenues for 2008, compared with $5.1 million for 2007. The net loss for 2008 was $12.7 million, compared with a net loss of $9.1 million for 2007. As of December 31, 2008, STI had $7.6 million in cash and cash equivalents and a commercial product backlog of $272,000.

Source:

“Superconductor Technologies Inc. Reports 2008 Fourth Quarter and Year-End Results”
Superconductor Technologies Inc. press release (March 11, 2009)
http://phx.corporate-ir.net/phoenix.zhtml?c=70847&p=irol-newsArticle&ID=1265109&highlight

Basic

Rice University (March 12, 2009)

Researchers from the United States and China have collaborated to offer a new theory explaining and predicting the complex quantum behavior of iron pnictides. Qimiao Si, a physicist from Rice University, explains, “Our research addresses the quantum magnetic fluctuations that have been observed in iron pnictides and offers a theory to explain how electron-electron interactions govern this behavior.” The group, which includes scientists from Rutgers University, Zhejiang University, and the Los Alamos National Laboratory, has explained some of the similarities and differences between cuprates and pnictides. For example, the parent compounds in pnictides are metallic, whereas they are non-metallic in cuprates; similar to undoped cuprates, however, pnictides exhibit antiferromagnetism. Based on current knowledge of electron-electron interactions and antiferromagnetism in other metals, the group collaborated to create a theoretical framework explaining the behavior of pnictides and predicting their behavior as they change phases. The group’s findings are available online from the *Proceedings of the National Academy of Sciences*.

Source:

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"Physicists offer new theory for iron compounds"
Rice University press release (March 12, 2009)
http://www.media.rice.edu/media/NewsBot.asp?MODE=VIEW&ID=12289&SnID=2045262890

University of Liverpool (March 19, 2009)

Scientists at the University of Liverpool and Durham University have developed a new material that may further our understanding of how superconductors can be used to transmit electricity. The group has produced a football-shaped molecule, known as carbon60, in a powder form to demonstrate how a superconductor could work at temperatures suitable for commercial use. The simple atomic structure of this molecule allowed the researchers to control how freely the electrons moved and to determine which manipulations would enable the material to superconduct. Professor Kosmas Prassides, from Durham University, explained, "At room pressure the electrons in the material were too far apart to super-conduct and so we 'squeezed' them together using equipment that increases the pressure inside the structure. We found that the change in the material was instantaneous – altering from a non-conductor to a superconductor. This allowed us to see the exact atomic structure at the point at which superconductivity occurred." The group's research has been published in *Science*.
Source:
"New material could help cut future energy losses"
University of Liverpool press release (March 19, 2009)
http://www.liv.ac.uk/news/press_releases/2009/03/superconductors.htm

National Institute of Standards and Technology (March 25, 2009)

Researchers at the National Institute of Standards and Technology (NIST) have found strong evidence that magnetism is a pivotal factor governing the physical properties of iron pnictides. The group's evidence shows that if magnetism is not taken into account, theoretical calculations of the inner structure of iron pnictides (such as the distance between iron layers) do not agree with actual lab measurements. If the effects of magnetism are included, however, the discrepancies disappear. These results are thought to imply that magnetism plays a key role in iron pnictide superconductivity. Taner Yildirim, a theorist at NIST, commented, "Determining the mechanism of superconductivity in iron pnictide systems is very important in solving the long-standing mystery of the high temperature superconductor phenomena in general. Once we have such an understanding of this strange phenomenon, we can then make predictions and design new materials with even higher superconductivity temperatures." The group's findings were presented in an invited talk at the March meeting of the American Physcial Society.
Source:
"Magnetism governs properties of iron-based superconductors"
National Institute of Standards and Technology press release (March 25, 2009)
http://www.nist.gov/public_affairs/techbeat/tb2009_0324.htm#iron-sc

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

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