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What's New in the World of Superconductivity (June, 2008)

Power

Zenergy Power plc (June 5, 2008)

Zenergy Power plc has announced that options have been exercised for 10,417 new ordinary shares of £0.01 each in the Company. An application has been made to admit the new ordinary shares to trading on the AIM stock exchange on or around June 11, 2008. The new ordinary shares will rank pari passu with the existing ordinary share capital of the Company. Following admission, the total issued share capital with voting rights will be 44,038,221 ordinary shares.
Source:
"Issue of equity and total voting rights"
Zenergy Power plc press release (June 5, 2008)
http://www.zenergypower.com/images/press_releases/2008-06-05-issue-of-equity-and-tvr.pdf

American Superconductor Corporation (June 6, 2008)

American Superconductor Corporation has licensed its 2-MW, IEC Class I (high wind speeds) proprietary wind turbine designs to Taiwan-based TECO Electric & Machinery Co., Ltd. (TECO), the world's third largest motor manufacturer. TECO has approximately 30 diversified subsidiaries and affiliations operating across Asia, Europe, and the United States. In late 2007, AMSC and Texas-based TECO-Westinghouse formed a joint venture to develop HTS and related technologies for a 10-MW direct drive wind generator for offshore wind farms. The license mentioned above, however, applies to a conventional wind turbine design. In addition to the multi-million-dollar upfront license fee, AMSC will also receive royalty payments for wind turbines produced by TECO. AMSC also has the right of first refusal to provide the full electrical systems and core electrical components for all of the wind turbines manufactured by TECO. TECO has purchased the right to manufacture and sell the FC-2000 wind turbine in Taiwan and mainland China. TECO plans to begin manufacturing the 2-MW wind turbines in 2009.
Source:
"AMSC Licenses Wind Turbine Technology to TECO Electric & Machinery Co., Ltd."
American Superconductor Corporation press release (June 6, 2008)
http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=1163258&highlight

American Superconductor Corporation (June 10, 2008)

American Superconductor Corporation (AMSC) has received a US $450 million dollar follow-on order from Sinovel Wind Corporation Limited (Beijing, China) for core electrical components for 1.5-MW wind turbines. Shipments are scheduled to begin in January 2009 and to increase in amount year-over-year until the end of the contract in December 2011. The core electrical components specified in the contract include AMSC's proprietary PowerModule™ power converters. Greg Yurek, founder and chief executive officer of AMSC, commented, "The core electrical components covered under this contract will be used to support more than 10 gigawatts of wind power capacity, nearly double China's total wind power installed base at the end of 2007."

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Source:
"AMSC Receives $450 Million Follow-on Order from China's Sinovel Wind"
American Superconductor Corporation press release (June 10, 2008)
http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=1164065&highlight

European High Temperature Superconductors GmbH &Co. (June 12, 2008)

European High Temperature Superconductors GmbH & Co., a division of Bruker Corporation's Advanced Supercon business, has received a grant from the German Federal Ministry of Commerce and Technology (BMWi) that will be put towards a $3.0-million, 3-year research project with Adelwitz Technologiezentrum (ATZ, Germany) to develop advanced commercial superconductors based on EHTS' proprietary second-generation YBCO wire technologies. The grant is expected to total about $0.74 million, almost half of EHTS' $1.5-million share in the overall project budget. The funding has been granted within the framework of the German government's technology initiative to meet the national and European goals for significant reductions in energy consumption and carbon emissions by the year 2020. The project will focus on the development of advanced copper-HTS hybrid superconductors that can operate reliably under a wide range of demanding conditions and provide unprecedented protection against mechanical stresses and electrical fault conditions. EHTS and ATZ have been collaborating in this area since 2005 and have achieved several milestones in the development of advanced second-generation conductors with copper shunts, including conductors that can carry currents higher than 500 Amperes per cm-width.
Source:
"European High Temperature Superconductors (EHTS) Receives Research Grant from German Government for Advanced Copper-HTS Conductors"
European High Temperature Superconductors GmbH & Co. press release (June 12, 2008)
http://www.bruker-ehts.com/fileadmin/Press_Release/2008/EHTS-BMWiGrant-D.pdf

SuperPower, Inc. (June 13, 2008)

SuperPower, Inc. has announced the successful conclusion of the Albany Cable Project, in which a 350-meter HTS distribution-level cable was installed underground in the National Grid power system in Albany, N.Y. The demonstration project, funded by the U.S. Department of Energy and the New York State Energy Research and Development Authority (NYSERDA), began in 2001 and was the first HTS cable to be integrated into a live power grid. Arthur P. Kazanjian, general manager of SuperPower, Inc., reported, "We are pleased to report that by all measures, this project has been an unqualified success. We have met all of the objectives for the program and have been able to demonstrate a significant number of first-of-a-kind achievements. In addition to being the first integration of HTS cable on a live power grid in the nation, we were able to demonstrate the first cable-to-cable joint in an HTS system, and the first disconnect and reconnect of HTS cables. We are especially pleased that we were able to demonstrate the first use of second-generation (2G) HTS wire in any device on a live grid when we installed and energized the 30 meter cable segment that was fabricated with 2G HTS wire manufactured by SuperPower in Schenectady." William Flaherty, Energy Solutions Regional Director of National Grid, added, "Of importance to National Grid is that this project has demonstrated the reliability of the technology. We encountered no difficulties in integrating the project into our grid and the entire installation was totally transparent to our customers. The system has stood up to very exacting utility standards and we look forward to further

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developments in HTS technology." The HTS cable was operated for more than 12 months, providing power to about 25,000 homes and businesses. During this time, the cable was subjected to real-world utility conditions that included a significant fault current event. No operational issues and zero downtime or outages as a result of the cable or cryogenic systems occurred. The project also demonstrated that second-generation HTS wire can be used as a direct replacement for first-generation wire, enabling a cost performance level equal to that of conventionally used copper. The Albany Cable Project was managed by SuperPower and included the participation of Sumitomo Electric Industries, Linde (formerly BOC), and National Grid.

Source:

"SuperPower successfully concludes Albany HTS Cable Project demonstrating the world's first integration of high-temperature superconducting wire on live power grid"

SuperPower, Inc. press release (June 13, 2008)

http://www.superpower-inc.com/news.php?n=154

American Superconductor Corporation and Nexans (June 25, 2008)

American Superconductor Corporation (AMSC), Nexans, Air Liquide, the Long Island Power Authority (LIPA), and the U.S. Department of Energy (DOE) have celebrated the commissioning of the world's first HTS power transmission cable system in a commercial power grid in Long Island, N.Y. The 138-kV, 600-m, 3-phase system was energized on April 22, 2008, and is operating successfully in LIPA's Holbrook transmission right-of-way. Operated at full capacity, the system is capable of transmitting 574 MW of electricity—enough to power 300,000 homes. The cable itself was designed, manufactured, and installed by Nexans, and the cable cores are made from AMSC's HTS wires; Air Liquide manufactured the liquid nitrogen refrigeration system.

A ceremony was held on June 25, 2008, to celebrate the completion of the first phase and to begin the second phase of the project. During the second phase, the HTS cable system will be extended, with the replacement of one of the HTS cable system's phases with a 600-meter-long cable made using AMSC's proprietary second-generation 344 superconductors. The new cable system will also incorporate Secure Super Grids™ technology, a system-level solution utilizing second-generation HTS wires, HTS power cables, and ancillary controls and enabling more power to be delivered through the grid while suppressing power surges that would otherwise disrupt service. The project will also include the development of a new repairable cryostat, cable joining technology, and a low-cost, reliable, and efficient refrigeration system. The DOE is expected to provide $4 million in funding. Upon the successful completion of key project milestones, as much as $5 million in additional DOE funding may be made available for the continued implementation of the 2 ½-year project.

Source:

"Commissioning of World's First Superconductor Power Transmission Cable System Celebrated"

American Superconductor Corporation press release (June 25, 2008)

http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=1169245&highlight

"Successful commissioning of the world's first transmission voltage superconductor cable in Long Island"

Nexans press release (June 25, 2008)

http://www.nexans.com/eservice/Corporate-en/navigatepub_142482_-16915_297_2579/Paris_June_25_2008_Successful_commissioning_of_the.html

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Basic

Johns Hopkins University (June 4, 2008)

Researchers at Johns Hopkins University, in collaboration with colleagues in China, have characterized some new properties of iron-based high-temperature superconductors that suggest the need for new theoretical models that could, potentially, lead to the development of room-temperature superconductors. The team measured the superconducting gap and its temperature variation in iron-based superconductors and found that the pairing mechanism differs from that in more traditional, copper-based, high-temperature superconductors. Surprisingly, the group's results were incompatible with some of the newly proposed theories in the field of high-temperature superconductivity, suggesting that new theoretical models are needed. The group's research was published in the June 4 edition of Nature.

Source:
"New superconductors present new mysteries, possibilities"
Johns Hopkins University press release (June 4, 2008)
http://www.jhu.edu/news/home08/jun08/supercon.html

Ames Laboratory (June 5, 2008)

Researchers at the U.S. Department of Energy's Ames Laboratory have discovered that the bubble-like arrangement of magnetic domains in superconducting lead exhibit patterns that are similar to soap foam or frothed milk. Despite the very different microscopic origins, the similarities between "suprafroths" (the patterns created by a magnetic field in a superconductor) and the polygonal patterns in conventional foams make suprafroths a model system for studying froths in general, thanks to the reversibility of suprafroths. One such similarity is the process of coarsening, which occurs when the froth cells grow or shrink and eventually disappear. Like the process that occurs in a sink full of dish soap bubbles, a similar process occurs in suprafroths when the magnetic field is increased; thus, suprafroths adhere to the John von Neumann law, which specifies the rate at which froth cells grow or shrink. Ames Laboratory physicist and primary investigator Ruslan Prozorov commented, "There are certain statistical laws that govern the behavior of froths, and we found that suprafroths satisfy these laws. We can now apply what we know of suprafroths to all other froths and complex froth-like systems." Observations of suprafroths have also disproved a long-believed connection between two statistical rules governing froths: that the most probable polygonal cell shape (a hexagon) is related to the number of sides (six) that determines whether a froth cell will shrink or grow during coarsening. Prozorov explained, "In our suprafroths, we found that the association between these two ideas is a coincidence. There is no strict correspondence between the most stable type of froth cell and the most common number of sides in a froth cell." Cells with all observed numbers of sides in suprafroths were shown to grow in an increasing magnetic field. This discovery has made an important contribution to the general study of froths. The research was published in the April issue of Nature Physics.

Source:
" A supra new kind of froth"
Ames Laboratory press release (June 5, 2008)
http://www.external.ameslab.gov/final/News/2008rel/suprafroth.html

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University of British Columbia (June 23, 2008)

Researchers at the University of British Columbia (Vancouver, Canada) have developed a technique for controlling the number of electrons on the surface of high-temperature superconductors, a process that had been regarded as impossible for the past two decades. The research team successfully deposited potassium atoms on the surface of a superconducting oxide using an approach that allowed them to continuously manipulate the number of electrons on ultra-thin layers of materials. Physics Associate Professor Andrea Damascelli commented, "Extremely thin layers and surfaces of superconducting materials take on very different properties from the rest of the material. Electrons have been observed to re-arrange, making it impossible for scientists to study. It's become clear in recent years that this phenomenon is both the challenge and key to making great strides in superconductor research." The new technique will enable the systematic study of high-temperature superconductors and other materials where surfaces and interfaces control the materials' physical properties. Details of the procedure were published in Nature Physics.

Source:
"UBC physicists develop 'impossible' technique to study and develop superconductors"
University of British Columbia press release (June 23, 2008)
http://www.publicaffairs.ubc.ca/media/releases/2008/mr-08-084.html

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

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