

What's New in the World of Superconductivity

(March, 2010)

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Power

American Superconductor Corporation (March 8, 2010)

American Superconductor Corporation (AMSC) has received an additional follow-on order for wind turbine core electrical components from CSR Zhuzhou Electric Locomotive Research Institute Co. Ltd. (CSR-ZELRI, China). The order is valued at US \$10 million. The components will be used in 1.65-MW wind turbines designed by AMSC Windtec™, a subsidiary of AMSC. AMSC expects to ship the components to CSR-ZELRI by the end of calendar year 2010. CSR-ZELRI began series production of their 1.65-MW wind turbine in mid-2008. Dan McGahn, president and chief operating officer of AMSC, commented, "CSR-ZELRI has done an excellent job of rapidly scaling its wind turbine manufacturing operation to capitalize on the strong growth of China's wind industry. This success has led to a quick succession of core component orders, each larger than the last. With five Chinese wind turbine manufacturers who have adopted AMSC Windtec designs either in production or set to enter production soon, 2010 is shaping up to be another record year for AMSC."

Source:

"AMSC Receives Fifth Core Electrical Component Order from China's CSR-ZELRI"

American Superconductor Corporation press release (March 8, 2010)

http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=1399852&highlight

SuperPower, Inc. (March 15, 2010)

SuperPower has celebrated the 10-year anniversary of its founding and the start of its mission to commercialize second-generation high-temperature superconductor wire for energy technology applications. In commemoration of this event, a new exhibit on superconductivity has been created at the Schenectady Museum and Suits-Bueche Planetarium; the exhibition presents the company's achievements including its successful scale-up of second-generation HTS wire production, the world's first in-grid demonstration of 2G HTS wire at the Albany HTS Cable Project, the development of a superconducting fault current limiter, the achievement of world-record magnetic fields strengths in magnet coils, and ongoing efforts to demonstrate superconductor technology in other fields. Arthur P. Kazanjian, general manager at SuperPower commented, "...we have come a long way since March 2000 and look forward to the next few years, in which we expect to further improve our wire manufacturing processes and performance attributes and achieve the cost targets that will bring the product pricing to the levels required for broad-scale adoption of the technology." SuperPower intends to expand its original mission statement to include superconductor applications in industry, healthcare, science and research, aerospace, and other areas, thereby further increasing the significant of superconductor technology.

Source:

“SuperPower Celebrates 10 Year Milestone in Development and Scale-up of 2G HTS Wire and Device Demonstrations”

SuperPower, Inc. press release (March 15, 2010)

<http://www.superpower-inc.com/content/superpower-celebrates-10-year-milestone-development-and-scale-2g-hts-wire-and-device-demonst>

Zenergy Power plc (March 15, 2010)

Zenergy Power has received a €175,000 grant from the German Federal Ministry of Education and Research for the further development of nanotechnology engineering techniques. The grant will be used to fund Zenergy's participation in a collaborative project with the aim of advancing the use of nanotechnology engineering to enhance the quality and consistency of the layered wire architectures required for the production of second-generation HTS wires. The project, which has been named “Northsee” (The Nano-organization in high-temperature superconducting layer architectures for efficient energy technologies), will begin in March 2010 and continue until February 2012 and will also involve research contributions from the Technical University of Braunschweig and PerCoTech AG.

Source:

“Nanotechnology Grant for 2G Wire Development”

Zenergy Power plc press release (March 15, 2010)

http://www.zenergypower.com/images/press_releases/2010/2010-03-15-Nanotechnology-Grant-for-2G-Wire-Development.pdf

Zenergy Power plc (March 18, 2010)

Zenergy Power has announced a new funded project that will support its work with ThyssenKrupp VDM GmbH on advanced research technologies related to the mass production of techniques for low-cost 2G superconductor wire. The funding will be used to support a €1.5 million project (“SupraMetal”), with an additional grant contribution from the regional government of North Rhine-Westphalia's Ministry of Economics and Energy for €680,000. The SupraMetal project is expected to last for 30 months and will reinforce the collaborative partnership between Zenergy and ThyssenKrupp.

Source:

“Strengthening of Collaboration with ThyssenKrupp through New Project for Second Generation (‘2G’) wire”

Zenergy Power plc press release (March 18, 2010)

http://www.zenergypower.com/images/press_releases/2010/2010-03-18-SupraMetall.pdf

American Superconductor Corporation (March 18, 2010)

American Superconductor Corporation (AMSC) and Tres Amigas, LLC, have announced that the Federal Energy Regulatory Commission (FERC) has approved the sale of transmission services through the proposed Tres Amigas SuperStation at the negotiated rates. Furthermore, the FERC has stated that upon receipt of the required application, it will issue the necessary orders allowing Tres Amigas to proceed and to interconnect with ERCOT without conferring FERC jurisdiction over ERCOT utilities. FERC Chairman Jon Wellinghoff commented, “This project, which is the first of its kind, will allow customers to trade power across the interconnections and to take advantage of opportunities to buy lower cost power from other regions. It may also open a new transmission path for customers interested in tapping the vast renewable energy potential in many parts of the country... Tres Amigas is a prime example of the creativity

and pioneering thinking that our country needs to expand the ability of the transmission grid to reliably accommodate all sources of electricity generation, including renewable energy.”

Source:

“Federal Energy Regulatory Commission Grants Tres Amigas Market-Based Rates; Requests Further Applications Regarding ERCOT Jurisdiction Waiver”

American Superconductor Corporation press release (March 18, 2010)

http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=1404065&highlight

Zenergy Power plc (March 22, 2010)

Zenergy Power has announced its preliminary results for the year ending December 31, 2009. Highlights for the year included the installation of the first medium-voltage fault current limiter (FCL), the securement of two orders for magnetic billet heaters from new customers, the successful testing of a new compact FCL design, an agreement with a large American grid operator for the installation of a novel high-voltage FCL, the delivery of a full set of electromagnetic coils for the world's first superconductor hydropower generator, and a generated revenue of €2.4 million, representing a 20 % increase from the revenue generate in 2008. Also in 2009, Zenergy won Europe's largest environmental prize, presented by the German Federal Foundation for the Environment. The company presently has a backlog of €4.1 million. Michael Fitzgerald, Chairman of Zenergy Power, summarized, “Throughout the year we maintained our focus on the delivery on our key objectives relating to the building of the technical, corporate and financial foundations of the Group and entered into 2010 better positioned than ever to execute our goal of generating sustained profits through the manufacture and sale of industrial-scale clean energy equipment. Accordingly, 2009 played a key role strengthening our ability to enter into clean energy technology markets with proven energy products based on a core technology with a growing credibility and brand recognition.”

Source:

“Preliminary Results for the Year Ended 31 December 2009”

Zenergy Power plc press release (March 22, 2010)

http://www.zenergypower.com/images/press_releases/2010/2010-03-22-Final-Results.pdf

American Superconductor Corporation (March 22, 2010)

American Superconductor Corporation (AMSC) has received an initial order for full wind turbine electrical control systems from Sinovel Wind Group Co., Ltd. (Sinovel, China). The systems will be used in Sinovel's first 5-MW doubly fed induction wind turbines. AMSC expects to deliver the order during the second half of calendar 2010. Meanwhile, Sinovel expects to have its first 5-MW wind turbine constructed within the next 12 months and to begin full production in 2011. The wind turbine will be China's largest and most powerful domestically produced wind energy system.

Source:

“AMSC Receives Order from Sinovel for Initial 5 Megawatt Wind Turbine Electrical Control Systems”

American Superconductor Corporation press release (March 22, 2010)

http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=1404295&highlight

American Superconductor Corporation (March 24, 2010)

American Superconductor Corporation (AMSC) and LS Cable Ltd. (Korea) have expanded their previously reported superconductor power cable strategic business alliance. Under the new agreement, the two companies will collaborate to deploy more than 50 km of superconductor power cables in commercial

power grids over the next 5 years. The previous agreement called for the deployment of a minimum of 10 km over the same time period. The expanded strategic alliance will focus on a full spectrum of superconductor cable projects, including distribution and transmission voltages as well as alternating current and direct current systems. The cables will be manufactured by LS Cables using AMSC's proprietary second-generation HTS wire (344 superconductors).

Source:

"AMSC and LS Cable Expand Superconductor Power Cable Strategic Alliance"

American Superconductor Corporation press release (March 24, 2010)

http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=1405376&highlight

Nexans (March 29, 2010)

As part of its participation in the Smart Grids Europe 2010 conference, Nexans highlighted how state-of-the-art cables solutions and services can aid the deployment of smarter power grids. One of the three key technologies that Nexans proposed was an MV superconducting fault current limiter. Nexans recently installed the world's first superconducting fault current limiter (SFCL) at a Vattenfall power plant in Germany. This SFCL will provide short-circuit protection for the plant's internal MV power supply (12 kV), enabling a 63-kA short-circuit current to be reduced to 30 kA instantaneously and further reducing the current to 7 kA in less than 10 milliseconds. Nexans has also written a new white paper entitled, "Deploying a smarter energy network through cable solutions and services". The paper provides an overview of "smart" and "smarter" grids, while outlining the main challenges and expectations in this area.

Source:

"Nexans cable solutions and services help the deployment of smarter power grids"

Nexans press release (March 29, 2010)

http://www.nexans.com/eservice/Corporate-en/navigatepub_142482_-24991/Nexans_cable_solutions_and_services_help_the_deplo.html

University of Houston (March 30, 2010)

The University of Houston has signed two agreements with SuperPower, a wholly owned subsidiary of Royal Phillips Electronics. The first agreement covers the intellectual property for the second-generation HTS wire that was previously developed under a Sponsored Research Agreement (SRA) between the two parties. The second agreement covers the fundamental composition of matter patent for the high-temperature superconductor discovered by Paul Chu in 1987 at the University of Houston. Together, these two agreements will enable SuperPower to continue with their efforts to advance the development of second-generation HTS wire for a broad range of applications. The University of Houston and SuperPower are also partners in a recently announced US \$3.5 million Emerging Technology Fund award for the creation of an Applied Research Hub at the Texas Center for Superconductivity at the University of Houston as well as a recent \$10.6 million award for the Smart Grid Fault Current Limiting Superconducting Transformer Demonstration program.

Source:

"SuperPower and UH sign high-temperature superconducting wire license agreements"

University of Houston press release (March 30, 2010)

<http://www.uh.edu/news-events/stories/2010articles/March2010/033010SuperPowerandUHSignAgreement.php>

University of Houston (March 30, 2010)

The University of Houston has reported that Prof. Venkat Selvamanickam, Director of the Applied Research Hub and the M.D. Anderson Chair Professor of the Department of Mechanical Engineering at the University of Houston, is developing a technology using HTS wires that is expected to revolutionize the way power is generated, transported, and used. Prof. Selvamanickam commented, "The goal of my research is to modernize the power grid with high-temperature superconducting wires to improve efficiency and reliability. Almost anything in the power grid – cables, transformers, motors, generators – can be more efficient if you use high temperature superconducting wires... High temperature superconductivity has the potential to revolutionize the way we use electricity, just like the way fiber optics revolutionized the way we communicate. Our research pays immediate returns to the industry. It's not like something that maybe 10 years down the line could be useful."

As part of the new Applied Research Hub, SuperPower has signed a research agreement with the University of Houston and plans to establish a specialty products facility at the University of Houston's Energy Research Park. Prof. Selvamanickam will oversee SuperPower's research and development activities in Houston, acting as chief technical officer.

Source:

"Researcher modernizes US power grid"

University of Houston press release (March 30, 2010)

<http://www.uh.edu/news>

Measurement

Bruker Energy & Supercon (March 15, 2010)

Bruker Energy & Supercon Technologies (BEST) has announced that its subsidiary has acquired the assets of AIXUV GmbH (Germany), a company that specializes in XUV/EUV (extreme ultraviolet) systems and key components. The financial terms of the transaction were not disclosed. In doing so, BEST has strengthened its position in several emerging application in the XUV/EUV spectral range that allow chemically sensitive measurements with nanometer lateral resolution. Dr. Hans-Udo Klein, Vice President of Business Development for BEST, explained, "This acquisition paves the way for the development of our business in new markets for scientific research and metrology in the extreme ultraviolet, or soft X-ray, spectral range. In future years, these new XUV/EUV product lines are intended to generate significant additional profitable growth for BEST."

Source:

"Bruker Energy & Supercon Technologies (BEST) Acquires Assets of AIXUV GmbH"

Bruker Energy & Supercon press release (March 15, 2010)

<http://phx.corporate-ir.net/phoenix.zhtml?c=121496&p=irol-newsArticle&ID=1402161&highlight>

Magnet

Oxford Instruments (March 18, 2010)

Oxford Instruments has received an order for a state-of-the-art 14-T split pair superconducting magnet from Diamond Light Source (Oxfordshire, UK). The superconducting magnet will be used for

ultra-high vacuum experiments, providing a high magnetic and low temperature (< 1.5 K) sample environment. Specifically, the magnet will be installed in the new I10 Beamline for Advanced Dichroism Experiments (BLADE) at Diamond Light Source. The superconducting magnet will be constructed from Oxford Instruments' Nb₃Sn superconducting wire and will contain a recondensing cryostat, thereby decreasing the liquid helium consumption of this powerful magnet. John Burgoyne, Manager of the Magnets Business Group at Oxford Instruments, commented, "Working with customers at the leading edge of science and technology such as Diamond Light Source, the ISIS neutron source and many other world-leading research institutes and facilities whose requirements constantly drive and challenge our own technology development, continuously enhances our expertise in advanced superconducting magnet systems. In particular we are pleased to be able to build upon our strengths in high field recondensing magnet systems for beamline applications with this order. We are delighted to have this opportunity to work closely with the Diamond team and to be a part of the UK and local economy which both supports and benefits from this world-class science base in the UK".

Source:

"Order for state-of-the-art high field magnet"

Oxford Instruments press release (March 18, 2010)

<http://www.oxford-instruments.com/news/Pages/news.aspx>

Accelerator

RI Research Instruments GmbH (March 17, 2010)

RI Research Instruments GmbH, a majority-owned subsidiary of Bruker Energy & Supercon, has been awarded a €4.2 million (approximately US \$5.7 million) contract with South Korea's Pohang Accelerator Laboratory (PAL) for the supply of two 500-MHz superconducting accelerator modules. The contract covers the engineering, manufacturing, integration, testing, delivery, and installation of the superconducting accelerator modules, which will be used to upgrade PAL's third-generation synchrotron light source. Dr. Michael Peiniger, Managing Director of RI Research Instruments, commented, "This award represents the increasingly sophisticated continuation of a series of similar superconducting accelerating modules, originally based on a design by Cornell University and refined by RI to industrial standards. Several synchrotron light sources in Shanghai, Great Britain, Taiwan and Canada are successfully operating with such supercon accelerator modules delivered by RI. With this Pohang contract, we are well positioned for future applications in synchrotron light sources and other accelerator projects using superconducting radio-frequency (srf) technology."

In addition, RI has also received an approximately \$750,000 contract amendment to a \$6 million contract with the U.S. Department of Energy's Thomas Jefferson National Accelerator Facility for the production of 86 accelerator cavities (originally announced in July 2009). The contract amendment will cover all the radio frequency measurements and calibrations as well as the cleaning of the interior surfaces of the cavities.

Source:

"BEST Subsidiary RI Research Instruments Awarded Major Contract for Two Superconducting Accelerator Modules for Pohang Accelerator"

RI Research Instruments GmbH press release (March 17, 2010)

<http://ir.bruker.com/phoenix.zhtml?c=121496&p=irol-newsArticle&ID=1403170&highlight>

CERN (March 19, 2010)

CERN has announced the successful circulation of two 3.5-TeV proton beams in the Large Hadron Collider. This event marks the highest circulating beam energy ever achieved in a particle accelerator and is an important step on the way toward the start of the LHC program. The first attempt to collide beams at 7 TeV (3.5 TeV per beam) should be announced in the near future. Once 7 TeV collisions have been established, the LHC will run continuously for a period of 18 – 24 months, with a short technical stop at the end of 2010. The resulting data is expected to establish the LHC as the world's foremost high-energy particle physics facility.

Source:

"LHC sets new record – accelerates beam to 3.5 TeV"

CERN press release (March 19, 2010)

<http://press.web.cern.ch/press/PressReleases/Releases2010/PR05.10E.html>

CERN (March 30, 2010)

CERN has announced the successful collision of two beams at 7 TeV in the LHC, marking the start of the LHC research program. This energy level is 3.5 times higher than any value previously achieved in a particle accelerator. ATLAS collaboration spokesperson Fabiola Gianotti commented, "With these record-shattering collision energies, the LHC experiments are propelled into a vast region to explore, and the hunt begins for dark matter, new forces, new dimensions and the Higgs boson. The fact that the experiments have published papers already on the basis of last year's data bodes very well for this first physics run." The first experiments will set out to "re-discover" the known Standard Model particles, followed by a systematic search for the Higgs boson. CERN Director General Rolf Heuer commented, "The LHC has a real chance over the next two years of discovering supersymmetric particles... and possibly giving insights into the composition of about a quarter of the Universe."

Source:

"LHC research programme gets underway"

CERN press release (March 30, 2010)

<http://press.web.cern.ch/press/PressReleases/Releases2010/PR07.10E.html>

Basic

Ohio University (March 29, 2010)

A research team led by the University of Ohio has discovered the world's smallest superconductor: a sheet of four pairs of molecules less than one nanometer wide. The achievement provides the first evidence that nanoscale molecular superconducting wires can indeed be fabricated, with potential applications in nanoscale electronic devices and the field of energy. Nanoscale interconnects using metallic conductors were previously thought to be nearly impossible because of Joule heating (in which the resistance increases as the size of the wire decreases). The research team examined synthesized molecules of an organic salt, (BETS)₂-GaCl₄, grown on a silver surface and then used scanning tunneling spectroscopy to observe superconductivity in molecular chains of various lengths. Although the superconductivity decreased as the chains became shorter in chains less than 50 nm in length, superconductivity could still be observed in chains as small as four molecular pairs (3.5 nm in length). The research provides a new way of understanding superconductivity on a nanoscale as well as providing

evidence that superconducting organic salts can grow on a substrate material. The group's results have been published as an advance online publication in the journal *Nature Nanotechnology*.

Source:

"Scientists discover world's smallest superconductor"

Ohio University press release (March 29, 2010)

http://www.ohio.edu/research/communications/nano_superconductor.cfm

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