

What's New in the World of Superconductivity (January, 2010)

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Conference

ivSupra (January 13, 2010)

ivSupra has announced that a second conference on "Future and Innovation of Energy Technology with High-temperature Superconductor" will be held from March 16 to 17, 2010, at the "Bonner Wasserwerk" conference center (in German language). At the conference, experts from research organizations and industry will outline the present status of superconductor technologies and explain their advantages with regard to energy efficiency, focusing on modern network technology utilizing superconductors. Specific topics will include a new electric power network study and recent practical experiences with middle and high-voltage superconducting cables, as well as innovative fault current limiter systems. In addition, the conference will include lectures on the production of superconducting wire and the broad spectrum of superconductor applications. Examples of the successful application of superconductor technology to the metal industry (German Environment Award 2009) and to ship propulsion will also be demonstrated. The conference is organized and sponsored by the Industrieverband Supraleitung e.V., the Karlsruhe Institute of Technology (KIT) and the project agency Jülich (PtJ), with support from the German Federal Ministry of Economics and Technologies. For further information, please visit www.ivsupra.de.

Source:

"More energy efficiency with Superconductivity"

ivSupra press release (January 13, 2010)

http://www.ivsupra.de/images/stories/Presse/2010_01_ivs_ziehl_ii_final.pdf

Power

American Superconductor Corporation (January 5, 2010)

American Superconductor Corporation (AMSC)'s wholly owned subsidiary AMSC Windtec™ has signed a follow-on contract with Dongfang Turbine Co., Ltd. (China) to design and jointly develop 5-MW full conversion wind turbines for the offshore wind power market. Wang Wei Min, vice general manager and chief engineer at Dongfang, commented, "We are happy to expand our relationship with AMSC and add this higher-power, full conversion wind turbine to our portfolio to help meet the growing demand for clean, wind-generated electricity." Dongfang has exclusive rights to the 5-MW full conversion wind turbine design in China and plans to begin supplying these wind turbines to the worldwide offshore wind power market in 2012. Greg Yurek, founder and chief executive officer of AMSC, commented, "Dongfang already has established itself as one of China's largest wind turbine manufacturers and is poised for strong growth in

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2010 and beyond as it introduces its new 2.5 MW in the second half of this year and its 5 MW wind turbines in the next two years. We are particularly pleased to see more and more of our customers become repeat customers for new wind turbine designs. It is a validation of our advanced wind turbine technologies and signals more growth for our customers and AMSC going forward."

Source:

"AMSC Signs Contract to Develop 5 Megawatt Wind Turbines with China's Dongfang Turbine Co. Ltd."

American Superconductor Corporation press release (January 5, 2010)

http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=1370610&highlight

Zenergy Power plc (January 7, 2010)

Zenergy Power plc and its industrial partner Bülmann GmbH have received their first repeat order for a Magnetic Billet Heater (MBH) from their very first customer, Weseralu GmbH & Co. KG, bringing the total number of units sold in the past six months to three. Weseralu's previous installation of a superconductor MBH reportedly enabled a 50 % reduction in energy consumption while simultaneously enabling a 25 % increase in productivity. Weseralu has also stated that it has been impressed with the MBH's low maintenance requirements, superior heating quality, and versatile operation. The proven economic and operational advantages of the superconductor MBH have prompted Weseralu to replace the last of their conventional heaters with a superconductor heater a mere 18 months after its installation of the world's first industrial-scale machine based on superconductors. Dr. Jens Mueller, CEO of Zenergy Power, commented, "This order is of huge significance to the Group and is a particularly satisfying win. There are no greater endorsements of a new technology than either the repeat business of an early customer or the complete replacement of an incumbent solution. In this instance we have both; and this clearly demonstrates the disruptive and game changing nature of our superconductor technology. The economic payback on our machines can be less than one year and I am particularly pleased to see that our first customer has realized the benefits of this and made the decision to purchase a further machine so soon after their initial order."

Source:

"Magnetic Billet Heater: Repeat Order"

Zenergy Power plc press release (January 7, 2010)

http://www.zenergypower.com/images/press_releases/2010/2010-01-07-MBH-Repeat-Order.pdf

American Superconductor Corporation (January 11, 2010)

American Superconductor Corporation (AMSC) has received a new D-VAR system order from Xiamen Red Phase Instruments Inc. (China). The devices will be used to increase the reliability of a portion of the power grid operated by China Southern Power Grid Company Ltd. AMSC expects to deliver the D-VAR system to Red Phase by the end of July 2010. The order represents the second sale of a D-VAR system to Red Phase and the fourth power grid order from China in the last 12 months. Additionally, AMSC has named Red Phase as a channel partner for the power grid market in southern China.

Source:

"AMSC Receives Fourth D-VAR® System Order for Power Grid in China"

American Superconductor Corporation press release (January 11, 2010)

http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=1373321&highlight

Zenergy Power plc (January 13, 2010)

Zenergy Power plc has announced that Honeywell Specialty Materials has qualified as an industrial-scale supplier of the specialist chemicals required for the mass production of second-generation (2G) superconductor wire. The qualification of Honeywell is a significant step in Zenergy's plans to reduce the cost of superconductor wire dramatically by adopting a patented "all-chemical" continuous production process. The qualification of Honeywell also ensures that Zenergy will be able to scale its all-chemical process using a secured supply of the necessary chemicals without comprising the consistency or quality of the resulting 2G wire. The qualification of Honeywell is part of a previously announced Joint Development Agreement between the two companies with the aim of establishing a secure supply of industrial-scale quantities of chemical precursors for Zenergy Power, forming a basis from which the working relationship between these two companies may deepen as the production of 2G wire is further scaled up.

Source:

"2G Qualification of Honeywell"

Zenergy Power plc press release (January 13, 2010)

http://www.zenergypower.com/images/press_releases/2010/2010-01-13-2G-Qualification-of-Honeywell.pdf

Zenergy Power plc (January 21, 2010)

Zenergy Power plc has received its first commercial order for a superconductor fault current limiter (FCL) from Applied Superconductor Limited (U.K.). The first ever order for a medium-voltage FCL will be installed in the distribution network of CE Electric UK in the second-half of 2010. The order is particularly noteworthy as it means that Zenergy's FCLs are now on course for installation in two geographical markets, Western Europe and the United States, that are widely acknowledged to require unprecedented levels of grid investment. Dr. Jens Mueller, CEO of Zenergy Power, commented, "Growing electricity consumption is putting considerable strain on grid infrastructures around the world. Our FCL is a proven alternative to upgrading grid equipment and is between one half to just one eighth of the cost. This considerable saving is compelling and of considerable interest to all utility companies and grid operators regardless of their geographical location. A commercial reality demonstrated by the fact that, although we have carried out the majority of our FCL-development work in the United States we achieved our first commercial sale in Europe. Growing power demands and renewable energy generation are global trends that are driving a global FCL market."

Source:

"First Commercial Sale of Fault Current Limiter"

Zenergy Power plc press release (January 21, 2010)

http://www.zenergypower.com/images/press_releases/2010/2010-01-21-First-Commercial-Sale-of-FCL.pdf

Zenergy Power plc (January 22, 2010)

Zenergy Power plc has successfully raised £20,040,000 (approximately £19,200,000 net of expenses) through the placing of 16,700,000 new ordinary shares of 1p each (Ordinary Shares) in the Company (Placing Shares) at a price of 120p per Placing Share with numerous new and existing institutional investors. The placing follows a notable strengthening of Zenergy's target markets over the past 6 months, which has in turn driven a significant increase in commercial activity resulting in an order book for 2010 of around €4.1 million. The proceeds from the placing will be used to 1) complete the development of Zenergy's high-voltage FCL product (scheduled for installation in the electricity grid of American Electric Power in late 2011), 2) complete the development of Zenergy's "all-chemical" production technique for the

mass-manufacture of low-cost superconducting wire, 3) expand commercial activities related to the sales and marketing of medium and high-voltage FCL products in the United States and Europe, and 4) provide additional working capital to support an anticipated increase in commercial orders for Magnetic Billet Heaters products in 2010 and 2011. Upon their issue, the Placing Shares will rank pari passu in all respects with the existing Ordinary Shares and have been allotted and issued credited as fully paid. Upon admission, Zenergy Power will have a total of 68,941,970 Ordinary Shares.

Source:

"Institutional Placing to Raise £20,040,000"

Zenergy Power plc press release (January 22, 2010)

http://www.zenergy.com/images/press_releases/2010/2010-01-22-Institutional-Placing.pdf

American Superconductor Corporation (January 26, 2010)

American Superconductor Corporation (AMSC) has received an initial order for 100 sets of wind turbine core electrical components from XJ Group Corporation (China). The components will be utilized in the 2-MW doubly fed induction wind turbines that XJ Group is co-developing with AMSC Windtec™, a wholly owned subsidiary of AMSC. XJ Group completed the construction of its first 2-MW wind turbine in December 2009 and has also completed the construction of a new wind turbine manufacturing plant with an annual capacity of 1000 MW. XJ Group is the third AMSC Windtec customer to begin the volume production of wind turbines in China. Li Fusheng, president of XJ Group, commented, "AMSC Windtec has provided a broad scope of services to XJ Group that has helped us build a strong foundation for our new wind turbine manufacturing business. We are proud to enter production with our 2 MW wind turbines just 15 months after beginning to work with AMSC Windtec, and we see great opportunities ahead in the Chinese wind power market."

Source:

"China's XJ Group Orders Initial 100 Sets of Wind Turbine Core Electrical Components from AMSC"

American Superconductor Corporation press release (January 26, 2010)

http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=1378894&highlight

Magnet

GE Global Research (January 27, 2010)

GE Global Research, the technology development arm for the General Electric Company, has received a four-year, \$3.27 million grant from the National Institutes of Health (NIH) to develop cryogen-free magnets that will make magnetic resonance imaging (MRI) systems less costly and easier to site. Minfeng Xu, Principal Investigator on the MRI magnet project from GE Global Research, explained, "The use of cryogenic liquids limits where MRI systems can be placed today, and we want to change that so more people around the world can have access to this vital diagnostic imaging technology. By developing a cryogen-free magnet, we can reduce the overall size, cost and siting requirements of new MRI systems and make them easier to site in areas where the infrastructure is not as well-developed." The successful development of the proposed magnet technologies will enable MRI systems with cost and sitability requirements compared to today's low-cost permanent magnet systems (with a magnetic field of 0.2 – 0.35 T), but with a high magnetic field (1.5 – 3.0 T) and excellent image quality.

Source:

“GE Working to Expand Access of Magnetic Resonance Imaging (MRI) Systems to Underdeveloped Regions”

GE Global Research press release (January 27, 2010)

<http://www.genewscenter.com/Press-Releases/GE-Working-to-Expand-Access-of-Magnetic-Resonance-Imaging-MRI-Systems-to-Underdeveloped-Regions-2530.aspx>

Cryocooler

Air Force Office of Scientific Research (January 28, 2010)

Under a multi-university grant from the Air Force Office of Scientific Research, a team of researchers from the University of New Mexico, the Los Alamos National Laboratory, and the University of Pisa (Italy) has developed an all-solid-state cryocooler for airborne and spaceborne applications. The technology is expected to enable advances in the miniaturization of superconducting electronics. Dr. Mansoor Sheik-Bahae, a professor at the University of New Mexico and the project's leader, commented, "Optical refrigeration or solid state optical refrigeration technology offers many advantages over currently used, bulky mechanical coolers because it is vibration free (no moving parts), compact, lightweight and agile (fast turn-on and off)." Using the new cryocooler, the team was able to reach a cooling temperature of 155 K. Further material research is expected to enable cooling to even lower temperatures, possibly as low as 10 K.

Source:

“Optical refrigeration expected to enhance airborne and spaceborne applications”

Air Force Office of Scientific Research press release (January 28, 2010)

<http://www.wpafb.af.mil/news/story.asp?id=123187569>

Communication

Hypres Inc. (January 28, 2010)

Hypres Inc. has announced the successful transition of its SQUID array antenna application to the Small Business Innovative Research (SBIR) Phase III level, with a new contract valued at nearly US \$3 million. Hypres will collaborate with the US Navy Space and Naval Warfare Systems Center Pacific (SSC Pacific) to produce a high dynamic range Signals Intelligence (SIGINT) antenna with superior performance and significant size, weight, and power improvements, compared with conventional antennas. Richard Hitt, CEO of Hypres, commented, “We are very excited about our success in SQUID array technology and look forward to working with our partners to transition it to mainstream weapon systems.”

Source:

“Hypres Successfully Transitions SQUID Array Technology for Antenna Applications to SBIR Phase 3 Contract”

Hypres Inc. press release (January 28, 2010)

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

Basic

Brookhaven National Laboratory (January 7, 2010)

An international research team from the Brookhaven National Laboratory, Ames Laboratory, Iowa State University, National High Magnetic Field Laboratory at Florida State University, and St. Andrew's University (Scotland) has discovered evidence of "electronic liquid crystal" states within the parent compound of an iron-based, high-temperature superconductor. Importantly, because these findings are similar to those observed in the parent state of cuprate superconductors, they suggest a common factor in the mechanism of high-temperature superconductivity between these otherwise very different materials. The research was performed using a uniquely sensitive spectroscopic image-scanning tunneling microscopy (STM) technique that enables the direct imaging of the arrangements of electrons in materials and the exploration of electronic structures in crystals. Using this technique, the researchers were able to observe static, nanoscale arrangements of electrons measuring about eight times the distance between individual iron atoms and aligned along one crystal axis, similar to the spatial order observed in liquid crystals. Furthermore, the electrons that were free to travel through the material did so in a direction perpendicular to the above-mentioned alignment, indicating that the current-carrying electrons are distinct from the electrons aligned in the electronic liquid crystal. Next, the group plans to observe how these conditions affect the superconductivity of the material once it has been transformed into a superconductor. The group's findings were published in the January 8, 2010, issue of *Science*.

Source:

"Electronic Liquid Crystal States Discovered in Parent of Iron-Based Superconductor"

Brookhaven National Laboratory press release (January 7, 2010)

http://www.bnl.gov/bnlweb/pubaf/pr/PR_display.asp?prID=1061

Rice University (January 8, 2010)

Researchers from Rice University, the University of Tennessee, Oak Ridge National Laboratory (ORNL), the National Institute of Standards and Technology (NIST), the Chinese Academy of Sciences' Institute of Physics and Renmin University (Beijing, China) have examined several iron-arsenide compounds used as undoped parent materials in the fabrication of iron pnictides and have concluded that the ability of the electrons to conduct electricity without resistance in these materials is directly connected with the magnetic properties of these electrons. Using neutron scattering, the group bombarded the materials with neutrons to examine their structural and magnetic properties. The tests supported previous theoretical predictions, confirming that the strength of the magnetic order in the materials was reduced when arsenic atoms were replaced with slightly smaller phosphorus atoms. The results provide the first direct evidence that a magnetic quantum critical point exists in these materials. Qimiao Si, a physicist at Rice University, commented, "The evidence from this study bolsters the hypothesis that high-temperature superconductivity in the iron pnictides originates from electronic magnetism. This should be contrasted to conventional low-temperature superconductivity, which is caused by ionic vibrations." The group's work was published in the January 8 issue of *Physical Review Letters*.

Source:

"Study: Quantum fluctuations are key in superconductors"

Rice University press release (January 8, 2010)

<http://www.media.rice.edu/media/NewsBot.asp?MODE=VIEW&ID=13532&SnID=1739118847>

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