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

Power

American Superconductor (June 9, 2004)

American Superconductor Corporation's Executive Vice President and Chief Technical Officer, Alex Malozemoff, has been named the 2004-2005 Distinguished Lecturer by the IEEE Council on Superconductivity. Dr. Malozemoff will serve as an ambassador for the Institute of Electrical and Electronics Engineers from June 2004 to September 2005, presenting lectures on current and future applications of HTS wires to a broad audience, including universities, companies, and end-users of electronic equipment throughout the world. Dr. Malozemoff is only the third person to be named a Distinguished Lecturer by the IEEE. He is internationally known for his pioneering work on the physical characteristics of magnetic and superconductor materials, leading to the development of practical applications, and resulting in commercial products for power cables, ultra-compact and highly efficient propulsion motors, and power grid stabilization systems. Professor Moises Levy, President of the Council on Superconductivity, commented "Superconductivity is increasingly important in the electrical and electronic applications of interest to the IEEE. With his stature and broad knowledge of the field, Alex will be an outstanding ambassador to raise awareness of this growing field in the wider IEEE community." An abstract of Dr. Malozemoff's general lecture can be obtained at http://www.ewh.ieee.org/tc/csc/DistinguishedAlex.html.
Source:
"American Superconductor CTO Named IEEE Distinguished Lecturer"
American Superconductor press release (June 9, 2004)
http://www.amsuper.com/newsEvents/news.html

American Superconductor (June 21, 2004)

American Superconductor Corporation (AMSC) has received a contract from the Defense Advanced Research Projects Agency (DARPA) to develop ultra-high performance second-generation (2G) HTS wire for advanced military applications, including electronic warfare and electric weapons systems. The ultra-high performance wire will be based on the application of novel materials science technologies using AMSC's nanotechnology-enabled 2G HTS wire. The contract is expected to yield a total of US $3.1 million in revenue over the next three years. Commented Dr. Greg Yurek, AMSC's chief executive officer, "This new contract will be focused on utilizing our 2G HTS wire platform to introduce additional low-cost manufacturing methodologies that significantly boost the electrical performance of the wire. While the goal under this contract is to meet the needs for special military applications, these improvements will have a direct benefit on our commercial 2G HTS wire." The Naval Research Laboratory (NRL), Oak Ridge National Laboratory (ORNL), and Los Alamos National Laboratory (LANL) will collaborate with AMSC on this project, under separate contracts with DARPA. AMSC is also being funded as part of DARPA's Superconducting Hybrid Power program, which aims to develop efficient cryogenic power systems.
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"American Superconductor Announces DARPA Contract to Develop Ultra-High Performance Second Generation HTS Wire for Military Applications"
American Superconductor press release (June 21, 2004)
http://www.amsuper.com/newsEvents/news.html

Intermagnetics General Corporation (June 28, 2004)

The construction phase of the 350-m HTS cable that will run between two Niagara Mohawk substations in Albany, New York, was launched in a ceremony attended by New York Gov. George E. Pataki and other dignitaries. Sumitomo Electric Industries, the BOC Group and Niagara Mohawk, a National Grid Company, are working with SuperPower, the project manager, to demonstrate the increased efficiency, reliability and safety of HTS power cables, compared to conventional copper cables. The New York State Energy Research and Development Authority (NYSERDA) and the U. S. Department of Energy (DOE) are both contributing funding to the project. Commented Governor Pataki, "New York State is a national leader in promoting advanced energy technologies that are helping clean our air, improve our energy security, and encourage sustainable economic development. We're proud to support innovative projects like SuperPower's HTS cable that offer the potential to enhance reliability and provide additional, affordable power for utility customers while protecting our environment." Philip J. Pellegrino, president of SuperPower, added that in addition to being able to carry three to five times more power than conventional cables, HTS cables are expected to be easier to license and permit because they are more efficient (reducing the average 7-10% grid delivery losses and associated greenhouse emissions), can deliver power at lower voltages (reducing the need for step-up and step-down transformers), and use non-flammable liquid nitrogen (rather than oil) for cooling.
Source:
"Intermagnetics' Superpower Subsidiary Begins Construction Phase of HTS Cable Project for New York Utility"
Intermagnetics General Corporation press release (June 28, 2004)
http://ir.thomsonfn.com/InvestorRelations/PubNewsStory.aspx?partner=10215&storyId=116431

Communication

Superconductor Technologies Inc. (June 15, 2004)

Superconductor Technologies Inc. (STI) has implemented a cost reduction program that will involve the consolidation of its Sunnyvale facility, a reduction in its workforce, and other cost reduction measures. STI believes that these actions will lower the company's breakeven point. The R&D operations at the Sunnyvale facility will be consolidated with those at STI's Santa Barbara facility. STI will also reduce its total workforce by about 50 positions, or approximately 20%. In addition, the company plans to accelerate the implementation of a new, lower cost wafer deposition process known as reactive co-evaporation (RCE). The cash and non-cash restructuring charges are expected to total US $3.7 million, the majority of which charges should occur in the second fiscal quarter. The company expects the cost-saving program to enable savings of approximately $1.7 million per quarter.

In another press release of the same date, STI announced that the underwriters of its

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recent offering of 20,000,000 shares of common stock have exercised in full their option to purchase an additional 3,000,000 common shares to cover over-allotments. This action brings the total offering size to $ 18.4 million, with net proceeds to STI of approximately $ 16.8 million. The offering was led by Needham & Company, Inc. and co-managed by Merriman Curhan Ford & Co.

Sources:

“Superconductor Technologies Announces Cost Reduction Measures”

“Superconductor Technologies Underwriters Exercise Option for 3,000,000 Additional Shares of Common Stock”

Superconductor Technologies Inc. press releases (June 15, 2004)

http://ir.thomsonfn.com/InvestorRelations/PubNewsStory.aspx?partner=5951&storyId=115765

http://ir.thomsonfn.com/InvestorRelations/PubNewsStory.aspx?partner=5951&storyId=115764

Basic

U.S. Department of Energy and Brookhaven National Laboratory (June 2, 2004)

Scientists at the U.S. Department of Energy's Brookhaven National Laboratory, in collaboration with researchers at the Rutherford Appleton Laboratory in the United Kingdom and Tohoku University in Japan, have discovered evidence supporting a possible mechanism for high-temperature superconductivity that was previously thought to be incompatible with certain experimental observations. When scientists measured the magnetic excitations of the static, non-superconducting form of LBCO (1 barium: 8 copper), which they know exhibits narrow regions of antiferromagnetism separated by regions with holes – or a "stripe" pattern, the pattern of magnetic excitations looked remarkably similar to that observed in YBCO. Some scientists had predicted that such a pattern would not be possible for a material with stripes. The finding that the striped LBCO 1:8 material produces magnetic excitations similar to those of YBCO suggests that the stripes might also be there when the material acts as a superconductor (at other barium:copper ratios), and not just in the static case of LBCO 1:8. The researchers believe that their results support the concept that stripe correlations might be essential to high-transition-temperature superconductivity. The controversial findings were described in the June 3, 2004, issue of *Nature*.

Source:

“Fluid 'stripes' may be essential for high-temperature superconductivity”

Brookhaven National Laboratory press release (June 2, 2004)

http://www.bnl.gov/bnlweb/pubaf/pr/2004/bnlpr060204.htm

U.S. Department of Energy and Ames Laboratory (June 25, 2004)

Researchers at the U. S. Department of Energy's Ames Laboratory have enhanced the properties of magnesium diboride (MgB_2) superconductors by doping them with carbon atoms, enabling the magnetic field that the material can withstand to be doubled. By substituting 5% of the boron in MgB_2 with carbon, the researchers raised the magnetic field that the material can withstand from 16 Tesla to 36 Tesla. While the doping also lowered the critical temperature from 39 K in the pure material to 35 K in the doped material, the magnetic field as a function of

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temperature still exceeds those of the NbSn compounds, which have a limit of about 30 Tesla. While the above results are promising, the critical current of MgB_2 must still be improved. The researchers are now attempting to do this by adding titanium diboride (TiB_2) using chemical vapor deposition to disperse the element uniformly throughout the material. This research is expected to eventually reduce the expenses associated with the presently available superconducting materials used to generate the intense magnetic fields required by applications such as magnetic resonance imaging, high-field magnets for research, and superconducting magnets for particle accelerators.

Source:

“Ames Lab Physicists “Perturb” Superconductor to New Heights”
Ames Laboratory press release (June 25, 2004)
http://www.external.ameslab.gov/news/release/2004rel/mgboride.htm

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

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