

What's New in the World of Superconductivity

(July, 2012)

초전도 뉴스 -세계의 동향-

超电导新闻 -世界的动向-

chāo diàn dǎo xīnwén - shìjiè de dòngxiàng-

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★News sources and related areas in this issue

▶ Industrial Application 산업응용 工业应用 [gōngyè yìngyòng]



Wire Order for Electric Propulsion Ship

AMSC (July 17, 2012)

AMSC has been selected as the HTS wire provider for Europe's Power Optimised Ship for Environment with Electric Innovation Designs Onboard (POSE²IDON) project. The aim of the €20 million project funded by the European Union is to provide a working guide on how to improve the efficiency and reduce the



This work was subsidized by JKA using promotion funds from
KEIRIN RACE.

environmental impact of Europe's commercial shipping fleet through the use of HTS rotating machines and distribution networks. As part of the project, large-scale motor and generator demonstrations using AMSC's HTS wire will be manufactured and tested by the end of 2013. Chris Hodge, Coordinator of the POSE²IDON project, commented, "We see great promise for superconductors in the maritime industry. The technologies developed in this project will enhance cargo space availability and efficiency on electric ships while at the same time reducing carbon emissions. AMSC is a trailblazer in HTS rotating machinery and is the world's leading producer of second-generation superconductor wire. As such, they are a logical contributor to the POSE²IDON Project." The power density advantages of HTS wire enable the size and weight of rotating machines to be reduced to less than half the values for conventional machinery with a comparable power rating. AMSC has long been involved in the development of such superconducting machinery, including the design, construction, and testing of a 36.5 MW HTS ship propulsion motor. Daniel P. McGahn, President and CEO of AMSC, commented, "In the maritime industry, superconductors can be applied to a range of systems, such as motors, generators, power cables and protection systems—freeing up precious cargo space, enhancing ship defense and reducing energy consumption, fuel costs and greenhouse gas emissions. We applaud the European Union for recognizing the transformative impact that HTS can have and, more importantly, demonstrating the power of these solutions under the POSE²IDON Project."

Source: "AMSC Superconductor Wire Selected for European Maritime Project"

AMSC press release (July 17, 2012)

URL:

http://files.shareholder.com/downloads/AMSC/1729988020x0x583343/10e8eb24-8c66-4ca9-8b24-dd7242dfc6b3/AMSC_News_2012_7_17_Commercial.pdf

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▶ Electronics 엘렉트로닉스 电子应用 [diànzìyè yìngyòng]



Caltech

New Parametric Superconducting Amplifier

California Institute of Technology (July 13, 2012)

Researchers at the California Institute of Technology (Caltech) and NASA's Jet Propulsion Laboratory have developed a new parametric amplifier for boosting electrical signals. The new device has potential applications in a variety of areas, from studying stars, galaxies, and black holes to exploring the quantum world and developing quantum computers. A key feature of the device is that it utilizes superconductors: titanium nitride (TiN) and niobium titanium nitride (NbTiN) were used to allow the amplifier's pump signal to amplify weak signals. The amplifier is capable of operating over a frequency range more than 10 times wider than other comparably sensitive amplifiers and can amplify strong signals without distortion, introducing a minimal amount of unavoidable noise. Further design improvements should be able to reduce this noise to an absolute minimum. Different versions of the amplifier can be designed to work at frequencies ranging from a few gigahertz to a terahertz. At present, the group is producing devices for

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Caltech's Owens Valley Radio Observatory, where they will be used to boost signals between radio and infrared wavelengths, thereby enabling astronomers to study the cosmic microwave background—or the afterglow of the Big Bang. The sensitivity of the amplifier and its minimal introduction of noise also make it applicable to the study of quantum phenomena, such as measuring the behavior of tiny mechanical devices that operate at the boundary of classical physics and quantum mechanics. The device's design was recently described in the journal *Nature Physics*.

Source: "Getting amped"

California Institute of Technology press release (July 13, 2012)

URL: http://media.caltech.edu/press_releases/13533

http://www.eurekalert.org/pub_releases/2012-07/ciot-ga071312.php

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► Basics 기초 基础 [jīchǔ]



HARVARD
UNIVERSITY

Pseudogap Phase for HTS

Harvard University (July 27, 2012)

Researchers at Harvard University studying the pseudogap phase in $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+x}$ (bisco) superconductors have found that the absence of oxygen, rather than its location within the material's crystal structure, is strongly related to the pseudogap. The finding should aid researchers to design new materials capable of acting as superconductors at higher temperatures. Associate Professor of Physics Jenny Hoffman commented, "The important finding here is that we believe we have the chemical handle on what is controlling the local pseudogap. The goal is to get to a place where we can say we understand these copper-based superconductors, and then take the next step to achieving higher temperatures. I'm extremely optimistic that we are going to get to room-temperature superconductors someday, but I think we're probably still a couple decades away." Researchers are interested in understanding the pseudogap for two reasons: some believe that the pseudogap might actually reflect superconductivity that is being foiled in some way; others believe that the pseudogap is actually a competing phase that must be "defeated" to achieve superconductivity. The Harvard researchers used scanning tunneling microscopy to obtain a better view of the oxygen dopants in the material over a broader energy range. By positioning the tip of the microscope several angstroms distant from the sample and measuring the electrical current that flows between the tip and the sample, the researchers were able to image individual atoms in the material. Using this challenging technique, the researchers were able to create a map of the oxygen dopants in the top three layers of the material. When the map was compared with data showing the local strength of the pseudogap, the researchers found that instead of a correlation between the pseudogap and the interstitial oxygen atoms, the pseudogap seemed to be correlated with defects in the material caused by the removal of oxygen atoms immediately adjacent to copper atoms. The experiment represented the first time that both the interstitial oxygen atoms and the vacancies could be examined simultaneously, enabling the exact chemistry affecting the pseudogap to be clarified: an achievement that has been sought for the last 15 years. The group's work has been reported in *Science*.

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Source: "Stages of Superconductivity – Researchers' insight on 'pseudogap' an important advance" By Peter Reuell Harvard Staff Writer Friday, July 27, 2012

Harvard University press release (July 27, 2012)

URL: <http://news.harvard.edu/gazette/story/2012/07/stages-of-superconductivity/>

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► **Management and Finance** 경영정보 经营信息 [jīngyíng xīnxi]



Intellectual Property to Resonant LLC

Superconductor Technologies Inc. (July 12, 2012)

Superconductor Technologies Inc. (STI) has contributed 14 patents regarding its Reconfigurable Resonance™ (RcR) technology as well as experienced executive leadership and technical expertise as its minority investment in Resonant LLC. Resonant hopes to commercialize RcR within the mobile communications products industry. As previously announced, Resonant has signed a product development agreement with a global leader in mobile communications products to bring RcR technology to the marketplace. As a new company separate from STI, Resonant's preliminary development efforts will be self-funded, and Resonant expects to pursue the additional financing that will be required to complete its development plans. Jeff Quiram, STI's president and chief executive officer, commented, "As we have discussed in the past, STI has a deep intellectual property portfolio developed over many years. These assets enable us to incubate promising technologies we believe can provide substantial returns for our shareholders with little or no demand on our capital and 2G HTS wire technical resources. Our IP investment in Resonant is a perfect example of STI expanding its market opportunities. While STI continues to aggressively pursue its 2G HTS wire program, Resonant allows us to participate in the mobile communications devices market by leveraging the RcR technology we developed through a modest investment, and with no obligation for future funding of the venture." Terry Lingren, co-founder of Resonant, added, "Mobile data demand from next generation smartphones is exploding, and device manufacturers are struggling to keep up. The RcR patented solutions and highly specialized technical team can address these issues, as validated by our development contract with a global market leader in the rapidly growing mobile communications industry. Resonant will commence development activity immediately to meet the demand of its primary target customer while at the same time seeking the outside financing necessary to bring its product to market."

Source: "Superconductor Technologies Inc. Successfully Leverages Deep Intellectual Property Portfolio" Superconductor Technologies Inc. press release (July 12, 2012)

URL: <http://phx.corporate-ir.net/staging/phoenix.zhtml?c=70847&p=irol-newsArticle&ID=1714098&highlight>

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Financial Report

Bruker Corporation (July 31, 2012)

Bruker Corporation has reported its financial results for the second quarter of 2012, ending June 30, 2012. Revenue for the quarter totaled \$420.7 million, representing an increase of 4.9 % compared with revenue of \$401.2 million for the same period in the previous fiscal year. The organic revenue growth rate after currency adjustments and excluding growth from acquisitions in the last 12 months was 10.4 % year-over-year. For the 6-month period ending June 30, 2012, the company's revenue was \$826.3 million, representing an increase of 9.0 % compared with revenue of \$758.2 million for the same period in the previous fiscal year. The organic revenue growth rate for the first half of fiscal 2012 was 12.0 % year-over-year.

For the Bruker Energy & Supercon Technologies (BEST) segment, the revenue for the second quarter totaled \$26.0 million, a decrease of 7.5 % compared with the \$28.1 million in revenue for the same period in the previous fiscal year; these figures correspond to an organic revenue growth of 3.2 % year-over-year. For the 6-month period ending June 30, 2012, the segment's revenue was \$56.0 million, an increase of 7.5 % compared with revenue of \$52.1 million for the same period in the previous fiscal year; these figures correspond to an organic revenue growth of 15.7 % year-over-year.

Frank Laukien, President and CEO of Bruker Corporation, commented, "Despite softening demand in some of our key end markets, particularly in Europe, we are pleased with our strong organic revenue growth in the first half of 2012. Also, our backlog remained very healthy as of the end of the second quarter. However, we are disappointed with our profitability in the second quarter of 2012. Our profitability was adversely affected by insufficient backlog conversion, gross margin pressures and higher spending in certain businesses..." The company is presently re-evaluating its business plans for the second half of 2012 with the goal of improving the company's cost structure and implementing new initiatives. Consequently, Bruker has reduced its previously announced 2012 financial goals to a full-year revenue target of \$1.70-\$1.75 billion.

Source: "Bruker Corporation Reports Financial Results for the Second Quarter and First Half of 2012"

Bruker Corporation press release (July 31, 2012)

URL: <http://phx.corporate-ir.net/phoenix.zhtml?c=121496&p=irol-newsArticle&ID=1720179&highlight>

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Investment by Venture Capital to Theva

THEVA (June 28, 2012)

Munich-based venture capital firm Target Partners (www.targetpartners.de) today announced a seven figure Series A investment in Theva Dünnschichttechnik GmbH (Theva) (www.theva.de). BayBG Bayerische Beteiligungsgesellschaft (www.baybg.de) joins Target Partners as a co-investor in the Munich-based technology company.

Theva is a specialist in 2nd generation (2G) high temperature superconductors (HTS). The funding will support development of production lines for 2G HTS tape for use in electrical power engineering applications.

Over the past ten years, Theva has developed a proprietary, patented process technology for manufacturing 2G HTS tape designed for applications such as electricity transmission, generators and electrical systems. 2G HTS

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tape can conduct two hundred times more electrical current than copper wire of the same dimensions. This results in huge potential savings for electricity grid expansion and increased power generation efficiency, while allowing for environmentally friendly electrical transmission. Theva provides a simple and cost-efficient process that ensures a high quality product. "We are also the only company in the industry with in-house equipment manufacturing capability," said Dr. Werner Prusseit, CEO of Theva.

Kurt Müller, a partner at Target Partners, explained why the firm decided to invest: "Theva's world-class team brings the ideal background and qualifications to the table. Their technical skills, many years of experience, and an excellent industry network are the cornerstones of the company's continued success."

Alexander Ullmann, senior project manager at co-investor BayBG, added, "The expertise of key Theva personnel and the favorable market and competitive environment are what tipped the scales in favor of our investment."

"We are delighted to have found long-term, strategically oriented investors in Target Partners and the BayBG," said Dr. Prusseit about the decision to opt for BayBG and Target Partners.

Source: "Target Partners invests in Theva Dünnschichttechnik GmbH"

Theva Press Release (June 28)

URL : http://www.theva.com/user/eesy.de/theva.biz/dwn/PR_Target_Partners_invests_in_Theva.pdf

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