Extra March, 2013 Date of Issue: March 1, 2013

Superconductivity Web21

Published by International Superconductivity Technology Center
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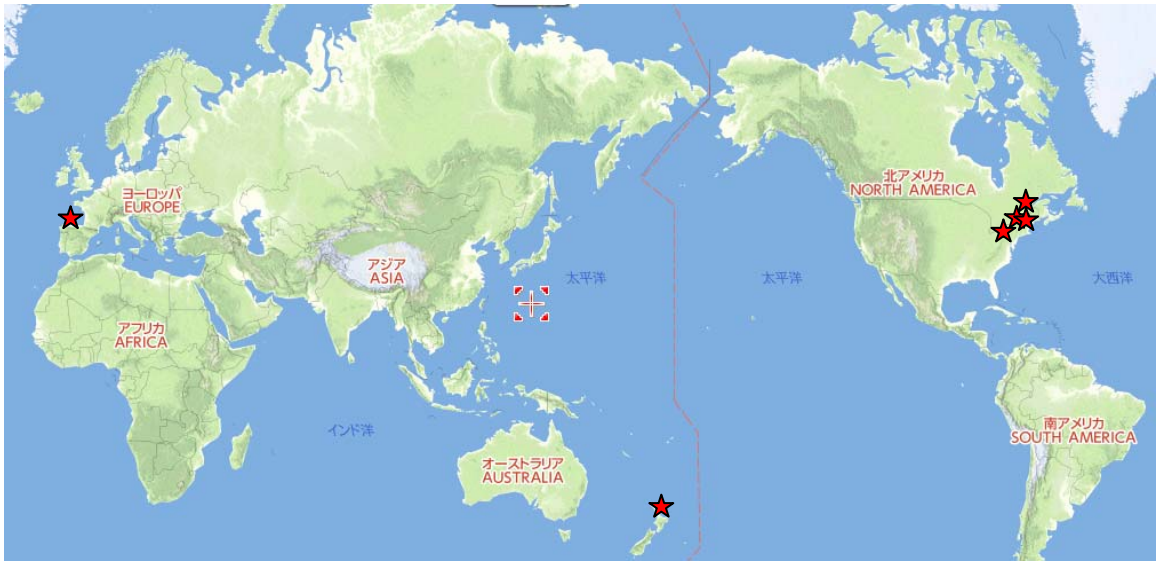
What's New in the World of Superconductivity (January, 2013)

초전도 뉴스 –세계의 동향–

超导新闻 –世界的动向-

chāo dǎo xīnwén - shìjiè de dòngxiàng-

Yutaka Yamada, Principal Research Fellow
Superconductivity Research Laboratory, ISTEC



★News sources and related areas in this issue

▶ Wire 선 재료 线材料 [xiàn cáiliào]

Breakthrough Iron-based Superconductors

Brookhaven National Laboratory (January 9, 2013)

A collaboration led by scientists at the U.S. Department of Energy's Brookhaven National Laboratory have

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

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created a high-performance iron chalcogenide-based superconducting wire that could open new pathways for essential and energy-intensive technologies. The new wires, which have a unique layered structure, are capable of carrying very large currents under exceptionally high magnetic fields, outperforming low-temperature superconducting wires while avoiding the high manufacturing costs associated with high-temperature superconducting wires. Because the iron-based superconductors are mechanically semi-metallic, they are also considerably less fragile and can be more easily shaped into long wires, in addition to exhibiting nearly isotropic behavior in magnetic fields. The raw materials required for the wires (iron, selenium, and tellurium) are relatively inexpensive, and the synthesis process can be performed at a temperature that is half that required for cuprate-based HTS wires. A key breakthrough was the discovery that adding layers of cerium-oxide between the films and substrates dramatically increased the critical current density (by more than 1 million amperes per square centimeter) as well as the critical temperature at which the material becomes superconducting (by 30%, compared with the same compound made without the layering process). At 30 T, the film was capable of carrying a record 200,000 amperes per square centimeter. The group also examined thin films grown on flexible metallic materials called rolling-assisted biaxial textured substrates (RABiTS), with similar performances. Qiang Li, a physicist at Brookhaven Lab, commented, "We believe both critical current and transition temperatures can be further improved as we fine-tune the structure and chemical composition. The next step is to pinpoint the mechanism behind the findings—the relationship between the structure and properties—which will provide guidance for the discovery of new superconductors with even greater performance." The group's work was published online in Nature Communications.

Source: "Breakthrough Iron-based Superconductors Set New Performance Records"
Brookhaven National Laboratory press release (January 9, 2013)
URL: http://www.bnl.gov/newsroom/news.php?a=11485
Contact: Justin Eure, jeure@bnl.gov

Luvata Expands Manufacturing Capacity of MRI Superconducting Wire

Luvata (February 4, 2013)

Luvata has signed a new 15-year lease that will include an overhaul of its present superconducting wire manufacturing facility in Waterbury, Connecticut. The newly renovated facility will include additional manufacturing space and a state-of-the-art laboratory. The changes to the facility should be completed by the end of 2014. The additional capacity supports Luvata's plans to double its sales of superconducting wire for MRI applications.

Source: "Luvata signs new lease to expand manufacturing capacity of MRI superconducting wire"
Luvata press release (February 4, 2013)
URL:
http://www.luvata.com/en/News-Room/Press-Releases/Luvata-signs-new-lease-to-expand-manufacturing-capacity-of-MRI-superconducting-wire-/?backurl=/en/News-Room/Press-Releases/
Contact: Susan Porter, susan.porter@luvata.com

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▶Power Application 전력응용 电力应用 [diànlì yìngyòng]

10MW Large Windmill R&D in EU-Pj

Tecnalia (January 8, 2013)

TECNALIA will coordinate the SUPRAPOWER research project in Europe, which has the goal of providing an important breakthrough in offshore wind industrial solutions by designing an innovative, lightweight, robust and reliable 10-MW class of offshore wind turbine utilizing a superconducting generator. Specific goals of the project include a reduction in the turbine head mass, size and cost by about 30% using a compact superconducting generator. The research consortium includes industrial and academic partners from 7 countries in Europe; Columbus Superconductors will supply the superconducting wire necessary for the project.

Source: "Tecnalia will shake up offshore wind market with smaller wind turbines"
Tecnalia News (January 8, 2013)
URL:
http://www.tecnalia.com/en/energy-and-environment/news/tecnalia-revolutionize-offshore-wind-turbines-smaller.htm
Contact: http://www.tecnalia.com/en/contact/contact-form/contact-form.htm?idc=1

Fault Current Limiter in Europe's Largest Superconductor Grid Project

AMSC (January 29, 2013)

AMSC has announced an order from Nexans for high-temperature superconducting Amperium® wire to be used in a superconductor fault current limiter (SFCL). The SFCL will be used as a surge protector at "AmpaCity", a project to replace inner-city high-voltage equipment with superconductor systems that is being undertaken by Nexans and its collaborators. Specifically, the SFCL will provide overload protection to a superconductor cable, lowering the fault current levels and enabling a safe and reliable interconnection to the power grid. Nexans will manufacture both the superconducting cable and the SFCL. The order follows a recent announcement that Nexans and AMSC intend to cooperate to bring the same medium-voltage SFCL to the North American market.

Source: "AMSC to Provide Wire for Fault Current Limiter in Europe's Largest Superconductor Grid Project"
AMSC press release (January 29, 2013)
URL:
http://files.shareholder.com/downloads/AMSC/2165855216x0x631262/eb526163-5cc4-42db-94a1-29590379d6c0/AMSC_News_2013_1_29_Commercial.pdf
Contact: Kerry Farrell, kerry.farrell@amsc.com

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▶Industrial Application 산업응용 工业应用 [gōngyè yìngyòng]

HTS-NMR Magnet

HTS-110 Limited (January 28, 2013)

HTS-110 Limited has announced that will provide HTS technology as a gift to support New Zealand researchers and scientists for one year. HTS-110 manufactures cryogen-free superconducting magnets for applications in high-tech manufacturing, materials research, and particle physics. Their latest-generation HTS-110 magnet is for use in NMR, a technique that provides highly specific chemical information from a variety of materials and can be used to greatly increase the understanding of chemical reactions in both industry and research. HTS-110 is planning to give New Zealand researchers access to this technology for one year so as to share and promote potential advances. Chris Hopkins, the Managing Director of Scott Technology (HTS-110's major shareholder), commented, "We are very proud of what we have achieved and we wanted to make this world leading technology that has been developed in New Zealand available to leading organizations in this country. Recently, the unique nature of the technology has been highlighted through uptake and trials in the Pharmaceutical, medical and other associated industries in the USA, Japan and Italy"

Source: "A World First Gift for NZ Researchers"
HTS-110 Limited press release (January 28, 2013)
URL: http://www.scott.co.nz/news/pdf/2013_A_World_First_Gift_for_NZ_Researchers.pdf
http://www.hts-110.co.nz/
Contact: http://www.hts-110.co.nz/contacts/new-zealand

▶ Basics 기초 基础[jīchǔ]

Find New Order in Quantum Electronic Material

Rutgers University (January 30, 2013)

Two physics professors at Rutgers University have proposed an explanation for a new type of symmetry in an exotic material made with uranium, ruthenium, and silicon. When the material is cooled to 17.5 K or lower, the flow of electricity through the material is known to change subtly, and the magnetic fields of the electrons align with the material's main crystal axis. The physics professors propose that this alignment arises from a new type of hidden order, or symmetry, in the material's magnetic and electronic properties. The fundamental new order has been named 'hastatic' order, after the Greek word for spear. This name reflects the highly ordered properties of the material and its effect on aligning the electrons that flow through

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it. The new concept has the potential to enable insights into new kinds of materials, magnets, superconductors, and other states of matter with as yet unknown properties. Physicists are now beginning to search for experimental evidence of hastatic order. The theoretical findings have been published in *Nature*.

Source: "Rutgers physics professors find new order in quantum electronic material"
Rutgers University press release (January 30, 2013)
URL: http://www.eurekalert.org/pub_releases/2013-01/ru-rpp013013.php
http://news.rutgers.edu/medrel/research/rh-2013-1/rutgers-physics-prof-20130130
Contact: Carl Blesch, cblesch@ur.rutgers.edu

▶ Management and Finance 경영정보 经营信息[jīngyíng xìnxī]

Helium Market Supply Solutions

Air Products (January 30, 2013)

Air Product's Walter Nelson, director of helium sourcing, has spoken at the European Industrial Gas Association (EIGA) Symposium in Brussels, Belgium regarding all aspects of the helium business, including the supply shortage, discussing the key actions necessary to maintain and increase the helium supply. Nelson commented, "Like fossil fuels, helium is a finite resource. While the known supplies are sufficient to meet demand for more than 100 years, and with advances in exploration and drilling, chances are that we may find even more, this finite resource must be managed… The current shortage in the helium market is unprecedented. Investments by the energy sector are necessary to develop and employ helium recovery with natural gas processing where there is helium present." Additionally, legislation that is currently being considered by the United States Congress with regard to the U.S. Bureau of Land Management helium reservoir (which currently supplies 30% of the global helium demand) will be a key factor. Nelson explained, "U.S. legislators undoubtedly need to pass legislation soon to extend the BLM operations and preserve the availability of this important source of supply. Unless, this legislation passes and BLM has renewed authority to continue to operate the federal reservoir, all of the helium that remains in the reserve would be inaccessible. The impact on the U.S. and the world in terms of helium availability would be chaotic. Renewed or new legislation granting the BLM the authority it needs to continue to supply helium would bridge the time period necessary for new announced natural gas and helium production plants to come onstream." Three new helium sources (in the U.S., Qatar, and Algeria) are currently expected to become operational in 2013.

Source: "Air Products' Helium Director Talks Market Supply Solutions at EIGA"
Air Products press release (January 30, 2013)
URL:
http://www.airproducts.com/company/news-center/2013/01/0130-air-products-helium-director-talks-market-supply-solutions-at-eiga.aspx
Contact: Art George, georgeaf@airproducts.com

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