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Commercialization • Markets • Products
Business Developments • R&D • Cryogenics

Researchers Learn Lessons from Setback on HTS Transformer Project

A team of researchers from Oak Ridge National Laboratory (ORNL) Superpower, and Waukesha Electric Systems reported a setback on Phase II of the 5/10MVA HTS Transformer Project sponsored by the Department of Energy's (DOE) Superconductivity Partnerships with Industry. Due to electrical problems with the cast epoxy method used to fabricate the three transformer coils, or phase sets, the transformer was unable to be energized at Waukesha's substation. Despite setbacks on this and other aspects of the project, reviewers said that many of the device subsystems performed more than adequately and that much of the planned test program was successfully completed.

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AIST Spins Out Instrumentation Company

The National Institute of Advanced Industrial Science and Technology (AIST) of Japan has spun out a new company that will market superconductor-based technologies developed by the institute's Nanoelectronics Research Institute. The new company, to be called IQUANTUM, is the first spawned by Innovation Center for Start-ups (INCS)—AIST's new effort to systematically identify commercially viable technologies developed by the institute. IQUANTUM will initially be headquartered in Tsukuba, Japan, and incubated by AIST under the management of Jun-ichi Watanabe, who advises INCS on start-ups. Upon achieving a revenue target, it will become an independent Japanese company.

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Varian to Acquire Magnex Scientific

Varian, Inc. today announced that it has entered into a definitive agreement to acquire Magnex Scientific Limited for $32 million in cash and assumed debt. The transaction will also include an opportunity for additional purchase price payments over three years, depending on performance relative to certain financial targets. Magnex designs and manufactures superconducting MRI magnets, vertical high-resolution NMR magnets, magnets for Fourier Transform Mass Spectroscopy (FTMS), and MR microscopy gradient coils. Superconducting magnets are core to both MRI and NMR, and are by far the most profitable use of superconductor technology. The acquisition is subject to regulatory approval, and is expected to close by mid November.

The acquisition follows a five-year relationship during which Magnex has been manufacturing MRI magnet systems for Varian. Magnex has also suppled Varian with two actively shielded 800MHz NMR

A conventional 30MVA Transformers weighs 75 tons, compared with 44 tons for an HTS transformers. The reduced weight and size of HTS transformers, plus the fact that they run cool, means they are easier to site, and can even be located indoors. A conventional 30MVA transformer uses 23,000 liters of oil. Because HTS transformers do not require oil for cooling, they pose significantly lower environmental hazards than conventional transformers. ❍

IQUANTUM Launches 3 Products

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IQUANTUM holds rights to three devices: a liquid helium-free programmable Josephson voltage standard system (PJVS), a fast-reversed DC measurement system, and an apparatus for measuring magnetic properties of materials at temperatures below 2K. Watanabe explained that his market research suggested sufficient demand for the magnetic measurement apparatus to warrant forming the company, and IQUANTUM will initially focus exclusively on bringing this device to market.

SQUID magnetometers are very widely used for characterization of magnetic materials or superconductors. The low temperature limit of all the magnetometers in the market, including non-SQUID types, is not lower than 1.8K. This is not sufficient for a certain class of materials such as single-molecule magnets, organic magnets/superconductors, and heavy-fermion superconductors, which show exotic properties only at extremely low temperatures. IQUANTUM product, "iHelium^3" is an installed-on-demand attachment to the de facto standard SQUID magnetometer; it lowers the temperature of the sample down to below 0.5K using $_3$He. The whole measurement procedure, from condensation of $_3$He gas to data acquisition, is fully automated. Further development of the device will make it fully compatible with AC susceptibility measurements.

INCS/AIST exhibited its new technological achievement in the Ninth International Conference on Molecule-based Magnets 2004, in Tsukuba, Japan. The company reported that over fifty researchers of single-molecule magnets and organic magnets have demonstrated interest in this product, and it expects to begin taking orders for the product by the end of November, 2004.

PJVS Operates Without Liquid Helium

IQUANTUM's programmable Josephson voltage standard (PJVS) system, is unique in that it operates without the use of liquid helium. The PJVS uses NbN films, which have a T_c above 15K, for the electrodes of the Josephson junctions and microwave circuit components. This allows for the chips to be operated above 10K, and permits a more compact and overall lower cost system. Watanabe explained that the elimination of the need for liquid helium provides a significant cost benefit, making it appealing to customers in economically under developed countries, or places where maintaining liquid helium refrigeration systems is prohibitively difficult. The device can be operated at 100-120V, and will be 150cm high by 85cm long by 57cm wide. 32,768 NbN/TiN/NbN junctions are used on the chip.

The new company plans to build the first prototype model of the product by May, 2005, incorporating its PJVS chips generating output voltages from -1V to 1V. Watanabe said that significantly greater demand exists for 10V devices, and added that a -10V to 10V PJVS chip using 327,680 junctions is under development.

The AC-DC Transfer Standard is a compact, portable device based on a fast-reversed DC method, composed of a thermal converter, fast-reversed DC source, a precision digital sine wave synthesizer, and a power supply with a USB interface. The system can be used by manufacturers to establish AC-DC transfer standards, and for calibration of instruments.

IQUANTUM's initial activities are supported by the Special Coordination Fund for Promoting Science and Technology promoted by the Ministry of Education, Culture, Sports, Science and Technology. For more information email: jun-watanabe@aist.go.jp. ❍