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Superconductivity Web21

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ISTEC's Outline of Activity Plans for Fiscal 2002

International Superconductivity Technology Center (ISTEC) has announced that Hiroshi Araki, President of ISTEC, held the general board of directors in the 29th time and the board of councilors in the 19th at the Keidanren Kaikan on March 7, and deliberated ISTEC's Activity Plans for fiscal 2002.

The activity plans feature active promotion of research on superconductivity by conducting surveys and investigations on pertinent topics, performing fundamental research and development required for specific superconductivity applications, and promotion of international exchanges. Consequently, these activities will provide significant contributions to the expansion of the superconductivity industry.

In addition, fiscal budget of about 5,500 million yen including the income from commissioned business, supporting membership fees, etc. is expected for the following activities.

1. Promotional and Educational Activities, and International Exchanges
(1) The Fifteenth International Symposium on Superconductivity (ISS2002)
Period: November 11 to 13, 2002
Venue: Pacifico Yokohama Conference Center, Yokohama City
(2) Workshop on research results
Date: May 15, 2002
Venue: Toshi Center Hotel, Tokyo
(3) Eleventh International Superconductivity Industrial Summit(ISIS2002)
Period: November 17 to 19, 2002
Place: Tokyo, Japan
(4) Superconductivity Web 21
Information on the development and practical applications of superconductivity technology will be distributed through the Internet to ISTEC members via E-mail (monthly Japanese version, quarterly English version) and a public website.
(5) Publication of SRL Technical Reports fiscal
(6) Reports on the results of superconductivity projects
(7) Collection and distribution of information on superconductivity activities in Japan and abroad (ISTEC Overseas News, etc.)
2. Research and Development Activities
(1) Research and Development of fundamental technologies for superconductivity applications(FY1998 - FY2002)
(2) Research and Development of superconducting magnetic energy storage system(SMES) (FY1999 - FY2003)
(3) Development of superconducting magnetic bearing for flywheel electric power storage systems(FY2000 - FY2004)
(4) Development of Superconductor Manufacturing Technology Utilizing a Microgravity Environment(FY1995 - FY2003)
3. International Standardization
(1) IEC/TC 90 superconductivity
(2) Preparation of JIS Drafts
(3) Technological development support for superconductivity standardization

(Mitsuhiro Anju, General Affairs Dept., ISTEC)

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Interim Appraisal Report on the "Research and Development of Fundamental Technologies for Superconductivity Application" Project

The Working Group (headed by Takehiko Ishiguro, Professor at Kyoto University) made an interim appraisal in fiscal 2001 on the "Research and Development of Fundamental Technologies for Superconductivity Application" Project being implemented by the International Superconductivity Technology Center (headed by President Hiroshi Araki). The Working Group was led by the Appraisal Subcommittee, Industrial Technology Subcommittee, and Industrial Structure Council under the Ministry of Economy, Trade and Industry.

The appraisal targets four areas, namely (1) Element technology for superconductive wires, (2) Superconductive device element technologies, (3) Superconducting bulk element technologies, and (4) Technological research on superconductive material bases. This research and development project has been entrusted to SRL since fiscal 1998 by the New Energy and Industrial Technology Development Organization (NEDO).

The contents of the rigid appraisal, which requires a high level of professional knowledge and wide experience, focused on the following six points, namely (1) General Appraisal, (2) Purposes and Political Positioning of the Project, (3) Appropriateness of the Purposes and Schemes of the Research and Development Project, (4) the Project System Implemented by Research and Development Enforcers, (5) Meanings of Achievements and Results Compared with Plans, and (6) Feasibility of R&D Results and Their Ripple Effects.

The Working Group has concluded in its General Appraisal that the purposes, goals, and development systems, and degree of achievement are appropriate and that "this project deserves continuation in the future."

More specifically, the interim appraisal report states in the "Purposes and Political Positioning of the Project" that "superconductive technology will contribute to public interest but requires a large amount of capital investment. Thus, it is reasonable that this project has been initiated by the Japanese government. The government should continue to take a strong initiative in promoting a broad range of superconductivity research and development programs including basic scientific studies. Therefore, the purpose of the project is appropriate and its political positioning is definite." In addition, the Working Group has concluded in the "Meanings of Achievements and Results Compared with Plans" that "some of the research and development results are characterized as completely new, advanced, and general-purpose oriented and are likely to lead to the creation of new markets while other results which have been achieved are the highest in the world, world firsts, and superior to the world level. Unexpected R&D results with ripple effects are also identified." The Working Group has finally concluded that "in general, the goals of the project are being achieved with the stead-fast progress of the research and development project."

The Working Group states in the "Proposal for Directions of Future Research and Development" that "this project, when its nature is considered, is expected to bring about results that will lead to an innovation for more practical application where peripheral technologies are involved," expressing its greater hope for future development.

ISTEC recognizes that superconductive technology will become the key technology that will reshape the next generation industrial structure and, therefore, is determined to make continuing efforts to produce effective results for low-cost and practical applications.

(Osamu Horigami, Director, SRL/ISTEC)

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High Temperature Superconducting Filters Seen as Merchandise

High temperature superconducting filters business is preparing to take a major step forward. Superconducting filters used for base stations for cellular phones are characterized as 1/sensitive and 2/interference-resistant. These features contribute to the reduction of base stations in sparsely populated large areas while they allow a large channel capacity in urban areas. In addition, these features lead to a sharp decrease in the number of drop calls and block calls, which tend to happen with cellular phones from time to time. Meanwhile, sometimes it ihas been said that superconducting filters have some weaknesses; they are costly and may have some reliability problems because of need to use a cryocooler.

However, Superconductor Technologies Inc. of the United States announced in November, 2001 that the company had sold an accumulated total of 1,000 units of superconducting filters, a major milestone in superconducting business, and that the working hours of the superconducting filter systems sold by the company had reached 10 million hours. In December, 2001, the company again announced that it had won a new order for 1,000 units of superconducting filters. Besides, Conductus Inc. and Illinois Superconductor Corporation of the United States are also making strenuous efforts. It seems to suggest that the market has finally begun to recognize the economical and practical value of superconducting filters.

These stories are all from the United States. A number of makers in Japan are competing with each other to develop better superconducting filters. NTT DoCoMo and KDDI have not yet introduced base stations with superconducting filters to practical application although they have already conducted field tests and identified superior performance.

Positions of the superconducting filter differ in Japan and in the United States. Japanese superconducting filter users have in mind the possible application of superconducting filters to base stations for third generation cellular phones while US users have already begun to deploy base stations with superconducting filters for second generation and 2.5th generation cellular phones. Most Japanese makers only occasionally come to know areas where base stations with superconducting filters for cellular phones are deployed in the United States. However, we dare to speculate that US makers are focusing on the deployment of base stations with superconducting filters in urban areas where population is dense and large revenues can be expected. It would be no exaggeration to say that US telecommunication carriers have begun to recognize that base stations with costly superconducting filters can pay in urban areas.

According to a survey made by CTIA (Cellular Telecommunications & Internet Associations) of the United States, 114,000 wireless base stations for cellular phones were operated in the United States as of June, 2001 and 20,000 new base stations is being installed every year. It is another question whether all of the existing base stations will be replaced with new base stations with superconducting filters, but to install such a number of base stations every year forms a huge potential market. Officers of Superconductor Technologies Inc. were invited by the Chinese Science Academy and other governmental agencies to visit China in June 2001. The officers of the company expressed a strong interest in forming a partnership with a counterpart in China. US superconducting filter makers have traditionally shown interest in the Japanese and European markets of base stations for cellular phones. However, it seems that they have also begun to bring the Chinese market into view because the market is expected to grow by 20% or higher every year and the number of cellular phone subscribers is expected to reach more than 300 million by 2007.

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

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Roadmap of "Superconducting Electronics" Issued

The fiscal 2001 edition of "Superconducting Electronics Roadmap" was issued by the 146th committee, which was formed by the Japan Society for the Promotion of Science and which was named the Superconducting Electronics Committee (Chairperson: Yoichi Okabe). The roadmap has been prepared by three subcommittees, namely the Digital Applied Subcommittee, High Performance SQUID (Superconducting Quantum Interface Device) System Subcommittee, and Microwave to Optics Subcommittee, under the Superconducting Electronics Committee. The roadmap report consists of Part I (Superconductive Digital Technology), Part II (SQUID and Measurement Applied Technology), and Part III (Superconductivity: Microwave to Optic Technology). The Superconducting Electronics Committee, headed by then-chairperson Hisao Hayakawa, began to prepare the roadmap in fiscal 2000. Additions and revisions were made between January - March 2002 before it was finally issued.

Part I of the roadmap report was written by 13 members of the Digital Applied Subcommittee and edited by Chief Examiner Akira Shoji. Specifically, Chapter 1 describes a receiver for software wireless communications as an application of the single flux quantum, SFQ, circuit, and an AD converter and SFQ switch and their possible applications. Chapter 2 describes a comparison of roadmaps of the semiconductor IC and of the superconductive IC, development of a superconducting DA-AD converter, development of a superconducting sampler, SFQ production process necessary for making devices, property evaluation, element technologies, such as an interface with ambient temperature circuits, and mounting of SFQ chips, and the situation and outlook of the current integration technologies of multi-chip modules. Research on "Quantum Computing" is also introduced in the appendix.

Part II is written by four members of the High Performance SQUID (Superconducting Quantum Interface Device) System Subcommittee and edited by Chief Examiner Shinya Kuriki. Specifically, Chapter 1 refers to the completion of a low temperature superconductor (LTS) device based on a Nb-type metal superconductor for a SQUID and measurement system technology, current development situation of a high temperature superconductor (HTS) SQUID device, and system development. Application areas of these technologies are described, extending to medicine, biology, material appraisal, current measurement, astrophysics, and other areas. Chapter 2 explains that a magnetoencephalogram (MEG) has already passed the clinical test stage and now is used for medical diagnosis and cerebral research. In total, 75 of them have already been delivered to hospitals and medical institutes all over the world (half of them have been delivered to such organizations in Japan). Chapter 3 describes the current situation of the magnetocardiogram (MCG) and its system development. Chapters 2 and 3 analyze results of the questionnaires collected and present the differences between LTS- and HTS-SQUID measurement instruments when they are put on the medical instrument market.

Part III is written by 15 members of the Microwave to Optic Device Subcommittee and edited by Chief Examiner Shigetoshi Ohshima. Chapter 1 describes basic characteristics of microwave superconductive electronics and required technologies; Chapter 2 describes the current situation of microwave superconductive electronics while Chapter 3 refers to future outlook of microwave superconductive electronics. In particular, Chapter 3 focuses on the front-end for base stations of mobile communications and on a newest cryo-cooler, a compact pulse tube, that is advantageous in terms of less mechanical vibrations and less magnetic noise as well as a tera-hertz electromagnetic detector, optical device, and new devices made through double-sided micro fabrication with superconductive single crystals.

(Yasuzo Tanaka, Editor)

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Superconductivity Web 21 - One Year Anniversary -

Superconductivity Web 21, an electronic informational magazine (monthly) in Japanese issued by the International Superconductivity Technology Center, ISTEC, marked its first anniversary in April, 2002. The editorial staff is grateful to readers for their understanding and support of the magazine.

Under the motto of providing speedy, general, and two-way information, Superconductivity Web 21 has delivered clear and concise information on superconductivity and related technologies to readers in Japan and overseas. Superconductivity Web 21 has replaced the "ISTEC Journal," a quarterly journal ISTEC had issued for the 13 years since its establishment. Superconductivity Web 21 also issues quarterly English language editions.

You can visit ISTEC's web site at http://www.istec.or.jp and access in the Japanese or English edition of Superconductivity Web 21. As of the end of February, 2002, Superconductivity Web 21 in Japanese had a total of 5,481 visitors and an average of 500 visitors per month while Superconductivity Web 21 in English had a total of 778 visitors and an average of 100 visitors per month. In addition, ISTEC delivers PDF files to its supporting members and other people concerned via e-mail. Thus, more than 1,000 people in total per month have access to the Superconductivity Web 21 magazine.

Superconductivity Web 21 also has a "Reader's Column" where editorial staff members and readers can interact. This communication allows both sides to feel more familiar with each other. The editorial staff members are determined to continue unabated efforts to win broad understanding and support from readers.

(Editorial Office)

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Advertising for Proposals concerning R&D Projects to be Entrusted to Candidates by METI for Fiscal 2002

Upon request by the Ministry of Economy, Trade and Industry (METI), the New Energy and Industrial Technology Development Organization (NEDO) conducted the research stated below concerning hopeful candidates for the research and development projects that the Ministry of Economy, Trade and Industry starts in fiscal 2002,as a structural reform special requests portion.

- Research target project area: 24 subjects in biology, health and welfare, IT, materials, environmental technology, process technology, and others.
- Budget for fiscal 2002: ¥13.9 billion in total
- Research period (period for accepting proposals): March 8, 2002 through April 15, 2002 (terminated)
- Preliminary document examination: early May (tentative)
- Contract Qualification Examination Committee: later May (tentative)
- Reports and recommendations to the Ministry of Economy, Trade and Industry: early June (tentative)
- Concluding a contract (project start): early July (tentative)

Note that the development of a low-powered superconductive network device project (a 5-year research and development period starting in fiscal 2002 with a budget of ¥615 million) is included in proposal subjects for superconductivity areas.

(Yasuzo Tanaka, Editor)

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Role of Superconductivity Technology in Telecommunications

In Japan, several indexes have shown inversions, reflecting structural reforms in the telecommunication area. For example, the number of cellular phone subscribers has recently surpassed the number of fixed phone subscribers. Data volume has also surpassed voice signal volume. These phenomena indicate that the use of telephone lines has advanced into the stage of personalization and intelligence. In addition, centering on the moving picture delivery service, broadband communications are expected to grow fast, supported by the introduction of the third generation cellular phone and of mega bit-class ADSL. Thus, enhancing hardware capacities is more necessary than the development of band width compression software programs. An example is the development of multi-layered, faster, and low-powered semiconductor integrated circuits. However, heating and wiring delay pose a problem that the gap between the performance demanded and chip performance has become wider. To break through the problems, research and development has turned to new materials, especially superconductors that allow them to make elements with features of low loss, high speed, and high sensitivity. An electronic component is commercialized only after it satisfies performance, price, and reliability requirement. This is the same with superconductors. A superconductor can naturally achieve the required performance but it must also satisfy price and reliability considerations, which are critical for marketing. The development of a pulse tube cryocooler has finally come to assure reliability of the superconducting devices. However, when considering that the recent innovations in telecommunications are attributed to the lowered cost of chip production, the development of low-cost superconductor production technologies is likely to become the key factor in the future.

(Yoichi Enomoto, Director, Div. VII, SRL/ISTEC)

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Status of the development of the HTS filter subsystem

Shigetoshi Ohshima
Professor
Faculty of Engineering, Yamagata University

In the U.S.A, superconducting filter subsystems already work base stations for mobile telecommunication. The practical application is attributable to the following factors. The superconducting filter subsystem is characterized by having low loss and frequency selectivity much better than existing systems. In addition, the US government had no definite scheme to control the frequency bands of users. These factors have helped to promote the practical application of HTS filter subsystem in the U.S.A... Superconductor Technologies Inc.(STI), ISCO International, Inc.(ISCO), and Conductus, Inc. competed with each other In the U.S.A.. Finally, STI seems to have dominant power over the market. According to a newspaper report, in December 2001, STI won an order to deliver more than 1,000 units of superconducting filter subsystems by April, 2003 to a leading telecommunication company. At present, ISCO is suing STI and Conductus for the alleged violation of patents (USA patent Nos. 6, 263, 215: method of cooling superconducting filters and amplifiers with a coolant. The method has not been applied to the Patent Office of Japan). People are concerned about the case and the decision that the court will make. Meanwhile, a number of Japanese makers have been engaging in the development of superconducting filters to solve interferences between PHS and IMT-2000 cellular phones. Since superconducting filters have proven to be effective, the next issues are when and where a superconducting filter will be put into practical use in Japan. As was seen in the United States, superconducting filters will be installed for base stations in a region or for subsystems (on precondition of the recovery of the Japanese economy). Use of cellular phones in China has propagated quickly. As of the end of 2001, the number of cellular phone subscribers exceeded 120 million, the largest number in a single nation in the world. To cover the vast land, the reception sensitivity of base stations must be enhanced. China is focusing on the development of superconducting filters. It is said that Professor Cao at Tsinghua University set up a venture capital company. China may succeed in putting a superconducting filter subsystem into practical use earlier than Japan.

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Superconducting Magnet Separation Technology Contributing to the Environment

Superconducting magnet separation technology has much potential in many areas, such as river and lake water quality recovery, sewage-containing water treatment, industrial effluent treatment, removal of hazardous materials in the environment, oil and seawater recycling, development of rare resources, and recycling of useful resources. Along with the propagation of refrigerator-cooled superconducting magnets, an increasing number of researchers at universities, national, and public research institutes are engaged in the development of superconducting magnet separation technology.

In the past, magnet separation technology was mainly applied to the collection of magnetic materials, removal of magnetic impurities, and enrichment of low-grade ores. The past magnet separation technology was, however, (1) slow to separate, (2) too small to process a large volume of an object, and (3) limited in terms of objects and their size for separation. Thus, the magnet separation technology was applied only to limited areas, such as removing iron from cooling water for power plants and boilers and refining kaolin. However, along with the propagation of refrigerator-cooled superconducting magnets, high fields have become easy to make with simple equipment. As a result, the superconducting magnet separation technology has come to attract people because of the following advantages. (1) the speed of magnet separation has increased dramatically, (2) a large volume (100 ton/day) can be processed, (3) any kind of materials can be separated, and (4) less secondary waste is produced. These advantages have been verified by the following technologies for the practical application of the superconducting magnet separation technology.

– Technology That Uses a Coil Superconducting Magnet –
(1) Removal of arsenic from geothermal fluid
Raw water: Geothermal fluid
Facility: Refrigerator-cooled superconducting (silver-sheathed Bi-2223 oxide superconducting coil) magnet, 1.7T, approx. 20K
Pre-treatment (magnetizing): Making arsenic absorbed to ferrous sulfate or ferric hydroxide
Treatment speed: 10 litters/minute
Removal rate: 99%, achieving 0.001 ppm (arsenic environmental standard)
Enforcement agency: Iwate Industrial Promotion Center (foundation), Iwate University, Tsukuba University, National Institute for Materials Science

(2) Removal of environmental hormones
Raw water: Nonyl phenol (NP) solution
Facility: Refrigerator-cooled superconducting (silver-sheathed Bi-2223 oxide superconducting coil) magnet, 40K
Pre-treatment (magnetizing): Adding a straight-chain alkyl organic compound to ferric-oxide fine grains to make the compound hydrophobic
Treatment speed: 0.6 ton/hour
Removal rate: Reducing 8.4 ppm to 1/10,000
Enforcing agency: National Institute for Materials Science, Iwate Industrial Promotion Center (foundation)

(3) Weak magnetic fine particle separation
Raw water: α-hematite (Fe_2O_3) or ferric hydroxide solution

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Facility: Refrigerator-cooled superconducting magnet (6T) and metal net high inclination magnet separator
Pre-treatment: α-hematite; average 1 μm of grain size; ferric hydroxide; 3 μm of MgO neutral
Seize rate: α-hematite: approx. 95% (@ flow speed: 0.8 m/s, 2T-6T)
Enforcing agency: Iwate Industrial Promotion Center (foundation), Iwate University, Tsukuba University, National Institute for Materials Science

(4) Treatment of industrial effluents from semiconductor treatment plants
Raw water: Effluents from semiconductor treatment plants
Facility: Superconducting magnet, 2T, ambient temperature
Pre-treatment (magnetizing): Ultrafine particle colloid of iron hydroxide from ferrous sulfate and potassium hydroxide
Treatment speed: 10 litters/minute
Removal rate: Approx. 12 μm SiC particles, almost 100% removed
Enforcing agency: Osaka University, Kyoto Institute of Technology, TKX Corporation

– Technologies Using Bulk Superconducting Magnets –
(1) Purifying sewage
Raw water: Sewage, effluents from plants, kaolin-polluted fluid
Facility: Refrigerator-cooled Y bulk superconducting magnet, Operating magnet field: 3.2T, 35K
Pre-treatment (magnetizing): Magnetite, ferrous inorganic coagulant (poly iron), magnet flock from polymers
Treatment speed: 100 tons/day
Removal rate: 90% or higher (polluted particle), 93% (kaolin polluted fluid)
Enforcing agency: Hitachi, Limited, ISTEC

(2) Removing water blooms (phytoplankton, dissolved phosphorus)
Raw water: water-bloom water from a pond of city K
Facility: Refrigerator-cooled Y-bulk superconducting magnet, operating magnet field: 3.2T, 35K
Pre-treatment (magnetizing): Magnetite, ferrous inorganic coagulant (poly iron), magnet flock from polymers
Removal rate: Chlorophyl a: 94.2%, floating particle: 96.4%, total phosphorous: 93.9%, iron: 83.7%
Enforcing agency: Hitachi, Limited, Kyushu Electric Power Co., Ltd.

(3) Purifying oil-polluted fluid
Raw water: Composite of tap water and crude oil
Facility: Refrigerator-cooled Y-bulk superconducting magnet, operating magnet field: 3.2T, 35K
Pre-treatment (magnetizing): Magnetite, ferrous inorganic coagulant (poly iron), magnet flock from polymers
Removal rate: Organic carbon: 90% or higher
Enforcing agency: Hitachi, Limited

(Yasuzo Tanaka, Editor)

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Application of an Industrial HTS Superconducting Magnet

-- Development of a High Temperature Superconducting Magnet for Silicon Single Crystal --

Michitaka Ono
Superconductivity Application Technology
Measurement and Inspection Technology Development Department
Power and Industrial Systems Research and Development Center
Toshiba Corporation

In April, 2001, Toshiba Corporation, Sumitomo Electric Industries, Ltd., and Shin-Etsu Handotai Co., Ltd. jointly succeeded in developing a high temperature superconducting magnet system which can work at around 20K with the world's largest storage energy of 1.1 MJ (mega joule). The magnet development project was supported by an energy-saving subsidy provided by the Ministry of Economy, Trade and Industry. The superconducting magnet is cooled by a GM cryocooler without using liquid helium. The success of this project is based on the establishment of a manufacturing technology of long length HTS wire and of the magnet design and manufacturing technology where the characteristics of tape wire are taken into consideration.

Compared with existing low temperature superconducting systems, this magnet system offers better energy saving (Power consumption: approx. 1/3) and reliability, and enables the magnet to energize in a short time (only 1 minute or approx. 1/20 of the existing period). The success of this magnet system represents one large step forward towards diverse applications of the high temperature superconducting magnet system. Such applications include medical MRI, steels, magnetically levitated train and other industrial equipment, as well as superconducting energy storage, superconducting cables, and other power related equipment.

Reference: To be established market for cryocooler type superconducting magnets, Superconductivity Web 21, Fall, 2001, p.9.

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Refrigerator-Cooled Superconducting Magnet I

Tsuginori Hasebe
Engineer, Research and Development Center
Sumitomo Heavy Industries, Ltd.

Sumitomo Heavy Industries has sold over 60 units of refrigerator-cooled superconducting magnets to customers in Japan and overseas since 1992 when the company succeeded in the practical application of a refrigerator-cooled superconducting magnet where Bi dioxide current lead is applied. The fact that nearly 10 years has passed since the application proves the reliability of Bi oxide current lead applied to magnets.

The refrigerator-cooled superconducting magnet is characterized as having flexible fixing directions (vertical, horizontal, and slanting), allowing magnetic fields to be made in almost any direction. A typical example of the magnet installation is found in the equipment, mounted on a rotary stand, with a maximum central magnetic field of 10T and an ambient magnetic field space diameter of 100 mm (see photo). The equipment is used for various magnetic science researches.

A research and development project to strengthen the magnetic field has succeeded in achieving a maximum generation of a 15T magnetic field. Such a 15T refrigerator-cooled superconducting magnet is working as a shared facility at the Institute for Material Research Laboratory of Tohoku University. Sumitomo Heavy Industries is also jointly working with Tohoku University in the research and development of a hybrid magnet, made of a refrigerator-cooled superconducting magnet and a water-cooled copper magnet, which can generate a large-aperture strong magnetic field.

The company intends to develop new applications of refrigerator-cooled superconducting magnets through the magnet development projects and researches in magnetic science.

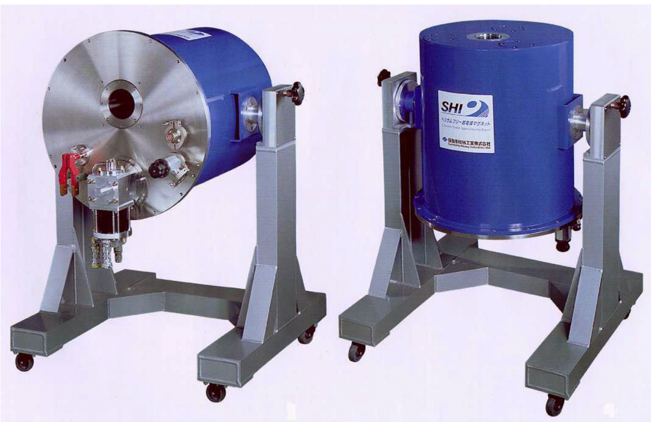

Photo: 10T Refrigerator-Cooled Superconducting Magnet (diameter: 10 mm)
(Photo credit: Sumitomo Heavy Industries, Ltd.)

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Refrigerator-Cooled Superconducting Magnet II

Kazuyuki Shibutani
Manager, Marketing & Sales Group, Japan Superconductor Technology Inc.

A "high magnetic field generated only by a superconducting magnet" and "high time stability on persistent current" were the main reasons that corporations and other organizations used superconducting magnets until several years ago. The main reasons that the refrigerator-cooled superconducting magnet was selected are: A) a large capacity superconducting magnet can cut operation costs much more than an ordinary electromagnet, and B) maintenance is easy and it is continuously operable. According to sales record of Japan Superconductor Technology, customers bought refrigerator-cooled superconducting magnets for mag-anneal (heat treatment under the magnetic field) equipment and magnetic separation equipment mainly because of reason A) above. In the case of a 1.2T-250 mm gap split pair magnet, such customers can achieve approx. 1/10 of power and cooling water volume and approx. 1/3 of equipment weight. A good example of reason B) are the two units of refrigerator-cooled superconducting magnets (photo) for gyrotron, delivered to the National Institute for Fusion Science at the end of FY2001. Since the market for refrigerator-cooled superconducting magnets is expected to grow in the future, user-oriented design, which includes a total integration of superconducting wire, magnets, and equipment, will become increasingly important. For example, we need to consider which is appropriate for a customer, the cryogen-free (conducting cooling) type or the re-condensation (immersion) type.

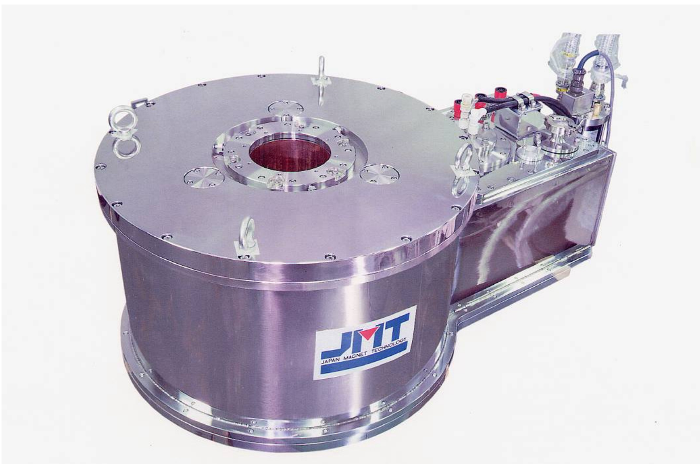

Photo: Refrigerator-Cooled Superconducting Magnet for Gyrotron
(maximum central magnetic field: 6.7T Bore(I. D.): 140 mm)
(Photo credit: Japan Superconducting Technology Inc. (formerly Japan Magnet Technology, Inc.))

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Refrigerator-Cooled Superconducting Magnet III

Takashi Sasaki
Senior Specialist, Machinery and Equipment Dept., Keihin Product Operation
Toshiba Corporation

Toshiba delivered a refrigerator-conducting-cooled superconducting magnet (hereafter "direct cooling magnet") in 1994 for the first time. Since then, the company has delivered such direct-cooled magnets to universities, research institutions, and other corporations for industrial applications. The direct cooling superconducting magnet uses no refrigerants such as liquid helium. It uses an ultra-low temperature refrigerator alone to cool the superconducting magnet. The successful development of the compact and easy-to-operate 4K-GM refrigerator, which uses fine circular magnet coolants, such as Er and Ni, developed by Toshiba, has enabled the direct cooling superconducting magnet to work. Since the 4KGM refrigerator uses no liquid helium, even an unskillful operator can easily handle the refrigerator. In addition, the direct cooling superconducting magnet can be rotated, so the scope of applications has broadened. The direct cooling superconducting magnet shown in the photo below can generate 10T in 100-mm aperture. The direction of the magnet field can be easily rotated vertically and horizontally with the rotation handle. The direct cooling superconducting magnet is used for material creation, magnetism separation, convection control, biochemistry, and other research areas. In addition, Toshiba's direct cooling magnet is also used for industrial applications, including MRI, superconducting magnets for single crystal, and steels. In recent years, our direct cooling magnet has been used for accelerators. We expect that the direct cooling magnet will be used for higher magnet fields and larger magnet applications.

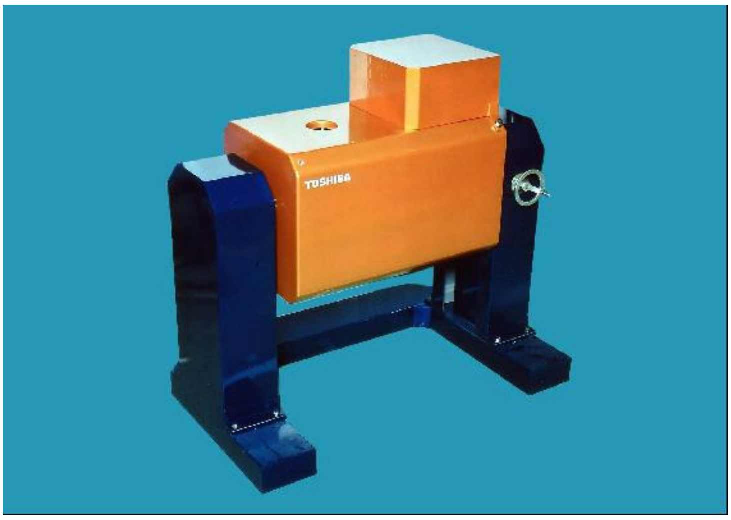

Photo: Direct Cooling Magnet (photo credit: Toshiba Corporation)

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A Step Forward for Next-Generation Long Wires

-- Technological Achievements Announced by Toshiba and Fujikura --

Toshiba Corporation and Fujikura Ltd. respectively announced their technological achievement in March 2002, namely the characteristic of length of an yttrium oxide superconducting wire or so-called next-generation wire rod. Toshiba manufactured a 20-mm wide, 10 meter long tape and succeeded in generating 4.4 amperes of critical current in liquid nitrogen temperature, or 110,000 amperes of critical current density per square cm. Meanwhile, Fujikura manufactured a 10-mm wide, 30-meter long tape and succeeded in generating 39 amperes of critical current in liquid nitrogen temperature and achieved 810,000 amperes of critical current density per square cm, the highest current density in the world.

In the past, short wire rods made from oxide yttrium, ranging from 1-cm up to 1-meter, achieved 1,000,000-class amperes of critical current density per square cm in liquid nitrogen temperature. When such wires were made longer, however, the alignment of the crystals became irregular, resulting in the fall of the critical current density. This made practical application difficult.

According to Toshiba, the next-generation wire with high characteristics was manufactured at a speed of 2.5 meters per hour after reinforcing the metal substrate by silver alloys, improving the orientation of silver recrystallisation, devising the excimer bloom, and adopting indirect heating of the metal substrate with a halogen lamp. According to Dr. Hisashi Yoshino, who is in charge of the wire, the production capacity of the facility can be enhanced to 10 meters per hour. According to Fujikura Ltd., the company succeeded in developing the new wire , whose characteristic performance is about twice that of its existing wires and is the highest in the world, by strictly aligning the orientation of crystals in the intermediate layer to be formed on the hastelloy metal substrate. Mr. Takashi Saito, a manager at Fujikura, added that, in order to put the yttrium oxide superconducting wire into practical application, a longer wire must be developed and the manufacturing speed of 4 meters per hour must be raised to 10 meters per hour.

These technological achievements were made by ISTEC (President: Hiroshi Araki) and member corporations, which carried out part of the Superconductivity Applied Key Technology Development Project commissioned by the New Energy and Industrial Technology Development Organization (NEDO) under the Ministry of Economy, Trade and Industry.

(Yasuzo Tanaka, Editor)

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Superconducting Products Guide

-- Companies are in Japanese alphabetical order --

Large-area Superconducting Thin Film and Applied Products

1. Large-area superconducting thin film
- Superconducting Research Dept., Energy and Environment Technology Research Institute, Sumitomo Electric Industries, Ltd.
3-inch, ball; HoBCO laser abrasion film
Phone:+81-6-6466-6539, FAX:+81-6-6466-5705
Kazuya Ohmatsu

2. Superconducting Antenna (under prototype development)
- Dept. of Electrical Engineering, Faculty of Engineering, Yamagata University
HTS antenna
Phone:+81-238-26-3286, FAX:+81-238-26-3293
Shigetoshi Ohshima

3. Superconducting Filter (under prototype development)
- Cryo-Device Co., Ltd.
HTS filter at the receiving end for mobile telecommunications base stations
Phone:+81-5617-2-5573, FAX:+81-5617-2-5575
Nobuyoshi Sakakibara

- Fujitsu Laboratories Limited
High-temperature superconducting filter
Phone: +81-46-250-8261

- Dept. of Electrical Engineering, Faculty of Engineering, Yamagata University
HTS cross-coupled filters
Phone:+81-238-26-3286, FAX:+81-238-26-3293
Shigetoshi Ohshima

Nb-Ti alloy composite superconducting wires

- Superconductor Technology Promotion Dept., Technology Development Division, Hitachi Cable, Ltd.
Conductors for oscillating magnetic fields, conductors for high-energy accelerators
Phone:+81-3-5252-3288, FAX: +81-3-3201-0508
Person in charge: Kunihisa Kamata

- The Furukawa Electric Co., Ltd.
Conductors for high-energy accelerators, conductors for oscillating magnetic field, a variety of copper stabilization Nb-Ti conductors
Superconductive Product Marketing Section, Traffic and Public Marketing Dept.
Phone:+81-3-3286-3161, FAX: +81-3-3286-3686
Person in charge: Yoshikawa, Shimuzu
Superconductor Development Dept., Research and Development Division
Phone:+81-288-54-0504, FAX: +81-288-54-2216
Person in charge: Kimura

- Superconducting Strand Manufacturing Project Group, Nuclear Dept., Power and Industrial System Office, Mitsubishi Electric Corporation
PVF film-insulated superconducting wires, polyimide film insulated tectangular wires, etc.
Phone:+81-427-79-5564, FAX: +81-427-79-5673
E-mail: Hidetoshi.kitakoga@sj.sow.melco.co.jp
Person in charge: Hidetoshi Kitakoga, Project Group Manager

Nb_3Sn Compound Combined Superconducting Wires

- Superconducting Laboratory, Electronics Technology Research Institute, Kobe Steel, Ltd.

Wires for NMR spectrometers, conductors for high magnetic fields
Phone:+81-78-992-5652, FAX: +81-78-992-5650
Person in charge: Takayoshi Miyazaki

- Superconductive Technology Promotion Dept., Technology Development Division, Hitachi Cable, Ltd.
Conductors for high magnetic fields
Phone:+81-3-5252-3288, FAX: +81-3-3201-0508
Person in charge: Kunihisa Kamata

- The Furukawa Electric Co., Ltd.
Wire rods for NMR analytical instruments, conductors for high magnetic fields, CICC strands for nuclear fusion reactors
Superconductive Product Marketing Section, Traffic and Public Marketing Dept.
Phone:+81-3-3286-3161, FAX: +81-3-3286-3686
Person in charge: Yoshikawa, Shimuzu
Superconductor Development Dept., Research and Development Division
Phone:+81-288-54-0504, FAX: +81-288-54-2216
Person in charge: Kimura

- Superconducting Strand Manufacturing Project Group, Nuclear Dept., Power and Industrial System Office, Mitsubishi Electric Corporation
Low hysteresis loss strands for nuclear fusion reactors, high magnetic field current density strands for DC
Phone:+81-427-79-5564, FAX: +81-427-79-5673
E-mail: Hidetoshi.kitakoga@sj.sow.melco.co.jp
Person in charge: Project Leader, Hidetoshi Kitakoga

Bismuthic Silver Sheath Oxide Superconducting Wires

- Inorganic and Metal Material Development Office, Technology Development Center, Showa Electric Wire & Cable Co., Ltd.
Silver-sheathed Bi-2212 wires, silver-sheathed Bi-2223 wires
Phone:+81-42-773-7163, FAX: +81-42-773-7291
Person in charge: Takayo Hasegawa

- Superconducting Research Dept., Energy and Environment Technology Research Institute, Sumitomo Electric Industries, Ltd.
Silver-sheathed Bi-2223 tapes
Phone:+81-6-6466-6534, FAX: +81-6-6466-5705
Person in charge: Kazuhiko Hayashi

Sterling Small Refrigerators

- E&E Group, Energy System Marketing Dept., Aisin Seiki Co., Ltd.
Pulse tube refrigerators, Sterling refrigerators
Phone:+81-566-24-8805, FAX: +81-566-24-8859
Person in charge: Kondo

- Marketing Section, Cryo-Unit Dept., Precision Instrument Division, Sumitomo Heavy Industries, Ltd.
Pulse tube refrigerators
Phone:+81-424-68-4094, FAX: +81-424-68-4254
E-mail: cryo@shi.co.jp
Person in charge: Sakajima, Ishikawa, Kanno, Watanabe

- Semiconductor Equipment Dept., Daikin Industries, Ltd.
Pulse tube refrigerators
Phone: +81-722-41-6111, FAX: +81-722-43-2652
E-mail: hiroyuki.morishita@daikin.co.jp
Person in charge: Hiroyuki Morishita

- Fuji Electric Co., Ltd.
Sterling refrigerators, pulse tube refrigerators
Phone:+81-3-5435-7086, FAX: +81-3-5435-7440
Person in charge: Takayuki Takeuchi

Gifford MacMahon (GM) Small Refrigerators

- E&E Group, Energy System Marketing Dept., Aisin Seiki Co., Ltd.
Pulse tube refrigerators, GM refrigerators

Phone:+81-566-24-8805, FAX: +81-566-24-8859
Person in charge: Kondo

- Marketing Section, Cryo-Unit Dept., Precision Instrument Division, Sumitomo Heavy Industries, Ltd.
4 KGM refrigerators
Phone:+81-424-68-4094, FAX: +81-424-68-4254
E-mail: cryo@shi.co.jp
Person in charge: Sakajima, Ishikawa, Kanno, Watanabe

- Semiconductor Equipment Dept., Daikin Industries, Ltd.
GM-J/T refrigerators
Phone: +81-722-41-6111, FAX: +81-722-43-2652
E-mail: hiroyuki.morishita@daikin.co.jp
Person in charge: Hiroyuki Morishita

- Ultra-Low Temperature Marketing Dept., Special Gas and Ultra-Low Temperature Marketing Division, Taiyo Toyo Sanso Co., Ltd.
Phone:+81-3-3231-9845, FAX: +81-3-3274-6257

- Measurement and Inspection Technology Development Dept., Power and Industrial system Technology Development Center, Toshiba Corporation
4KGM refrigerators
Phone:+81-45-510-6695, FAX: +81-45-500-1427
E-mail: yausmi.ootani@toshiba.co.jp
Person in charge: Yasumi Ohtani

- Magnetism Applied Project Group, Systematic Transformation of Electrical Energy and Traffic System Office, Mitsubishi Electric Corporation
4KGM refrigerators (3-step and 2-step types)
Phone:+81-791-46-2140, FAX: +81-791-46-2368
E-mail: matumoto@ako.melco.co.jp
Contact: Takahiro Matsumoto

Modified-Solvay Small Refrigerators

- Low-Temperature Equipment Dept., Iwatani Industrial Gases Corp.
Phone: +81-6-6303-1165, FAX: +81-6-6304-2170
Person in charge: Yasuji Ochi

- Semiconductor Equipment Dept., Daikin Industries, Ltd.
Phone: +81-722-41-6111, FAX: +81-722-43-2652
E-mail: hiroyuki.morishita@daikin.co.jp
Person in charge: Hiroyuki Morishita

Liquid Helium-Diluted Refrigerators

-Ultra-Low Temperature Marketing Dept., Special Gas and Ultra-Low Temperature Marketing Division, Taiyo Toyo Sanso Co., Ltd.
Phone:+81-3-3231-9845, FAX: +81-3-3274-6257

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Patent Information

Introduced below are the patents recently approved.

"Surface Treatment of $LnBa_2Cu_3O_{7-X}$ Single Crystal Substrate"
(Publication No. 1996-73298, applied in 1994)

This patent defines a method for forming oxides and superconductor epitaxial thin films for superconducting devices on an Ln (Ln = Y, Pr, Sm) oxide superconducting single crystal substrate.

In order to form epitaxial thin films with a PLD and sputtering method, heating the substrates is required. But the both heating processes of the single crystal substrate heating and thin film growth will cause many particles to be produced on the substrate surface.

This invention provides you with a method for suppressing the surface particles and surface roughness on the substrate.

For detail, refer to the Intellectual Property Digital Library (IPDL) through the homepage of the Patent Office of Japan.

- Published Unexamined Patents for the 4th Quarter of Fiscal 2001

Stated below are the ISTEC's published unexamined applications from January to March 2002. For detailed information, visit the homepage of the Patent Office of Japan and check the patent database of IPDL (Intellectual Property Digital Library).

1) Publication No. 2002-9353: " Bicrystal Oxide Superconducting Film and High Temperature Superconducting Josephson Junction Element and Superconducting Quantum Interference Element Using It": This forms LPE superconducting film on a bi-crystal substrate to realize bi-crystal junctions with excellent characteristics.

2) Publication No. 2002-37626: "Method for Manufacturing Bismuth Type High Temperature Superconductor": Adding KCl as flux enables Bi2223 to be fabricated by burning without replacing Bi and Pb.

3) Publication No. 2002-63815: " Oxide Superconductor and Its Manufacturing Method": The new buffer layer on a metal substrate enables to form several- μ-thick superconductive LPE films on the oxide buffer layer.

4) Publication No. 2002-76457: "Perovskite Type Oxide Laminate Film and Its Manufacturing Method": This invention is related to the stacking of perovskite type thin film layers. A newly oxide insetrted barrier enables to prevent the diffusion of metallic elements in the upper and lower perovskite type thin film layers.

5) Publication No. 2002-80297: " Preparing of Oxide Superconductor, Raw Material for Oxide Superconductor, and Preparing Method of Raw Material for Oxide Superconductor": This method refers to the manufacturing of a high Jc superconducting film with the MOD method and its raw materials.

6) Patent Disclosure 2002-94370 " Superconductive Semiconductor Hybrid Integrated Circuit": This method can realize an extremely low-power consumption integrated circuit by inserting a semiconductor circuit between a superconductive circuit and the current bias line.

(Katsuo Nakazato, Director, Research and Development Div., SRL/ISTEC)

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Standardization Activities

Establishing the International Standard IEC 61788-7 "Superconductivity – Electronic characteristic measurements -- Surface resistance of superconductors at microwave frequencies"

The following INTERNATIONAL STANDARD IEC 61788-7 was established in January 2002. This is the 8th international standard following: 1/Superconductivity related terms, 2/Ic of Nb-Ti wires, 3/Ic of Nb_3 Sn wires, 4/Ic of oxide wires, 5/RRR of Nb-Ti wires, 6/Room temperature tensile test of Nb-Ti wires, and 7/copper ratio of Nb-Ti wires.

This standard (popular name: testing method for microwave surface resistance of superconductors) defines a method for testing the surface resistance of superconductors in microwave bandwidth using two standard resonators, and measures the temperature dependency of surface resistance Rs in a resonance frequency. The surface resistance to be applied ranges 8 GHz $< f <$ 30 GHz at the measurement resolution of 0.01m ohm at 10 GHz. The surface resistance will be converted into to surface resistance values converted to 10 GHz by using surface resistance values measured in a frequency and f^2 rules ($f <$ 30 GHz) for comparison.

It has taken over seven years for the standard to be adopted as an international standard. We appreciate the devotion and dedication of the people concerned with internationalization to have carried out the following:

The formation of WG8 (Electronic Characteristics measurement) was proposed on July 15, 1994. The WG8 member list was confirmed on April 22, 1997 (convener: Hisao Hayakawa, professor at Nagoya University). After that, WG8 submitted its first WD on April 24, 1998; submitted its first CD on August 3, 1999; implemented two RRT in 2000; implemented a CVD on August 23, 2000; and transformed into the FDIS stage on July 20, 2002. The WG8 established the international standard in January, 2002.

The standard document is available at:
Yasuzo Tanaka, Standardization Dept., ISTEC 6th Floor, Eishin-Kaihatsu Bldg.,
Shinbashi 5-34-3, Minato-ku, Tokyo 105-0004
Phone: +81-3-3459-9872 FAX: +81-3-3159-9873

Two Japan Industrial Standards (JIS) Announced

The No. 29 special issue of the Government gazette issued on February 20, 2002 announced that the Japanese Industrial Standards Committee enacted the following two standards related to superconductivity as JIS H 7303 and JIS H 7304.

- Superconductivity -- Mechanical properties measurement – Room temperature tensile test of Cu/Nb-Ti composite superconductors: JIS H 7303: 2002

Summary:

This standard defines elasticity coefficients in room temperature, 0.2% proof strength of the composite due to the breakdown of the copper constituent, and the method for testing tensile strength for Cu/Nb-Ti composite superconductors where no insulation film with a round cross-sectional or rectangular cross-sectional area of 0.15 to 2 mm^2 and having a volume ratio of copper to the superconductor ranging 1.0 to 8.0 is facilitated. Note that class-2 0.2% proof strength values due to extended rapture and breakdown of Nb-Ti constituents are for reference only.

- Superconductivity – Matrix to superconductor volume ratio measurement -- Copper to superconductor volume ratio of Cu/Nb-Ti composite superconductors: JIS H 7304: 2002

Summary:

This standard defines how to obtain the volume ratio of copper to superconductor by dissolving copper with nitric acid and obtaining their respective masses and specific gravities for Cu/Nb-Ti composite superconductors, which have a round or rectangular cross-sectional area of 0.1 to 3 mm^2, an Nb-Ti filaments with a diameter of 2 μm to 200 μm, and a copper ratio of 0.5 or more.

These Japanese standards conform to IEC 61788-6: 2000 and IEC 61788-5-: 2000 of the International Electrotechnical Commission (IEC) standards. If you want to get copies of these standard documents , contact the TC90 secretariat of IEC at the following address:

IEC/TC90 Secretariat, ISTEC
Phone: +81-3-3459-9872 FAX: +81-3-3459-9873
E-mail: rc90tanaka@istec.or.jp

Standardization Electronic System (e-JISC) Started in April 20, 2002

An electronic network system was introduced by the Japanese Industrial Standards Committee (JISC) in the Ministry of Economy, Trade and Industry (METI), in order to facilitate JIS-related work, JIS database inspection, and other relevant services. The system has been opened to the public since April 20, 2002. You can also visit the electronic network of IEC.

JISC homepage: http://www.jisc.go.jp/

This network has the following functions:

(1) Browsing: JIS browsing, JIS related information (industrial standardization, conformity appraisal, international standardization, standardization strategy, etc.)

(2) Public comments: Your views and opinions on JIS

(3) Forming JIS original plans: working plan, how to propose original plans, original plan formation template, and original plan forming organization sites, for example the secretariat of the IEC/TC90 Superconductivity Committee (within ISTEC, Phone: +81-3-3459-9872, FAX: +81-3-3459-9873)

(4) ISO/IEC cooperation: ISO/IEC electronic voting process support, IEC site: Web Store, Search iec e-tec, IEV Online, Just Published, e-tech forum.

IEC homepage: http://www.iec.ch/

(Yasuzo Tanaka, Director, Standardization Dept. and Mizue Takezawa, ISTEC)

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

Power Applications

American Superconductor Corporation (May 14, 2002)

American Superconductor Corporation (AMSC) reported fiscal 2002 results for the year ended March 31, 2002. Net revenues for fiscal 2002 were $11.7 million compared with net revenues of $16.8 million for the previous year. The net loss for fiscal 2002 was $57.0 million, or $2.79 per share, compared with a net loss of $21.7 million, or $1.08 per share, for fiscal year 2001. Included in the fiscal 2002 net loss were non-recurring costs of $13.9 million ($0.68/share) related to a restructuring implemented by the Company in March 2002, and to a license from Pirelli Energy Cables & Systems. The Company ended fiscal 2002 with cash, cash equivalents and long-term investments of $68.2 million and no long-term debt, which was expected. Cash use during the year was primarily for the initial build-out of the Company's new HTS wire manufacturing facility.

Greg Yurek, CEO stated, "We achieved many important milestones last year as we continued our transition from a research oriented company to one that is a customer-focused, manufacturing-based business." He added, "As of March 31, 2002 we have orders and contracts for $11million, $8.2 million of which we expect to recognize in our operating results in the current fiscal year. We believe that this beginning backlog, the new organization we have in place and our strong cash position provide a platform from which we can effectively manage the next stages of commercialization of our technologies and products." Yurek concluded, "The restructuring, consolidation and cost-cutting measures we implemented in March will lower our annual operating expenses by approximately $9 million."

News Source:
"American Superconductor Reports Fiscal 2002 Year-end Results" (American Superconductor Press Release; May 14, 2002)
http://www.amsuper.com

American Superconductor Corporation and GE Industrial Systems (May 21, 2002)

American Superconductor Corporation (AMSC) has announced the introduction of its new D-VAR ™ voltage regulation system to its product line-up. AMSC and GE Industrial Systems (GE) plan to jointly market the system to U.S. utilities. AMSC and GE also announced their first sale of a D-VAR system to PacifiCorp, who will use the system to regulate voltage at the Wyoming Wind Energy Project, the largest wind farm in the State of Wyoming.

The D-VAR, or "Dynamic VAR" voltage regulation system is a mobile, distributed power resource that utilizes AMSC's power electronic converters (also used in AMSC's D-SMES product line) to inject precise amounts of continuous and instantaneous reactive power into transmission grids. This enables the grid voltage to be regulated and stabilized. The main difference between D-VAR and D-SMES is that a D-VAR system does not contain a superconducting storage device. The amount of reactive power delivered per unit varies between 4 and 8 megaVARs (MVAR) of continuous power, with an instantaneous reactive power output of up to 18 MVAR per unit.

Voltage regulation systems are critical to wind turbines, since variations in wind patterns can cause large fluctuations in the voltage of the connected power grid, creating grid reliability problems. Wind power generation controls and systems are also sensitive to voltage disturbances caused by events such as capacitor switching, thereby increasing the need for voltage regulation devices. While capacitors can be economically used to create VARs, the high volume of switching that is required in a wind power generator could cause premature failure of the capacitors and capacitor switches, leading to increased maintenance and repair costs. When AMSC's D-VAR is used in conjunction with the capacitors, the D-VAR drastically reduces the number of switching events that are required. However, PacifiCorp decided to use the D-VAR to eliminate these damaging step voltage changes altogether and control local capacitor bank switching. Craig Quist, the transmission planning principal engineer at PacifiCorp stated that "AMSC's D-VAR system was the most cost-effective solution for integrating this wind farm into the regional transmission grid. What really helped was AMSC's forward-looking technical approach to solving the voltage control problem."

The importance of wind energy in the United States is expected to increase as renewable energy solutions are sought. PacifiCorp is projecting that 100,000 MW of wind capacity will be developed in the U.S. by 2020. GE Power Systems has also entered the wind industry with the formation of GE Wind Energy; GE also predicts that wind generation will undergo significant growth in the coming years.

Source:
"American Superconductor and GE Receive Order for New Voltage Regulation System",
"American Superconductor Announces New Transmission Grid Reliability Solution"
American Superconductor Corporation Press Releases (May 21, 2002)
http://www.amsuper.com

Material

Superconductive Components, Inc. (May 10, 2002)

Superconductive Components, Inc. reported US $ 783,379 in revenues for the first three months of 2002, ending March 31, 2002. This represents a 26.1 % decline from the same period in 2001. The company's earnings before interest, taxes, depreciation, and amortization was $1,929 for the first quarter, down from $180,584 for the same period last year. Dan Rooney, President and Chief Executive Officer of Superconductor Components, Inc., explained that the decrease reflects "a substantial slowdown in production orders during the quarter as well as a sharp drop in contract research revenue compared to last year." Sales revenues decreased by 19.7% compared to that for the same period last year, while contract research revenues decreased by 59.4%. The company has increased its emphasis on marketing and its ability to respond to new sales opportunities. As a result, business conditions are expected to stabilize in the second quarter and improve in the last half of 2002.

Source:
"Superconductive Components, Inc. Announces First Quarter Results"
Superconductive Components, Inc. Press Release (May 10, 2002)
http://www.superconductivecomp.com/

Communication

Conductus, Inc. (May 7, 2002)

Conductus, Inc. reported a 55% increase in revenues for the first three months of 2002, ending March 31, 2002. Revenues for the first quarter of 2002 totaled US $ 1,967,000, compared to $ 1,272,000 in revenues for the same period in 2001. This increase was mainly due to an increase in revenues arising from product shipments (up 89% from $ 542,000 for the first quarter in 2001 to $ 1,024,000 for the first quarter in 2002) and, to a lesser degree, an increase in revenues related to government contract activities (up 29% from $ 730,000 for the first quarter in

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2001 to $ 943,000 for the first quarter in 2002). The net loss also decreased from $ 4,497,000 for the first quarter in 2001 to $ 3,870,000 for the first quarter in 2002.
Source:
"Conductus Reports First Quarter Financial Results"
Conductus, Inc. Press Release (May 7, 2002)
http://www.conductus.com/

ISCO International, Inc. (May 8, 2002)

ISCO International, Inc. reported US $ 1,563,000 in consolidated net revenues for the first three months of 2002, ending March 31, 2002. Compared to the $ 512,000 in revenue for the same period in 2001, the present results are a record high for ISCO International. The consolidated net loss also decreased from $ 4,747,000 for the first quarter in 2001 to $ 3,780,000 for the first quarter in 2002. This improvement was mainly due to an increase in gross revenue, an increase in the contribution margin from the mix of products sold, and cost reductions implemented during 2001, including the consolidation of facilities. However, legal expenses increased as a result of an ongoing patent litigation.
Source:
"ISCO International Reports Record Financial Results During the First Quarter 2002"
ISCO International, Inc. Press Release (May 8, 2002)
http://www.iscointl.com/

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

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