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Equipment and Products

A NEW SUPERCONDUCTING LABORATORY MAGNET

A superconducting magnet that generates a magnetic field of 4.6 T at 11 K without requiring liquid helium has been developed jointly by the Institute for Materials Research of Kohoku University and by the Sumitomo Heavy Industries Ltd. The new magnet was made possible by combining a Nb_3Sn superconducting coil and Sumitomo's high–temperature oxide superconductor for the current leads. The superconducting leads made of high–temperature Bi–Sr–Ca–Cu oxide with critical temperature of 110 K eliminated the need for liquid helium. The oxide has a critical current of 1000 A in zero magnetic field at 77 K. Thermal conductivity of the ceramic material is several hundred times less than copper now in wide use. The magnet measures 320 mm in o.d. and 920 mm in height. The system priced at US$125k to US$167k will be initially sold to laboratories and research institutes.

SSR R&D MAGNET REACHES 9.5 TESLA

While the magnet programme for the US Superconducting Supercollider (SSC) moves into its industrial phase, interesting results are still coming from the final phases of magnet research and development work. Recently Fermilab built and tested a full–length R&D SSC magnet. Although it trained a little at temperatures from 2.3 to 4.4 K, when the helium reached superfluid temperatures (1.8 K), the magnet went to very high currents. After three training quenches it reached a plateau 9.5 T at nearly 10 000 A, approximately 95% of the short–sample limit.

TOSHIBA AND SHOWA UNVEIL SUPERCONDUCTING TAPE

A bismuth–based high–temperature superconducting tape that achieves a critical current density of 66 kA/cm^2 at a temperature of 77 K has been developed by Toshiba Corp. jointly with Showa Electric Wire & Cable Co. The new superconductor which surpasses the former record of 53.7 kA/cm^2 by more than 20 per cent is to be used for superconducting magnetic coils for magnetically levitated transport systems and magnetic resonance imaging systems. The new tape conductor is fabricated by the powder–in–tube method. Silver tubes packed with the oxide powder are subjected to drawing, rolling and heat treatment and then pressed, causing them to lengthen and form a tape. The superconducting characteristics of the tape were improved by increasing the density of the oxide, improving the orientation of superconducting grains and reducing the volume of non–superconducting phase. The new superconductor is expected to contribute to practical applications of high–temperature superconductors, replacing metal superconductors cooled by liquid helium.