

New Technology for America's Electric Power Industry

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High-Temperature Superconducting Current Leads

Opportunity

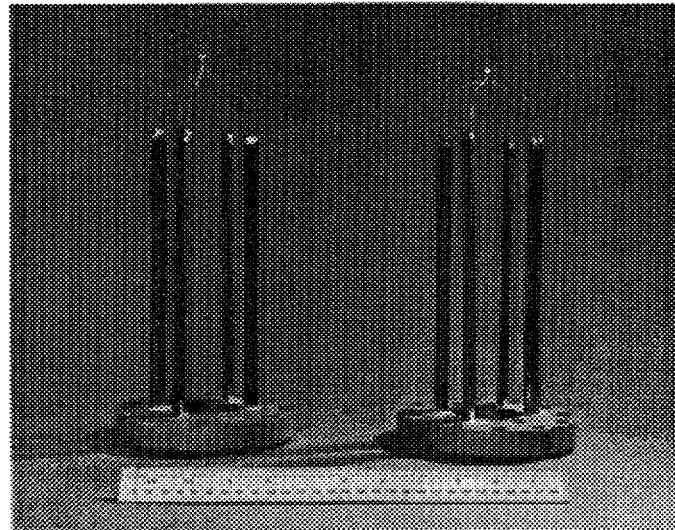
Use of high-temperature superconductors (HTSs) for current leads to deliver power to devices at liquid helium temperature can reduce refrigeration requirements to values significantly below those achievable with conventional leads. HTS leads are near commercial realization.

Description of Work

Argonne National Laboratory has developed a sinter-forge process to fabricate current leads from bismuth-based superconductors. The current-carrying capacity of these leads is five times better than that of HTS leads made by a conventional fabrication process. (An example of an HTS current lead is shown in the photo. Each assembly, shown inverted, was designed to deliver 1500-A AC with less than 0.2 W dissipation at line frequency.)

Current Status

Under the U.S. Department of Energy's Superconductivity Technology Program, Argonne and U.S. industry partners are developing HTS current leads suitable for various commercial applications. In one effort with Superconductivity, Inc., 1500-A HTS leads are being developed for an existing, commercial superconducting magnetic energy storage (SMES) device. With Babcock & Wilcox Co., Argonne is creating 16-kA leads for use in a 0.5-MWh SMES. In a third project, Argonne performed characterization testing of an existing, proprietary conduction-cooled lead being developed by Zer Res Corp.



For More Information, Contact

Ralph C. Niemann

Phone: (708) 252-6156;
Fax: (708) 252-5568

C. Arthur Youngdahl

Phone: (708) 252-5029;
Fax: (708) 252-3604

Michael T. Lanagan

Phone: (708) 252-4251;
Fax: (708) 252-3604

Energy Systems Division
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

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