

Superconducting Power Cable made from Drastically Innovative BSCCO

Wire (DI-BSCCO) fabricated by the CT-OP process

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Abstract

Since 1988, when BSCCO HTS material was discovered in Japan, SEI has been developing the BSCCO wire for real applicable HTS wire. The recently developed CT-OP (controlled over pressure) process made it possible that the wire has extreme characteristics for practical use. The innovation of the Bi-based wire is the turning point for the HTS application to the real application for its user-friendly characteristics.

The Sumitomo CT-OP processed wire, Drastically Innovative BSCCO wire (DI-BSCCO) has greatly improved critical currents (I_c), mechanical properties, anti-ballooning properties and yield of Bi-based wires simultaneously.

The Sumitomo BSCCO wire has been utilized for not only SEI's HTS cable but also world largest HTS magnet for silicon single crystal growth, HTS magnet for magnetic separation, HTS transformer and so on. Recently, DI-BSCCO has made the world first HTS motor cooled by liquid nitrogen possible.

Three Bi-based cable projects, which are in the real network, have started in US under international collaborations. Also, Asian HTS cable projects are on-going in Korea and China. Sumitomo Electric Industries, Ltd. (SEI) is now engaging in the US Albany Project and the Korean project led by KEPRI (Korea Electric Power Research Institute) adopting Sumitomo's 3-core in one cryostat type HTS cable for distribution network.

SEI along with SuperPower Inc., Niagara Mohawk, the BOC Group, is conducting an HTS cable project in Albany, NY, funded by Dept. of Energy and New York State Energy Research and Development Authority (NYSERDA). The 34.5kV-800Arms-350m underground cable will be installed between two substations in the Niagara Mohawk utility grid. In this Project, SEI will develop and produce a Bi-based HTS cable, terminations and a cable joint which demonstrates the utilization of the real power cable longer than several hundred meters.

By KEPRI, SEI has been ordered to provide the 22.9kV-1250Arms-100m HTS cable and install their Gochang Testing Center. The cable will be installed in early summer 2005 and have a long-term maintenance test.

In this 21st century, DC transmission cable system is becoming more and more important to secure the transmission network and to achieve high power transmission with low loss. And HTS cable is most suitable to DC use because of its no resistance for DC.

HTS Cables with Large Transmission Capacity and Low Loss are environmentally friendly, hence indispensable for 21st Century's Power Grid, especially for Renewable Energy and Distributed generation, and the innovated Bi-based wire is leading the HTS cable!