

## **APP1-3**

### **A Study on Temperature Distribution Measurement for a No-Insulation HTS Coil with Encapsulated Optical Fiber Based on Raman-Scattering Technology**

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In high temperature superconducting (HTS) applications, especially for HTS magnets, quench detection before burning out is very difficult, and it is considered as a key issue. As a potential candidate method, the technology based on optical fibers is proposed in recent years, and some progress is shown in HTS quench detection. However, the combination methods between optical fibers and HTS tapes in present study are inapplicable to HTS applications using long length tapes. In this paper, we proposed a novel HTS tape with two encapsulated optical fibers along the two sides to make good contact between the optical fibers and HTS tapes. To verify the feasibility of temperature distribution measurement for this novel HTS tape, a no-insulation coil is fabricated, and also a DTS system based on interrogating Raman-scattering is prepared. The structure of this novel HTS tape is introduced in this paper. Besides, critical currents of the novel HTS tape before and after winding are tested. Moreover, temperature distribution of the no-insulation HTS coil in air and in liquid nitrogen is measured. More specification of the no-insulation coil and the experiment results are presented and discussed in this study.

Keywords: optical fiber, DTS system, temperature distribution, HTS tapes