The Effect of Ag-alloy Sheath on Thermal Conductivity of Bi-2223 Superconductor Tapes

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We evaluated the effect of alloying-element additions to Ag sheathed on thermal conductivity of Bi-2223 superconductor tapes. In order to evaluate the effect of sheath alloys and their configuration on the properties of tape, various combinations of Ag and Ag alloys were selected as the inner and outer sheath. Thermal conductivity of the tapes was measured by using thermal integral method at 10~120 K. It is observed that the presence of alloying-elements in Ag sheath such as Mg, Sb, and Au, results in being decreased thermal conductivity at low temperature. Specifically, the thermal conductivity of AgMg, AgSb, and AgAu at 40 K were 411.4, 142.3, and 109.7 W/(m·K), respectively, which is about 2~9 times lower than that of Ag (1004.6 W/(m·K)). In addition, the thermal conductivity of alloy-sheathed tape was significantly dependent on their values of constituent sheath materials.

keywords : alloys, BSCCO tape, thermal conductivity, thermal integral method