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Tue-Mo-Or8-07: Superconducting joints between Bi2223/Ag tapes towards persistent current HTS magnets

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For realizing HTS magnets equipped with a persistent current circuit, the development of superconducting joints between HTS tapes with enough large current capacity in external magnetic fields is indispensable. On the other hand, the Ag-sheathed Bi2223 (Bi2223/Ag) commercial tapes, DI-BSCCO, show high critical current (I_c) characteristics of ~ 200 A at 77 K in self-field and above 400 A at 4.2 K under high magnetic fields such as 20 T. DI-BSCCO tapes have been widely used for power cables and superconducting magnets for various applications including a high-resolution NMR system, while the practical superconducting joint technology for Bi2223/Ag tapes has not been developed thus far.

In our recent study, a superconducting joint with high I_c above 400 A at 4.2 K in self-field connecting DI-BSCCO tapes was successfully demonstrated [1]. In addition to the improvement in I_c properties for joints including under fields, the design of optimal joint configurations is needed, which enables joint parts to be introduced in the actual superconducting magnet systems. These developments should lead to the realization of persistent current Bi2223/Ag magnets. Based on these backgrounds, the achievement of high joint I_c characteristics under wide temperature and field conditions and in various joint configurations has been aimed in this study. Furthermore, the result of experiments to evaluate joint resistance using circuits with a persistent current loop consisting of DI-BSCCO tapes will also be reported.

[1] Y. Takeda *et al.*, *Appl. Phys. Express* (2019) 023003.

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