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Potential of Superconducting Joints Connecting Bi2223 Tapes

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Recent progress in superconducting joint technologies connecting coated conductors (RE123) [1] had triggered reconsideration of development of superconducting joints connecting Bi2223 tapes.
Through the systematic studies on polycrystalline Bi2223 thick films [2,3] and establishment of polishing technology with very low angle to expose most of the filaments in Bi2223 tapes, we succeeded in the development of high I_c superconducting joints connecting Bi2223 tapes via Bi2223 polycrystalline intermediate layer[4]. Introduction of intermediate pressing and optimization of heat-treatment conditions increased I_c of Bi2223 joints above 100 A at 77 K under self-field and 300 K at 4.2 K in 1 T. Since the predominant factor limiting joint I_c is considered to be critical current properties of Bi2223 polycrystalline intermediate layer and interface between this layer and Bi2223 filaments, further enhancement of joint I_c can be expected by improvements of microstructure and chemical composition. If the joint I_c is increased up to the I_c of Bi2223 tapes, applications as for superconducting magnets with persistent current circuit operating at various temperatures will be realized. In this paper, potential and future prospects of Bi2223 joint technology will be discussed from various viewpoints, such as critical current properties of Bi2223 thick films, effective joint area ratio at the joint interface and possibility of further improvement of J_c-B characteristics of Bi2223 tapes and joints.

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