

High Critical Current Joint of Iron-based Superconducting Tapes

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So far, the significant progresses have been made in iron-based superconductors. Such as, the J_c of Ba-122 wire and tapes have been rapidly improved to 1.5×10^5 A/cm² at 4.2 K and 10 T for short samples [1], and the 100 m class Sr_{1-x}K_xFe₂As₂ (Sr-122) tapes were fabricated last year [2]. However, for large-scale applications, it is very common to connect several pieces of long iron-based superconducting tapes. Hence, superconducting joint is very important for the merits of lowering the total heating generation and persistent current operation. To our knowledge, there was no report on the method of connecting iron-based superconductors. **In this study, a process for fabricating superconducting joints between Sr_{1-x}K_xFe₂As₂ (Sr-122) tapes is developed for the first time** [3]. The Ag sheath was peeled off from one side of each sample. The exposed superconducting parts of the two tapes were joined and wrapped again with Ag foil. The diffusion bonding of the iron-based superconducting joint was achieved by hot-pressing process in Argon atmosphere. The pressure and compressing time were optimized in order to enhance the transport current of the joints. The highest critical current ratio of 63.3% (at 4.2 K in 10 T) is obtained for the Sr-122 joint sample. Furthermore, the superconducting properties, microstructures and the elements distribution of the joint regions have been investigated.

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