

Correlation of the 2223 Percentage Before the First Intermediate Pressing and the Transport J_c of the Fully Processed Bi-2223/Ag Tapes

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Two kinds of multifilament Bi-2223/Ag tapes, which are varied in the precursor calcination temperatures, were heat treated for different time (12, 20, 30, 50, 70, or 100 h) firstly to obtain varied 2223 contents, and then followed by the same pressing and sintering cycles. The relation of the 2223 phase content after the first sintering and the transport J_c of the fully processed tapes was studied. The results show that 75-80% 2223 phase formed in tapes before the first cold pressing is beneficial to get a high J_c in the final tapes. Compensating the total heat treatment time of the tapes first sintered for 20 h to the same length as that first sintered for 50 h in the subsequent sintering stages, different J_c enhancements were observed in these two tapes. No improvement on J_c was found in the tape made from the powder calcined at higher temperature, whereas for the tape prepared with the lower temperature calcined powder, the J_c did increase to the same level as that first sintered for 50 h. The 2223 contents before the intermediate mechanical work is related to the residual reactants, especially to the liquid phase, which is of vital importance to the phase conversion and healing microcracks, meanwhile, to the size and distribution of the non-superconducting secondary phases. The lower temperature calcined powder resulted in slow formation of 2223 phase, but also provided more reactants and liquid phase for the further phase conversion, as a consequence, for the improvement of J_c .

Keywords: Bi-2223/Ag tapes, Sintering time, Phase formation, Critical current density