

# Enhanced Densification in Tl-1223/Ag Tapes Prepared using Pretreated Precursors

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The effects of reacted precursors on phase evolution, microstructure,  $J_c$  and junctional characteristic of the inter-granular contacts were investigated in Ag-sheathed Tl-1223 tapes filled with three kinds of reacted precursors and heat-treated with an intermediate rolling, and compared to those in the tape prepared using an unreacted precursor. The precursors were prepared by heat-treating a mixture of Sr-Ba-Ca-Cu-O,  $Tl_2O_3$ , PbO and  $Bi_2O_3$  powders at 805 (precursor I), 840 (precursor II) and 905 °C (tape III), respectively, for 20 min. Tl-1223 phase content, grain size and  $J_c$  in the tapes were high in an order of precursors I, II and III. Compared to tapes prepared using an unreacted precursor, highly textured tapes were prepared using precursors II and III, and attributed to reduced pore and impurity densities. Also characteristic of inter-granular contacts and fraction of strong-links was improved. The improved properties are attributed to enhanced grain-connectivity resulting from their highly dense morphology. The  $\beta=1.46$  value in  $J_c(T) \propto (1-T/T_c)^\beta$  estimated from ac susceptibilities indicated that the inter-granular contacts are composed of a mixed type of SIS and SNS junctions. A relatively low  $J_c$  of 21,450 A/cm<sup>2</sup> at 77 K and in a self field, compared to that in the tape prepared using an unreacted precursor, was obtained in a tape prepared using precursor III, due to relatively thick thickness of the tape.

key words: Tl-1223/Ag tapes, directional grain-alignment, grain-connectivity; high  $J_c$ ; powder-in-tube method