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Processing of $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_x$ superconductors via direct oxidation of metallic precursors

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$\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_x$ (Bi_2212)/Ag multifilamentary wires are manufactured via the powder-in-tube process using metallic precursors (MP). After deformation, the MP is converted to Bi_2212 by heating in flowing oxygen. Previous results on pellets show that via mechanical alloying, a controlled stoichiometry and homogeneous MP powder was synthesized. The MP powder was then converted to superconducting Bi_2212 through a simple two-step heat treatment. By introducing oxygen at a temperature at which Bi_2212 is a stable phase, and holding at an elevated temperature for a sufficient time, the metallic precursors were oxidized and transformed into Bi_2212 . Here, several factors that impact the formation and growth of Bi_2212 grains are discussed. Furthermore, a multifilamentary wire containing metallic precursors is made, heat treated and analyzed. Results of chemical analysis, transport properties, magnetic behavior, microstructure and phase assemblage of metallic precursors and heat treated wires are reported.

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