

Usefulness of a Low Grade BaCO₃ Powder as a Raw Material for the Fabrication of Y₂BaCuO₅ Excessive YBa₂Cu₃O_{7-y} Superconductors

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To develop a commercially available cost-effect process for YBCO bulk superconductors, the usefulness of a low purity precursor powder was studied. YBa₂Cu₃O_{7-y} (Y123) powders were synthesized by the solid state reaction method using 99.75% BaCO₃ powders and other precursor powders of 99.9% purity. The phase formation and superconducting properties of the sample prepared using low purity BaCO₃ powder were compared with those of the sample prepared using a 99.9% BaCO₃ powder. The melt-processed single grain YBCO bulks for the levitation application were fabricated using two different Y123 powders (the low purity and high purity). The superconducting temperature (T_c) and critical current density (J_c) of melt-processed YBCO samples were not influenced by the purity of BaCO₃ powder. The T_c and J_c values are 90K and 10⁴ A/cm² at 0 T and 77 K, respectively. In addition to the fabrication of stoichiometric Y123 bulk, we have tried to fabricate Y₂BaCuO₅ excessive YBCO bulks by adding Y₂O₃ to Y123 powders. In this study, we report on the effect of purity of BaCO₃ powder on the growth nature of Y123 grain, Y211 distribution inside Y123 grain and the J_c of Y211 excessive YBCO bulks.

Keywords: Purity of BaCO₃, melt growth process, critical current density