

Microstructure and superconducting properties in $GdBa_2Cu_3O_{7-\delta}$ bulk with additives of nano particles

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It is regarded as an effective method to improve the flux pinning performance by the additives of the secondary phase inclusions in nano sizes into high temperature superconductor bulks. We prepared the single domain superconductor $GdBa_2Cu_3O_{7-\delta}$ bulks with variable additions of ($ZnO + ZrO_2 + SnO_2$) nano-particles in air by using top seed melt-textured growth process. The effect of nano-particle additions on superconductivity properties has been investigated. An enhancement of the critical current J_C in low and intermediate field at 77K and trapped field was discovered by the additions of the nano-particles. The microstructure measurements show that the nano-particle inclusions enhance with the increase of the content of nano-particles, which may illuminate the J_C of the specimens.