

The superconductivity of $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ reacted with nano-SiC

ABSTRACT

We report on the influence of nano-SiC as an additive on the superconductivity of polycrystalline $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ (YBCO) prepared via solid state reaction method. In particular, we studied the characteristic of superconducting transition temperature (T_c), crystal structure and microstructure of the YBCO system. X-ray diffraction patterns show the dominance of YBCO (123) phase in all the samples. The a and c axes increase slightly while the b-axis decreases with SiC addition causing the reduced orthorhombicity. Measurements of resistance versus temperature show that the normal state changes from metallic to semiconducting like behavior upon increasing the amount of additive from 1.5 wt.% onwards. The T_c -onset was found to decrease from 91 K for pure samples to 78 K for the 2 wt. % sample attributable to the adverse effect of Si. The broadening in superconducting transition breadth, T_c indicates degraded crystallinity or inhomogeneity in the samples caused by SiC additions.

Keyword: YBCO; Lattice parameters; Superconducting transition temperature