

Fabrication of Superconducting YBCO Nanoparticles by Electrospinning

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ABSTRACT

High temperature superconductor $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ (HTS YBCO) nanoparticle was successfully prepared by electrospinning and sol-gel techniques. The sol-gel containing a homogeneous solutions of the precursor of Y-Ba-Cu acetate and Poly (vinyl pyrrolidone) PVP. The critical transition temperature (T_c) of the samples have been found using four point probe technique. By optimizing electrospinning, sol-gel process and heat treatment procedure, YBCO nanoparticle with a transition temperature of 78 K was obtained. The surface area measurements of YBCO samples showed, high surface area $2.0 \text{ m}^2/\text{g}$ for nanoparticle, in comparison with block sample $1.0 \text{ m}^2/\text{g}$. The structural Characterizations of YBCO samples demonstrated that, the YBCO nanoparticles have single phase orthorhombic structure which typical crowd nanoparticles diameter were 388 nm. The Individual nanoparticle diameter were found between 20 and 50 nm. The calcination temperature at $950 \text{ }^\circ\text{C}$ does not affect to decrease the surface area of YBCO samples. Electrospinning in combination with a sol-gel techniques are an effective routes to realize different nanostructure morphologies of YBCO superconductor. Production of HTS YBCO nanoparticle by these process promising practical applications.

KEYWORDS: Electrospinning; High Temperature; Nanoparticle; Superconductor; YBCO

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