

## Microstructure And Critical Current Density of $\text{YBa}_2\text{Cu}_3\text{O}_{7-x} + \text{BaSnO}_3$ Thick Films Grown with Pre-Mixed Pulsed Laser Ablation Target

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**Abstract** -  $\text{YBa}_2\text{Cu}_3\text{O}_{7-x} + \text{BaSnO}_3$  (BSO) thin films with BSO nanocolumns have been shown to have improved critical current density (JC) in applied magnetic fields. Previously, a sectored target was used to grow thick ( $> 2.5$  mm) YBCO + BSO films. In the present study, a premixed YBCO + BSO (20 mol %) target was used to grow thick films ( $> 3$  mm) to determine if similar high quality thick films can be obtained as with the sectored target approach. In the case of the premixed target, BSO material is continuously supplied as opposed to the sectored target method. YBCO + BSO thick film samples processed using a premixed target were also found to have high JC at high fields with  $J_c > 10^4$  A/cm<sup>2</sup> at 8 T at 77 K, whereas typical YBCO films carry only  $10^2$  A/cm<sup>2</sup>. Transmission electron microscopy (TEM) on these films indicated that BSO nanocolumns with a diameter of  $\sim 8$ -11 nm extend through the thickness of the films. The critical transition temperature ( $T_c$ ) for the films was found to be  $\sim 87$  K, regardless of thickness.

**Keywords** - high-temperature superconductors,  $\text{BaSnO}_3$ , critical current density, superconducting transition temperature,  $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ .

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