

## Growth Mechanism and Morphology of Melt-processed $Y_{1.5}Ba_2Cu_3O_x$ with $BaCeO_3$ Addition

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To study the effect of second phase addition on the pinning properties of melt-textured YBCO,  $BaCeO_3$  added to  $Y_{1.5}Ba_2Cu_3O_x$  oxides were prepared by melt processing.  $BaCeO_3$  powder with various compositions (5, 10, 15, 20, 25 wt.%) was mixed with  $Y_{1.5}Ba_2Cu_3O_x$  (YBCO) powder and then melt-textured.

The critical improvement in the superconducting properties was observed with the  $BaCeO_3$  addition to  $Y_{1.5}Ba_2Cu_3O_x$  as compared to the undoped sample. With the increase of doping level up to 5, 10, 15, 20 and 25 wt.%, the entire microstructure is strongly affected - a high density of submicron size Y211 inclusions and the enhancement of critical current density ( $J_c$ ) at 77 K were observed. Size refinement as well as uniform distribution of Y211 particles was observed with the increase of  $BaCeO_3$  addition. It was also found that the number of pores decreased with the increase of  $BaCeO_3$  addition. The improvement of  $J_c$  with the increase of  $BaCeO_3$  addition, are believed to come from the local Y211 refinement, partial Ce substitution in the Y123 matrix structure and the control of pore density.

Keywords: melt textured YBCO,  $BaCeO_3$  effect, microstructure and critical current density

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