INVITED

Effect of Calcium Doping in Low Angle Grain Boundaries of $YBa_2Cu_3O_{7-\delta}$ on Textured Metal Substrates

B.W. Kang*, A. Goyal, F.A. List, D.F. Lee, D. M. Kroeger, P.M. Martin, D.K. Christen, and S. Sathyamurthy

Oak Ridge National Laboratory, Oak Ridge, TN 37831, U.S.A.

**National Creative Research Initiative Center for Superconductivity and Department of Physics, Pohang university of Science and Technology, Pohang 790-784, Republic of Korea*

It has been known that grain boundaries (GB) in $YBa_2Cu_3O_{7-\delta}$ (YBCO) superconducting thin films are depleted of carriers compared to the bulk and this depletion limits the critical currents in superconductor. Partial replacement of yttrium in YBCO with Ca has been used to increase GB critical current density substantially, but only at temperatures much lower than 77 K. Recently, significantly improved grain boundary behavior at 77 K has been reported in YBCO/$Y_{0.7}Ca_{0.3}Ba_2Cu_3O_{7-\delta}$ multilayer structures on 24° [001] tilt GBs. Encouraged by this success, GB doping with Ca has been conducted in YBCO thin films grown on the Rolling-Assisted Biaxially Textured Substrates (RABiTS) with 6-8° GBs. Bilayer and trilayer structures of YBCO/$Y_{1-x}Ca_xBa_2Cu_3O_{7-\delta}$ have been fabricated as well as pure YBCO and fully Ca-doped YBCO for comparison. Critical currents are measured over a wide field and temperature range. The effect of Ca doping in low angle GB will be discussed.

Keywords: YBCO, grain boundaries, calcium doping, critical current density