

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Magnetic field-orientation independence of large basal-plane critical currents in RBCO films with correlated pinning nanostructure¹

DAVID CHRISTEN, Y.L. ZUEV, Oak Ridge National Laboratory, S.H. WEE, University of Tennessee, A. GOYAL, C. CANTONI, Oak Ridge National Laboratory, C. TARANTINI, A. GUREVICH, D. LARBALESTIER, Florida State University — It has been widely confirmed that self-assembled columnar stacks of second-phase precipitates aligned near to the c -axis provide strong flux pinning in RBCO epitaxial films. Such growth-controlled nanostructures can be produced by at least two different deposition techniques and for several species of oxide precipitates. For many of these systems, the usual dependence of in-plane critical current densities, J_c , on field-orientation nearly vanishes at a specific temperature-dependent field, $B^*(T)$. The phenomenon can be described by a competition between intrinsic electronic anisotropy and orientation-dependent pinning. A simple model parameterizes the effect through the dependencies $H_{irr}(\theta)$ and the power-law decay exponent $\alpha(\theta)$, where $J_c \propto H^{-\alpha}$ in the intermediate field regime. Limits to and fundamental aspects of the model with respect to these parameters will be discussed.

¹Research sponsored by the U.S. Department of Energy - Office of Electricity Delivery and Energy Reliability and by the Office of Science, Division of Materials Sciences and Engineering.

David Christen
Oak Ridge National Laboratory

Date submitted: 15 Dec 2008

Electronic form version 1.4