Contribution ID: **389** Type: **Contributed Oral Presentation**

Towards isotropic vortex pinning in YBCO films with BHO-Y2O3 and BZO-Y2O3 artificial pining centers

Wednesday 12 July 2017 11:45 (15 minutes)

Strong and isotropic vortex pinning landscape is demanded for high field applications of high temperature superconductor (HTS) thin film. Double-doping (DD) of different kinds of artificial pinning centers (APCs) has been identified as a promising approach to generate such a pinning landscape. This work presents a systematic study on the critical current density Jc(H, θ) of 3%Y2O3+2-6 vol.% BZO (BZO DD) and 3%Y2O3+ 2-6 vol.% BHO (BHO DD) films deposited at their optimal growth conditions. The goal is to elucidate the effect of the secondary APC Y2O3 nanoparticles on the alignment of the BZO and BHO nanorods of comparably diameters and the consequent Jc (H, θ) behavior. Intriguingly, a much enhanced isotropic pinning was observed in BHO DD samples. For example, at 65 K and 9T, the variation of the Jc across the entire θ range from θ=0 (H//c) to θ=90 degree (H//ab) is less than 18 % for BHO DD film, in contrast to about 100% for the BZO DD counterpart. Since the two samples have comparable Jc values at H//c and the larger Jc variation in the latter is primarily caused by the reduced Jc in the larger θ>40 deg especially at θ=90 deg (H//ab), the improved isotropic pinning in the BHO DD samples illustrates the higher tunability of the APC microstructure using secondary APCs.

Authors: GAUTAM*1, Bibek (1Department of Physics and Astronomy, University of Kansas, Lawrence, Kansas 66045, USA); SEBASTIAN2, Mary Ann (2U.S. Air Force Research Laboratory, Propulsion Directorate, WPAFB, OH 45433 USA); CHEN1, Shihong (1Department of Physics and Astronomy, University of Kansas, Lawrence, Kansas 66045, USA); HAUGAN2, Timothy (2U.S. Air Force Research Laboratory, Propulsion Directorate, WPAFB, OH 45433 USA); XING3, Zhongwen (3College of Engineering and Applied Science, Nanjing University, Nanjing, Jiangsu 210093, China); WU*1, Judy (1Department of Physics and Astronomy, University of Kansas, Lawrence, Kansas 66045, USA)

Presenter: GAUTAM*1, Bibek (1Department of Physics and Astronomy, University of Kansas, Lawrence, Kansas 66045, USA)

Session Classification: M3OrC - Focused Session: Latest Development in Flux Pinning III: Pinning, Critical Currents & Creep in HTS