Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Irradiation-induced enhancement of the Critical Current of $YBa_2Cu_3O_{7-\delta}$ Coated Conductors U. WELP, Materials Science Division, Argonne National Laboratory, M. P. SMYLIE, W. K. KWOK, Argonne National Laboratory, Y. ZHANG, SuperPower Inc., P. M. NIRAULA, A. KAYANI, Western Michigan University — We investigate the enhancement of the critical current density J_c of production-line REBCO coated conductors containing Barium Zirconate (BZO) nanorods due to irradiation with MeV oxygen and copper ions along the c-axis. In magnetic fields exceeding 2 T J_c is substantially enhanced upon irradiation approaching doubling at 6 T ||c and 5 K. In low fields, irradiation causes a suppression of J_c. However, we find that off-c-axis irradiation reduces the suppression of Jc at low fields while maintaining enhancements in high fields. Irradiation-induced enhancement of J_c opens an industrially viable approach to address the challenge in HTS conductor development, namely their greatly reduced performance in even modest applied magnetic fields. The major effect of the irradiation-induced defects is the reduction of the in-field suppression of J_c, which we attribute to the mixed pinning landscape composed of strong pre-existing pin sites (BZO nanorods) and the finely dispersed irradiation-induced defects. This work was supported as part of the Center for Emergent Superconductivity, an EFRC funded by the U.S. Department of Energy, Office of Science, Office of Basic Energy Sciences.

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Date submitted: 11 Nov 2016 Electronic form version 1.4