Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Rapid Doubling of the Critical Current of $YBa_2Cu_3O_{7-\delta}$ Coated Conductors. U. WELP, M. LEROUX, K. J. KIHLSTROM, Argonne National Laboratory, S. HOLLEIS, Technische Universitaet Wien, Austria, M. W. RUPICH, S. SATHYAMURTHY, S. FLESHLER, American Superconductor Corp., H. P. SHENG, D. J. MILLER, Argonne National Laboratory, S. ELEY, L. CIVALE, Los Alamos National Laboratory, P. M. NIRAULA, A. KAYANI, Western Michigan University, W. K. KWOK, Argonne National Laboratory — We demonstrate the doubling of the critical current density of production-line REBCO coated conductors (CCs) in fields of 6 T ||c at 27 K by irradiation with a 3.5-MeV oxygen ion beam. This doubling of Jc is achieved within one second or less opening an industrially viable approach to address a persisting challenge, namely the greatly reduced performance of CCs in even modest applied magnetic fields. TEM images reveal that the enhanced critical current is due to finely dispersed small clusters approximately 5 nm in diameter. The major effect of the irradiation-induced defects is the reduction of the field-dependence of Jc, which we attribute to the mixed pinning landscape composed of strong pre-existing pin sites and the finely dispersed irradiation-induced defects. Work supported by the Center for Emergent Superconductivity, an EFRC funded by the U.S. Department of Energy, Office of Basic Energy Sciences. Patterning and microstructural characterization were performed at the Center for Nanoscale Materials, an Office of Science user facility, supported by the Office of Basic Energy Sciences, under Contract No. DE-AC02-06CH11357.

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Date submitted: 06 Nov 2015 Electronic form version 1.4