Abstract Submitted
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Enhancement of critical current through oxygen irradiation in optimized 2G superconducting coated conductors KAREN KIHLSTROM, Argonne National Laboratory, University of Illinois at Chicago, M. LEROUX, U. WELP, W-K. KWOK, A.E. KOSHELEV, Argonne National Laboratory, G.W. CRABTREE, Argonne National Laboratory, University of Illinois at Chicago, M.W. RUPICH, S. FLESHLER, A.P. MALOZEMOFF, American Superconductor Corp, A. KAYANI, Western Michigan University, CES COLLABORATION — We demonstrate the strong enhancement of the critical current density, Jc, of commercial coated conductors (CC) in high magnetic fields using 3 MeV oxygen irradiation. The rapid suppression of Jc of coated conductors in magnetic fields remains a barrier for application of CCs in motors, generators, transformers, solenoids, and MRI systems. Using TRIM simulations, we determined that 3-MeV O-ions produce an essentially uniform defect distribution in bare CC at a rate that is $\sim$ 2500 faster than that achieved with proton irradiation. Irradiating with 3 MeV O-ions to a dose of 1x10^{13} O-ions/cm^2 generates a near doubling of the critical current at low temperatures: at 5K, 5T, we enhanced the critical current from 6.4 MA/cm^2 to 12.2 MA/cm^2. This dose can be achieved in a couple of seconds, thus this irradiation technique could be incorporated into a viable reel-to-reel production process. This work supported by the Center for EmergentSuperconductivity, an Energy Frontier Research Center funded by the U.S. D.O.E., Office of Science, Office of Basic Energy Sciences (K.K, M.L.,A.K) and by the D.O.E, Office of Basic Energy Sciences, under Contract No. DE-AC02-06CH11357 (U.W., W.K.).

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