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Irradiation of commercial, high-T_c superconducting tape for potential fusion applications: electromagnetic transport properties NATHAN T. GREENWOOD, ALBERT A. GAPUD, JESSICA A. ALEXANDER[1], AURANGZEB KHAN, University of South Alabama, KEITH J. LEONARD, TOLGA AYTUG, FREDERICK A. LIST III, YANWEN ZHANG, Oak Ridge National Laboratory — Samples of commercially available thin-film tapes based on the high-temperature superconductor $YBa_2Cu_3O_x$ (YBCO) have been ion-irradiated under conditions approximating that of neutron irradiation to investigate these materials for potential fusion magnet applications. Effects on supercurrent transport and vortex dynamics were studied. Three different levels of irradiation damage were applied to films that had been produced by three different processes that utilize the inclusion of nanostructures to produce different defects for pinning – the immobilization of supercurrent vortices (magnetic flux quanta, to which applied current exerts a Lorentz force, causing dissipative motion; thus rendering the sample non-superconducting.) As such, the effect of irradiation on these pinning-effective defects is of interest. We examined normal state resistivity, residual resistivity, critical temperature, field dependence of critical current density J_c, the irreversibility line, and vortex creep rate – for Hparallel to the c axis. Preliminary results show improved radiation tolerance over other YBCO materials for comparative irradiation conditions, with no detrimental effects on J_c, and in one case have even enhanced it over a broad range of fields. Details as to the role of various nanostructures shall be discussed.

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