Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Effect of ion irradiation and annealing on scattering processes in MgB2 RAGHURAM GANDIKOTA, RAKESH SINGH, JIHOON KIM, BARRY WILKENS, NATHAN NEWMAN, JOHN ROWELL, Arizona State University, ALEXEJ POGREBNYAKOV, XIAOXING XI, JOAN REDWING, SHENGYONG XU, QI LI, Pennsylvania State University, BRIAN MOECKLY, Superconductor Technologies Inc. — The effect of point defects introduced by ion irradiation on Tc, resistivity, and Hc2 of MgB2 films was studied. We will show that ion induced disorder in films with different as-made disorder, followed by annealing, offers advantages in the study of Hc2 of MgB2 films. Films, from three deposition processes, were damaged by 2 MeV alpha particles, followed by annealing after Tc was reduced to <10K. Damage increases Hc2 (0) in clean films, resulting in maxima (∼34T) near Tcs of 33K, for fields parallel to the film. For Tcs from ∼25K to below 10K, Hc2(0) decreases almost linearly with Tc. Annealing the films, after Tc has been reduced below 10K, reproduces the resistivity value but not the Hc2(0), for a given Tc. These results suggest that Tc is reduced by smearing of the density of states, and that the measured resistivity and Hc2 are determined by scattering in pi and sigma bands respectively.

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Date submitted: 30 Nov 2005 Electronic form version 1.4