Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Introduction of Carrier Scattering in MgB2, and its Effect on both Normal and Superconducting Properties, especially Hc2 N. NEWMAN, Y. SHEN, R. SINGH, J. ROWELL, ASU, D. LARBALESTIER, F. HUNTE, FSU — The low Hc2 values seen in pure and well ordered MgB2 can be raised dramatically, to 35 T or more, by introducing carrier scattering by native and impurity defects. We describe three means to do this. First, He ion irradiation is used to tune Tc from 39K to less than 10K, while at Tc near 33K, Hc2 reached a maximum value. Similar behavior has been reported for neutron damage and carbon doping. Second, we introduced oxygen in the films, either in-situ or ex-situ, and again, high Hc2 values were seen and in these films, very high Jc values as well. Finally, a novel route has been investigated. We deposited MgB2 films on room temperature substrates, then annealed at temperatures just sufficient to produce crystallinity, giving Tcs in the range of 10 to 30K. Such films exhibit large dHc2/dT values near Tc, sometimes larger than 2 T/K. This work is of practical importance and gives an improved understanding of how intraband and interband carrier scattering in the "2-gap" superconductor MgB2 determine its Hc2, resistivity and Tc.

N. Newman
ASU

Date submitted: 14 Dec 2007 Electronic form version 1.4