Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Probing 2-band superconductivity of Al and C-substituted MgB2 with heat capacity measurements ANTONIO J. ZAMBANO, LANCE COOLEY, ARNOLD MOODENBAUGH, Material Science Department, Brookhaven National Laboratory, Upton NY, 11973 — We study the changes in the heat capacity Cp(T) in $Mg_{1-x}Al_xB_2$ ($x \leq 0.19$) and $Mg(B_{1y}C_y)_2$ ($y \leq 0.08$). The two band model is used to fit Cp(T) and extract the two energy gaps and electron-phonon coupling matrix for the different dopant concentrations. These fitting routines are sensitive to background subtraction, and we discuss what constraints this places on sample quality and preparation. Like previous results, fits for Al doping do not indicate merging of the gaps, suggesting Al does not increase interband scattering. However, we also notice trends that are different from those seen in previous experiments, which we also discuss. For instance, the main peak due to the sigma band does not smear with increasing Al content, but remains fairly abrupt. Other characterization suggests the Al doped samples are of very high quality. Results for C doping are also discussed in terms of filling the sigma band hole states with electrons and increased interband scattering.

Lance Cooley
Material Science Department, Brookhaven National Laboratory
Upton NY, 11973

Date submitted: 14 Dec 2004 Electronic form version 1.4