Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Carbon and Aluminum Doping in MgB_2. Similarities and differences PETER SAMUELY, PAVOL SZABO, ZUZANA HOLANOVA, Centre of Low Temperature Physics IEP Slovak Academy of Sciences, SK-04001 Kosice, Slovakia, MANUEL ANGST, RUDEGER WILKE, SERGEY BUD'KO, PAUL CANFIELD, Ames Laboratory and Iowa State University, Ames, IA 50011, USA — Both carbon and aluminum dope the magnesium diboride by one extra electron which leads to filling of the most important σ band and decreasing of the transition temperature. The point-contact spectroscopy in magnetic field is used to address the evolution of two superconducting energy gaps and density of states in the doped systems with T_c's from 39 to 22 K. The similarities and differences in the inferred *interband* and *intraband* scatterings introduced by these two substitutions are discussed. It is shown that the two gap superconductivity is retained in all studied cases. The carbon doping is effective in increasing of the intraband scattering mainly in the π band. This leads to important enhancement of the upper critical field. The approaching of two gaps is stronger in the Al-doped systems but the interband scattering is yet not large enough to merge two gaps. The full merging can be expected only for higher dopings, in the samples with T_c's below 10 – 15 K. Al substitution does not affect strongly the intraband scattering leaving the samples in the clean limit.

Peter Samuely
Centre of Low Temperature Physics IEP
Slovak Academy of Sciences, SK-04001 Kosice, Slovakia

Date submitted: 27 Nov 2006 Electronic form version 1.4