Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Vortex pinning in single crystal CaC_6 ULRICH WELP, DANIEL ROSENMANN, RUOBING XIE, DAVID HINKS, HELMUT CLAUS, GORAN KARAPETROV, JOHN SCHLUETER, WAI-KWONG KWOK, Argonne National Laboratory, Argonne, IL 60439, LISA PAULIUS, Western Michigan University, Kalamazoo, MI 49008 — Crystals of the new graphite intercalation superconductor CaC_6 were synthesized in a liquid transport process in which graphite single crystals are exposed to an eutectic Ca-Li melt at 350 °C. The resulting samples displayed a sharp superconducting transition at 11.6 K. X-ray diffraction reveals the rhombohedral CaC_6 structure with no indication of graphite second phases. The phase diagram and the vortex pinning properties were determined using magnetization and Hall magnetometry measurements. The irreversibility line for fields applied along the c-axis lies close to the upper critical field and displays down to temperatures of 2 K a linear temperature dependence with a slope of about -230 G/K. An analysis based on the Bean critical state model yields a critical current density of 10^4 A/cm^2 at 4.5 K and zero field. The effect of particle irradiation on the flux pinning properties of CaC_6 will be presented. This work was supported by the US Department of Energy, BES-Materials Sciences, under Contract DE-AC02-06CH11357.

Ulrich Welp
Argonne National Laboratory

Date submitted: 30 Nov 2006 Electronic form version 1.4