

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Anisotropic Superconducting Phase Diagram of C₆Ca¹ ULRICH WELP, R. XIE, D. ROSENMANN, A. RYDH², H. CLAUS, G. KARAPETROV, W. K. KWOK, Materials Science Division, Argonne National Laboratory, Argonne, IL 60439 — We present a study of the anisotropic superconducting phase diagram of the new carbon intercalation superconductor C₆Ca employing magnetization and specific heat measurements. The intercalation of Ca into flakes of natural graphite takes place through vapor transport at temperatures near 500 °C. The resulting crystals display an onset of superconductivity at 11.3 K and a transition width of about 1 K as seen in heat capacity and low-field magnetization measurements. A clear step in the heat capacity confirms the bulk nature of the superconducting state. Roughly 1/3 to 1/2 of the sample volume is superconducting as evidenced by the reduced step height of the heat capacity. From measurements of the upper critical field, H_{c2}, we determined an in-plane coherence length of $\xi_{ab} \approx 36$ nm. The angular dependence of H_{c2} is well described within the model of effective mass anisotropy yielding an anisotropy parameter of $\Gamma \approx 3.5$ to 4.

¹This work was supported by the U.S. Department of Energy under grant no. W-31-109-ENG-38

²present address: Stockholm University, Albanova, SE-10691, Sweden

Ulrich Welp
Argonne National Laboratory

Date submitted: 29 Nov 2005

Electronic form version 1.4