

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Evolution of Anomalous Angular Dependence of H_{c2} in $\text{CaAl}_{1-x}\text{Ga}_x\text{Si}$ TSUYOSHI TAMEGAI, KENTARO UOZATO, MASASHI TOKUNAGA, Department of Applied Physics, The University of Tokyo, UNIV. OF TOKYO TEAM — In CaAlSi , the angular dependence of the upper critical field, $H_{c2}(\theta)$, shows an anomalous cusp when the field is applied parallel to the superconducting layer. $H_{c2}(\theta)$ can be reasonably well fitted by the Tinkham model for thin film superconductors. On the other hand, $H_{c2}(\theta)$ in CaGaSi does not show such an anomaly. Concomitant with these features, a lattice modulation along the c -axis exists only in CaAlSi . We have grown single crystals of the alloy $\text{CaAl}_{1-x}\text{Ga}_x\text{Si}$, and studied the evolution of the anomalous angular dependence of H_{c2} and the superstructure. The superstructure is sustained at least up to $x = 0.2$, although the period of the modulation changes from $\sim 6c$ to $\sim 3c$. On the other hand, the cusp-like feature in $H_{c2}(\theta)$ is strongly suppressed by the Ga substitution, and only evident at low temperatures. We have also investigated the homogeneity of the crystal by inspecting the vortex penetration using magneto-optical technique. We have found an inhomogeneous penetration of vortices along the superconducting plane in the ac plane, suggesting the presence of modulation of superconducting parameters. Based on these results, we will discuss the origin of the anomalous $H_{c2}(\theta)$.

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Date submitted: 26 Nov 2005

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