The magnetic phase diagram of single-crystal antiferromagnetic Ce$_2$Fe$_{17}$

Y. JANSSEN$^1$, Y. A. MOZHARIVSKYJ$^{1,2}$, S. JIA$^{1,3}$, P. C. CANFIELD$^{1,3}$, Ames Laboratory$^1$, Dept. of Chemistry$^2$, Dept. of Physics and Astronomy$^3$, Iowa State University — The binary intermetallic compound Ce$_2$Fe$_{17}$ crystallizes in the rhombohedral Th$_2$Zn$_{17}$-type structure. Unlike other R$_2$Fe$_{17}$ (R=rare earth), which are ferro- or ferrimagnetic, Ce$_2$Fe$_{17}$ displays antiferromagnetic behavior below its ordering temperature of $\sim$ 215 K. At lower temperatures, a second transition takes place, to an antiferromagnetic state for pure, and a ferromagnetic state for impure (e.g. Ta doped) Ce$_2$Fe$_{17}$. For antiferromagnetic samples, the lower temperature transition is accompanied by a feature in the resistivity that is consistent with the formation of a superzone gap. This study focuses on single crystals of pure Ce$_2$Fe$_{17}$. As a first step, the magnetic phase diagram for antiferromagnetic Ce$_2$Fe$_{17}$ has been determined by means of magnetization and resistance measurements. Ames Laboratory is operated for the US Department of Energy by Iowa State University under contract number W-7405-ENG-82.

Y. Janssen
Ames Laboratory

Date submitted: 30 Nov 2004  Electronic form version 1.4