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**Magnetic, thermodynamic and transport properties of $GdFe_2(Al_xZn_{1-x})_{20}$**[1] M. LAMPE, N. NI, S. JIA, G.D. SAMOLYUK, A.S. SEFAT, S.L. BUD'KO, P.C. CANFIELD, Ames Lab / Iowa State University — The unusual physical properties of the dilute, rare-earth-bearing, intermetallic compound $GdFe_2Zn_{20}$ have been explained as being the result of the $Gd^{3+}$ moment being embedded in a nearly ferromagnetic Fermi liquid. To understand this in detail, single crystals of the pseudo ternary series $GdFe_2(Al_xZn_{1-x})_{20}$(x $\leq$0.07) and $YFe_2(Al_xZn_{1-x})_{20}$(x $\leq$0.05) were grown out of Zn-rich solution. Magnetization, heat capacity and resistivity measurements on these compounds reveal a decrease of $T_c$ from 86 K (x = 0) to 4 K (x = 0.07) for $GdFe_2(Al_xZn_{1-x})_{20}$ and a decrease of the Stoner enhancement factor, Z, from 0.88 (x = 0) to 0.35 (x = 0.05) for $YFe_2(Al_xZn_{1-x})_{20}$. Rigid band approximation and TB-LMTO-ASA calculation are used to explain this trend. These results, combined with earlier studies of the substitution of Co for Fe clearly indicate the importance of band filling and the applicability of even a simple rigid band model, to these compounds.

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