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Ferromagnetism in Melt-spun $\mathbf{Gd_{0.946}Fe_{0.054}}$[1] PAUL SHAND, NICHOLAS JENSEN, JUSTIN BOHNET, University of Northern Iowa, JARED GOERTZEN, JEFFREY SHIELD, University of Nebraska-Lincoln, DAVID SCHMITTER, Providence College, GEOFFREY SHELBURNE, DIANDRA LESLIE-PELECKY, University of Nebraska-Lincoln — The ac susceptibility and dc magnetization at various temperatures have been measured for a melt-spun $Gd_{0.946}$ $Fe_{0.054}$ alloy. The grain size was ≈100 nm. A sharp paramagnetic-to-ferromagnetic transition was observed at a temperature close to that of pure Gd. Effective critical exponents and the critical temperature T_C were extracted by using modified Arrott plots and Kouvel-Fisher analysis. The values obtained were $\beta_{eff} = 0.398 \pm 0.004$, $\gamma_{eff} = 1.24 \pm 0.02$, $\delta_{eff} = 3.83 \pm 0.05$, and $T_C = 290.25 \pm 0.17$ K. These exponent values do not satisfy the Widom scaling relation $\beta\delta = (\beta+\gamma)$. The β_{eff} and γ_{eff} values for ms-$Gd_{0.946}$ $Fe_{0.054}$ are similar to those obtained for pure Gd in the same temperature interval around T_C. This is in consonance with x-ray microanalysis measurements indicating that the grains are nearly pure Gd. The lower-than-expected value of δ_{eff}g may be due to the effect of increased anisotropy due to the presence of Fe in the grain-boundary regions.

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