Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Magnetic Hardening of $Ce_2Fe_{14-x}Co_xB$ J.F. HERBST, E.J. SKOUG, M.S. MEYER, F.E. PINKERTON, GM R&D Center — Permanent magnets based on $R_2Fe_{14}B$ (R = rare earth element) are essential to a wide variety of applications, among them automotive traction motors. Current state-of-the-art materials rely on R = Nd and Dy, both of which are currently subject to supply and cost instability. A possible alternative is R = Ce, the most abundant rare earth, but $Ce_2Fe_{14}B$ has several disadvantages, including a low Curie temperature (T_c) that restricts the maximum operating point to well below that required for some applications. Given that substitution of Co for Fe is known to enhance T_c significantly in other $R_2Fe_{14}B$ compounds, we systematically investigate magnetic hardening of $Ce_2Fe_{14-x}Co_xB$ by melt spinning alloys having compositions guided by our previous work on the Ce-Fe-B system. We find the range of Co solubility in $Ce_2Fe_{14}B$ to be markedly lower than for other $R_2Fe_{14}B$ materials, a consequence of the fact that $Ce_2Co_{14}B$ apparently does not form.

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Date submitted: 05 Nov 2012 Electronic form version 1.4