Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

**First-Order Magnetostructural Phase Transition in $AlFe_2B_2$** BRIAN LEJEUNE, RADHIKA BARUA, Department of Chemical Engineering, Northeastern University, Boston, MA 02115, ENRIC STERN-TAULATS, LLUIS MANOSA, ANTONI PLANES, Departament d'Estructura i Constituents de la Matèria, Facultat de Física. Universitat de Barcelona, 08028 Barcelona, Catalonia, POL LLOVERAS, Departament de Física i Enginyeria Nuclear, ETSEIB, Universitat Politècnica de Catalunya, 08028 Barcelona, Catalonia, L.H. LEWIS, Departament d'Estructura i Constituents de la Matèria, Facultat de Física. Universitat de Barcelona, 08028 Barcelona, Catalonia — Understanding correlations between composition and crystal structure is key to tailoring the response of functional magnetic materials. In particular, the ferromagnetic $AlFe_2B_2$ compound with the layered $AlMn_2B_2$-type structure is reported to exhibit a magnetic transition of relevance for magnetocaloric cooling, with a reported entropy change $\Delta S \sim 4$J/kg-K at an applied magnetic field of 2 T1.[1] New results derived from magnetic, structural and calorimetric probes confirm a thermodynamically first-order magnetic phase change in $AlFe_2B_2$ in the vicinity of the Curie temperature of ∼300 K. The transformation from the ferromagnetic to the paramagnetic state is accompanied by a non-uniform 1% unit cell volume expansion upon heating, signifying that application of magnetic field is anticipated to have a similar effect (stabilizing the ferromagnetic phase) as the application of chemical or hydrostatic pressure. Relevant barocaloric effects are expected in this compound.

[1]X. Tan et al., J. Am. Chem. Soc., 135(2012) 9553.

Brian Lejeune
Department of Chemical Engineering, Northeastern University,
Boston, MA 02115

Date submitted: 12 Nov 2014 Electronic form version 1.4