Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Miscibility gap between $BaMn_2As_2$ and $BaFe_2As_2$[1] ABHISHEK PANDEY, DAVID C. JOHNSTON, Ames Laboratory and Department of Physics and Astronomy, Iowa State University, Ames, Iowa 50011 — $BaMn_2As_2$ and $BaFe_2As_2$ both crystallize at room temperature in the same tetragonal $ThCr_2Si_2$-type structure but with divergent unit cell volumes of 234.12 and 204.38 Å^3, respectively, suggesting that the Mn^{+2} is in a high-spin state while Fe^{+2} is in a low-spin state. The physical properties of the two compounds are therefore also highly divergent; *e.g.*, $BaMn_2As_2$ is an insulating local moment antiferromagnet with a high Néel temperature $T_N = 625$ K whereas $BaFe_2As_2$ is a metallic itinerant antiferromagnet with a much lower $T_N = 137$ K.[2] We have discovered a miscibility gap in the pseudobinary phase diagram between these two isostructural compounds, probably arising from their divergent chemistry. Our investigations of the miscibility gap and of the structural, magnetic, electronic transport and thermal properties of various compositions in this system will be discussed.

[1]Work at the Ames Laboratory was supported by the Department of Energy-Basic Energy Sciences under Contract No. DE-AC02-07CH11358.
[2]D. C. Johnston, Adv. Phys. **59**, 803–1061 (2010).

Abhishek Pandey
Ames Laboratory and Department of Physics and Astronomy,
Iowa State University, Ames, Iowa 50011

Date submitted: 03 Jan 2011 Electronic form version 1.4