

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Phase diagrams of K- and Na - doped BaFe₂As₂ as probed by heat capacity and hydrostatic pressure¹ S.L. BUD'KO, Ames Laboratory and Dept. of Physics and Astronomy, Iowa State University, D.Y. CHUNG, M. STURZA, D. BUGARIS, Materials Science Division, Argonne National Laboratory, M.G. KANATZIDIS, Materials Science Division, Argonne National Laboratory and Dept. of Chemistry, Northwestern University, P.C. CANFIELD, Ames Laboratory and Dept. of Physics and Astronomy, Iowa State University — Many iron-arsenide based superconductors present a simple scaling of the jump in specific heat at superconducting transition temperature T_c with the value of T_c , $\Delta C_p \propto T_c^3$ (so called BNC scaling). A comprehensive study of Ba_{1-x}K_xFe₂As₂ over the whole range of K - concentrations showed clear deviation from the BNC scaling for $x > 0.7$. At the same concentrations anomalous behavior was observed in NMR and thermal conductivity measurements. This observation suggests change of the superconducting state for $x > 0.7$. The pressure dependence of T_c (up to ~ 1 GPa) is linear or close to linear for all measured K-concentrations. In contrast, the data for the large portion of Ba_{1-x}Na_xFe₂As₂ ($0.2 \leq x \leq 0.9$) series follow the BNC scaling. In addition, the pressure dependence of T_c (measured up to ~ 1 GPa) have clear non-linearities for Na concentration in 0.2-0.25 region, that may be consistent with an emergent, narrow, tetragonal $C4$ phase.²

¹Supported by DOE BES under DE-AC02-07CH11358 (Ames) and DE-AC02-06CH11357 (Argonne).

²S. Avci et al., PRB 88, 094510 (2013).

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Date submitted: 14 Nov 2013

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