

Abstract Submitted
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Temperature-pressure-composition phase diagram for Ba(Fe_{1-x}Ru_x)₂As₂ (x≤0.285 and P≤84kbar) S.K. KIM, Iowa State University and Ames Lab, M.S. TORIKACHVILI, Iowa State University, Ames Lab. and San Diego State University, A. THALER, E.C. COLOMBIER, S.L. BUD'KO, P.C. CANFIELD, Iowa State University and Ames Lab. — BaFe₂As₂ shows a structural/magnetic (SM) phase transition near T_{SM}=134K, which is suppressed upon partial substitutions at the Ba (K), Fe (Cr, Mn, Co, Ni, Cu, Ru, Rh, Pd, Ir) or As (P) sites, and also by adding pressure (P), most times leading to the emergence of superconductivity (SC) at low T. Here, we report on the P-dependence of the electrical resistivity in under- to near-optimally doped Ba(Fe_{1-x}Ru_x)₂As₂ (0≤x≤0.285) for P≤84kbar. Pressure suppresses the SM transition at a rate that increases with Ru content, e.g. for x=0.092, 0.161, and 0.210, dT_{SM}/dP ∼ -0.2, -0.4, and -0.6K/kbar, respectively. Although the x=0.092 and x=0.161 compositions are not SC at P=0, SC is seen when T_{SM} is sufficiently reduced by P. For x=0.161, T_c at first increases to a maximum near 25K at ∼20kbar, after which it decreases at a rate of ∼-0.4K/kbar. Likewise, the T_c values for the higher dopings peak ∼20kbar and decrease at higher P at similar rates. We find that the application of pressure on Ba(Fe_{1-x}Ru_x)₂As₂ enhances T_c beyond that which was achieved with only doping, seen before in Ba(Fe_{1-x}Co_x)₂As₂. – Supported by U.S. DOE (DE-AC02-07CH11358), AFOSR-MURI (FA9550-09-1-0603), and NSF (DMR-0805335).

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