Phase diagrams and physical properties of $Ba(Fe_{1-x}TM_x)_2As_2$ (TM = Co, Ni, Cu, Ru, Rh, Pd)

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A brief overview and summary of the effects of transition metal (Co, Ni, Cu, Ru, Pd, and Rh) doping and pressure on physical properties of $BaFe_2As_2$ will be presented. A detailed comparison of the phase diagrams for different dopants will be made. The range of experimental parameters that allow for the stabilization of superconductivity will be outlined [1-4]. The evolution of physical properties with doping, in particular, two possible Lifshitz transitions, bracketing the superconducting dome, as inferred from thermoelectric power and Hall measurements (as well as ARPES) will be examined [5,6]. Effects of doping will be compared with pressure [7,8]. In addition, a "universal" behavior of specific heat jump at T_c and peculiarities of thermal expansion in $Ba(Fe_{1-x}Co_x)_2As_2$ for a wide range of Co-concentrations will be discussed [9,10].

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