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High Resolution X-ray Scattering Studies of Structural Phase Transitions in $BaFe_{2-x}Cr_xAs_2$ B.D. GAULIN, J.P. CLANCY, J.J. WAGMAN, McMaster University, A.S. SEFAT, Oak Ridge National Laboratory — While the effects of electron-doping on the parent compounds of the 122 family of Fe-based superconductors have been extremely well-studied in recent years, far less is known about the influence of hole-doping in compounds such as $BaFe_{2-x}Cr_xAs_2$. In contrast to the electron-doped 122 systems, the hole-doped compounds do not become superconducting. Furthermore, while the hole-doped compounds exhibit similar structural and magnetic phase transitions, they appear to be much less sensitive to dopant concentration. We have performed high resolution x-ray scattering and magnetic susceptibility measurements on single crystal samples of $BaFe_{2-x}Cr_xAs_2$ for Cr concentrations ranging from $0 \leq x \leq 0.67$. These measurements allow us to determine the magnetic and structural phase transitions for this series and map out the low temperature phase diagram as a function of doping. In particular, we have carried out detailed measurements of the tetragonal (I4/mmm) to orthorhombic (Fmmm) structural phase transition which reveal how the orthorhombicity of the system evolves with increasing Cr concentration and how this correlates with the values of T_s and T_m.

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