Structural, electronic and magnetic properties of doped CrAs

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Transition metal pnictides are an important family of compounds with several applications such as in photovoltaics [1], spin-dependent transport [2] and optoelectronics [3] to name a few. High temperature superconductivity discovered in Fe-based pnictides renewed excitement and interest in these materials [4-6]. Binary CrAs is an interesting system as it exhibits an interplay between lattice and magnetic structures and superconductivity (SC), where a spin reorientation transition induced by pressure results into anti-parallel alignment of nearest neighbour spins in the vicinity of SC [7]. The compound exhibits highly tuneable magnetic moment and propagation vector. Although application of pressure allows a cleaner method of tuning, it would be interesting to investigate the effect of dopants on CrAs. Controlling the electron count through doping have been successful in achieving SC in compounds containing FeAs [4-6]. We report the effect of doping CrAs with Mn, Fe, Co and Ni. X-ray diffraction measurements indicate that all the doped samples crystallize in the orthorhombic MnP type crystal structure with space group *Pnma*. Electrical resistivity data measured at $\mu_0 H = 0$ and 8 T show metallic behaviour and indicate the presence of a sizable magnetoresistance in all the four doped samples. Electrical resistivity and magnetic susceptibility results reveal that the antiferromagnetic ordering observed at Néel temperature $T_N \approx 260$ K in CrAs is absent in the doped samples. Additionally, evolution of ferromagnetic ordering below ~ 50 K is observed in the Mn doped sample. These results will be analysed and reported in detail in this contribution.

References:

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