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Magnetic phase diagram of CrIr

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Abstract content
 (Max 300 words)

Cr alloyed with group-8 nonmagnetic transition metals Ir, Os, Ru, Re and Pt show large anomalies of magnetic origin at the phase transition temperatures [1]. Doping with these metals increase the electron to atom ratio of Cr and their magnetic phase diagrams contain the commensurate (C) spin density wave (SDW) phase, as well as the paramagnetic (P) phase, the transverse (T) incommensurate (I) SDW and longitudinal (L) ISDW phases. A triple point exists where the ISDW, CSDW and P phases coexist, while the CSDW phase is observed for impurity concentrations (x) above the triple point concentration ($x_{>L}$) [1]. The magnetic phase diagrams of both CrRe and CrRu show interesting features for $x \gg x_{>L}$, including possible superconducting properties and quantum critical behaviour [1,2,3]. In this contribution we extend these investigations to the phase diagram of $\text{Cr}_{1-y}\text{Ir}_y$, previously not determined for $y > 0.04$ [4]. A polycrystalline $\text{Cr}_{1-y}\text{Ir}_y$ sample series, with $0.04 < y < 0.14$, was prepared and characterized using scanning electron microscopy, electron microprobe analysis and X-ray diffraction. These reveal that the alloys with $y \leq 0.10$ are homogenous in composition and single-phase. Electrical resistivity (ρ) measurements as function of temperature (T) for $4\text{K} < T < 1000\text{K}$ was used to obtain the magnetic transition temperatures of the samples and determine the magnetic phase diagram of the $\text{Cr}_{1-y}\text{Ir}_y$ alloy system for $y > 0.04$.

[1] E Fawcett et al. 1994 Rev. Mod. Phys. 66 25

[2] BS Jacobs et al. 2011 Proceedings of SAIP 2011 291

[3] L Reddy et al. 2008 J. Appl. Phys. 103 07C903-1

[4] K Fukamichi et al. 1975 J. Less Common Met. 40 357

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