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Magnetic and transport studies on $Cr_{100-x}Ir_x$ alloy single crystals

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Abstract :

An investigation of the physical properties of $Cr_{100-x}Ir_x$ alloy single crystals, with x = 0.7, 1.5, 2.0 and 2.5, were previously used to establish the magnetic phase diagram of $Cr_{100-x}Ir_x$ alloy system around triple point concentration [1] where the various magnetic phases co-exist. The present study extends these results by considering the temperature (T) dependence of the Seebeck coefficient (S), specific heat (C_p) and Hall coefficient (R_H) measurements, in addition to the electrical resistivity (ρ) [1]. Well defined anomalies were observed in the electrical resistivity $\rho(T)$ curves of all the samples, due to the antiferromagnetic to paramagnetic phase transition on heating through the Néel temperature (T_N). The $S(T)$ curves of the samples with x = 0.7, 1.5 and 2.0 also exhibit anomalies associated with T_N in the temperature range below 380 K. As the upper limit of temperature for the measurements was 380 K, the anomaly associated with T_N could not be observed for x = 2.5 alloy (T_N = 391.5 K). Contrary to what is normally expected [2] it is noted that the anomaly related to T_N is more prominent in the (ρ) curves than in the $S(T)$ curves. (R_H) measurements carried out from 380 K down to 2 K in a constant magnetic field of 6 T, shows only weak anomalies at T_N for certain samples. The Sommerfeld coefficient (γ) is obtained by fitting $C_p/T = \gamma + (\beta)T^2$ to the low temperature C_p/T versus T^2 data. The γ values found for the present single crystal samples fits in well with the γ versus electron-to-atom (e/a) ratio curve previously published [3, 4] for certain Cr alloys.

[1].Martynova J *et al.* 1998 J. Magn. Magn. Mat 187 345[2].Fawcett E *et al.*1994 Rev. Mod. Phys. 66 25[3].Heiniger F 1966 Phys. Kondens. Materie 5 285[4].Heiniger F *et al.* 1966 Phys. Kondens. Materie 5 243

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Yes

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