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Electronic and magnetic properties of the $(\text{Cr}_{84}\text{Re}_{16})_{100-x}\text{Mn}_x$ alloy system

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The electrical resistivity (ρ) and magnetisation (M) of $(\text{Cr}_{84}\text{Re}_{16})_{100-x}\text{Mn}_x$ alloys with $x = 0.3, 0.4, 0.6, 0.8$ and 3.1 at.% Mn were studied as a function of temperature (T) and applied magnetic field. Anomalies are observed in the $\rho(T)$ curves corresponding to the Néel temperature (T_N). $M(T)$ curves in a constant small applied field (100 Oe) was obtained on increasing T after cooling in zero magnetic field (ZFC). Measurements were also done after cooling in a field of 100 Oe (FC). At $T < 10$ K, a sharp increase in magnetisation is observed on increasing T after ZFC. A prominent sharp peak is observed close to 30 K beyond which the magnetisation rapidly decreases to lower values. In samples with concentrations 0.6, 0.8 and 3.1 at. % Mn, the magnetisation approaches zero above 30 K. In the FC state, there is a slower decrease in M on increasing T up to around 30 K beyond which the behaviour is identical to that observed in the ZFC state except for the alloy with 3.1 at. % Mn. In this case, the magnetisation obtained in both the FC and ZFC state first increases to a maximum value resulting in a peak before rapidly decreasing to low M values. The behaviour of M is indicative of possible spin glass state and is similar to behaviour that has been previously observed [1,2]. Results to test the characteristics of the spin glass state will also be presented.

[1] Galkin VY *et al*, J.Phys.:Condens Matter 7 L649 (1995)

[2] Galkin VY *et al*, J.Phys.:Condens Matter 8 7925 (1996)

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No

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N/A

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