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Spin density wave behaviour in the (Cr₈₄Re₁₆)_{100-y}V_y system

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Abstract content
   (Max 300 words)

The spin density wave (SDW) behaviour in the (Cr₈₄Re₁₆)_{100-y}V_y alloy system, with $4 \leq y \leq 14$, was investigated using electrical resistivity (ρ), Seebeck coefficient (S) and specific heat (Cp) measurements as a function of temperature (T). For this alloy series ρ measurements reveal a clear anomaly at the Néel temperature (T_N), which can be ascribed to the opening up of the SDW energy gap and the corresponding decrease in charge carrier density on cooling through T_N [1]. The Seebeck coefficient is sensitive to the changes in the electronic structure and scattering mechanisms that are consequential to the antiferromagnetic phase [1]. An anomaly in the form of a hump in the vicinity of T_N is observed in the S(T) curves for samples with y = 5.7 and 8.5. On increasing y the magnitude of this anomaly is suppressed and the position of the hump shifts to lower temperatures, corresponding to a decrease in T_N. At low temperatures, a broad valley is observed for y = 4 and 5.7. On increasing y, this valley initially becomes more pronounced, but eventually weakens and becomes imperceptible in samples with y > 5.7. T_N(y) obtained from both ρ(T) and S(T) measurements indicate the existence of a possible quantum critical point at $y \approx 10.4$. Signatures of quantum critical behaviour have also been linked to anomalies in the behaviour of the Sommerfeld electronic specific heat coefficient (γ) as a function of the tuning parameter [2]. γ is obtained from the low temperature Cp measurements and γ(y) for the (Cr₈₄Re₁₆)_{100-y}V_y alloy system also shows an anomaly in the vicinity of the putative quantum critical point.

[1] E. Fawcett et al., Rev. Mod. Phys. 66, 25 (1994).
[2] J. Takeuchi et al., J. Phys. Soc. Jpn. 49, 508 (1980)

Apply to be
 consider for a student
   award (Yes / No)?

Yes

Level for award
 (Hons, MSc,
   PhD)?

PhD

Main supervisor (name and email)
and his / her institution

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