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Magnetic behavior of the Cr-Al alloys system round the triple point concentration

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<p>Recent measurements on an antiferromagnetic (AFM) Cr_{0.978}Al_{0.022} alloy single crystal suggest that the triple point (TP) on the magnetic phase diagram (MPD) might be a special type of critical point. This suggestion is further investigated here through electrical resistivity and specific heat measurements on a series of Cr_{1-x}Al_x alloy single crystals with x around the triple point concentration (x_c). Néel temperatures (T_N), obtained from the resistivity measurements, indicate that x_c ≈ 0.02 is situated at the position of a rather sharp and deep minimum of the AFM-paramagnetic phase transition line on the T - x MPD. The minimum is deeper than that generally accepted for this alloy system. The Sommerfeld electronic specific heat coefficient, obtained from the specific heat measurements, shows an interesting aspect. The Sommerfeld electronic specific heat coefficient as function of Al concentration peaks relatively sharply at x_c, an aspect for which the explanation is two-fold: either the phase boundary line separating the incommensurate (I) and commensurate (C) spin-density-wave (SDW) phases on the MPD, starts at the TP and reaches T = 0 K vertically below this point, or the TP itself is situated close to T = 0 K. It is reasoned that the latter seems a more likely possibility, making this system unique in exhibiting a critical point at 0 K where ISDW, CSDW and paramagnetic (P) phases coexist.

Level (Hons, MSc,
   PhD, other)?

other

Consider for a student
   award (Yes / No)?

No

Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?

No

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