

Studies of the Magnetic Ordering in Polycrystalline Cr-Ru Alloys by Neutron Powder Diffraction

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The magnetic phase diagram of the Cr-Ru alloy system [1,2] shows that the spin density wave (SDW) ordering below the Néel temperature is incommensurate (I) for Ru concentrations (x) $< 1\%$, commensurate (C) for $1\% < x < 17\%$, with the formation of a superconducting state for $x > 17\%$ [2].

Our approach to identify the nature of the magnetic ordering has always encompassed neutron diffraction studies on single crystal samples in which the different SDW orderings give rise to specific intensity distributions around the {100} reciprocal lattice position [3].

We here report experimental results from neutron powder diffraction studies of polycrystalline samples with $x = 0.3\%$, 12.5% and 15% representative of the I and C phases. This has become an option with the availability of the upgraded neutron powder diffraction instrument at the SAFARI-1 research reactor.

The results demonstrate the viability of using diffraction pattern distributions from polycrystalline samples to research intricacies in the magnetic ordering of dilute alloys of Cr in future studies.

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