SAIP2014



Contribution ID: 74

Type: Poster Presentation

Probing the antiferromagnetism in (Cr₈₄Re₁₆)_{100-<i>y</i>}V<sub><i>y</i>odd>alloys using neutron diffraction

Wednesday, 9 July 2014 17:10 (1h 50m)

Abstract content
 (Max 300 words)
 dry-Formatting &
 &classed chars

Sommerfeld coefficient (<i>y</i>), obtained from fitting the low temperature specific heat (<i>C</i>_p) data to the equation $<i>C</i>_p = <math><i>\gamma T</i><+ <i>\beta T</i>³, has previously been used$ to identify the region of critical concentration in Cr_{1-<i>x</i>}V_{<i>x</i>}[1] and in (Cr₈₄Re₁₆)_{100-<i>y</i>}V_{<i>y</i>}[2] alloys. The effects of spin fluctuations and nature of the nesting bands on physical properties of Cr_{1-<i>x</i>}V_{<i>x</i>} alloys were explored using specific heat measurements and the corresponding trends in the <i>> γ </i>>curve~[1].~In~the~(Cr₈₄Re₁₆)_{100-<i>y</i>}V_{<i>y</i>}alloysystem, $\langle i \rangle \gamma \langle i \rangle$ shows anomalous trends close to the critical concentration as well as at $\langle i \rangle \gamma \langle i \rangle \approx 4$ [2]. The decrease in <i>γ</i> observed at <i>γ</i> ≈ 4 may correspond to the transition from one magnetic phase to another. At <i>y</i> = 0, the alloy system is expected to be in the commensurate spin-density-wave (CSDW) phase [3]. On increasing the V concentration, the incommensurate (I) SDW phase may prevail due to the mismatch between the electron and hole sheets. In order to clarify this conjecture, neutron diffraction studies are proposed. Neutron diffraction is an ideal tool to explore the magnetic phases in an alloy and was successfully used in the Cr_{1-<i>x</i>}Ru_{<i>x</i>} system to establish the types of antiferromagnetic order in the system [4]. This paper reports on the preliminary results of neutron diffraction on the (Cr₈₄Re₁₆)_{100-<i>y</i>}V_{<i>y</i>} alloy system,with <i>>y</i>> = 0, 4.2 and 6.2. Results indicate that at room temperature, the Cr₈₄Re₁₆ alloy is in the CSDW phase. Possible magnetic satellites indicative of the ISDW phase were observed in the alloys with $\langle i \rangle y \langle /i \rangle = 4.2$ and 6.2 as envisaged.

- [1] Takeuchi J <i>et al</i>., <i>J. Phys. Soc. Japan</i> 49, 508 (1980)
- [2] Jacobs B S <i>et al</i>., <i>J. Appl. Phys.</i> 113, 17E126 (2013)
- [3] Fawcett E <i>et al</i>., <i>Rev. Mod. Phys.</i> 66 25 (1994)
- [4] Papoular R <i>et al</i>., <i>J. Magn. Magn. Mater.</i>24 106-110 (1981)

Apply to be br> considered for a student br> award (Yes / No)?

Yes

Level for award

- (Hons, MSc,

- PhD)?

PhD

Main supervisor (name and email)
-br>and his / her institution

Prof ARE Prinsloo alettap@uj.ac.za University of Johannesburg

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

Yes

Primary author: Mrs JACOBS, Bincy Susan (University Of Johannesburg)

Co-authors: Prof. PRINSLOO, Aletta (University of Johannesburg); Dr VENTER, Andrew (Necsa Limited); Dr SHEPPARD, Charles (University of Johannesburg); Dr MAYNARD-CASELY, Helen (Australian Nuclear Science and Technology Organisation, Australia)

Presenter: Mrs JACOBS, Bincy Susan (University Of Johannesburg)

Session Classification: Poster2

Track Classification: Track A - Division for Physics of Condensed Matter and Materials