Contribution ID: **256** Type: **Poster Presentation**

Magnetic and thermodynamic properties of the CeIrGa4 compound.

Thursday, 11 July 2019 15:00 (2 hours)

A polycrystalline sample of CeIrGa4 was prepared by an arc-melting technique using high-purity elemental constituent elements on a water-cooled copper plate under ultra-high pure argon atmosphere. This compound crystallizes in an orthorhombic structure having the CeOsGa4 structure type belonging to the space group Pmma [1]. The sample was characterized by powder X-ray diffraction spectra which were refined using EXPO software, where the lattice parameters were found to be; a = 9.456(3) Å, b = 8.726 (2) Å and c = 7.547 (3) Å. In this work, we study the physical and magnetic properties of this compound, by heat capacity Cp(T), magnetization M(B), magnetic susceptibility χ(T) and electrical resistivity ρ(T). In the χ(T) results a Curie-Weiss behaviour is followed above 50 K, yielding an effective magnetic moment, ⊠eff = 2.43 (2) ⊠B/mol-Ce, which is close to the theoretical value for a free Ce3+ ion. This indicates that Ce3+ is the only magnetic species in this compound. The paramagnetic Weiss temperature is ⊠p = – 97.42 (2) K. The negative value of the Weiss temperature indicates that AFM interactions dominate. The magnetization shows typical paramagnetic behaviour above 15 K, where M is linear in B up to 8 T. However, in the T = 2 K isotherm a strong curvilinear behaviour is observed with a weak tendency towards saturation and a steep rise in M at very small fields. This suggests a possible phase transition at very low T in this compound, even though our maximum field extracts only about 0.5 μB/Ce. The electrical resistivity follows a ρ(T) ˜ - log(T) behaviour below room temperature which is in evidence of incoherent Kondo scattering effects in this compound. A coherence or Kondo-lattice peak in ρ(T) develops at 90 K, below which ρ decreases sharply. Above 2 K, ρ(T) shows an anomalous near – linear rise with temperature. The electronic specific heat, Cp(T)/ T increases sharply below 10 K to reach a very high value of 600 mJ/mol.K2 at 2 K. Our interpretation of the physics in CeIrGa4 is that this is a new example of a strongly correlated, Kondo- lattice system. Future studies will focus upon the low temperature region to search for a possible magnetic phase transition.

References
[1] M. Schlüter and W. Jeitschko, Z. Anorg. Allg. Chem. 628, 628 (2002).

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

yes

Level for award
 (Hons, MSc,
   PhD, N/A)?

MSc

Primary author: Ms MABIDI, P.M (University of Johannesburg)

Co-authors: Prof. STRYDOM, A.M (University of Johannesburg); Dr SONDEZI, B.M (University of Johannesburg); Dr SAHU, B.N (University of Johannesburg)

Presenter: Ms MABIDI, P.M (University of Johannesburg)

Session Classification: Poster Session 2

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