



Contribution ID: 117

Type: Oral Presentation

Thermodynamic Properties and Inelastic Neutron Scattering of Ferromagnetic CeCuSi

Wednesday, 13 July 2011 14:00 (15 minutes)

Cerium-based ternary compounds demonstrate different and interesting phenomena depending on the valence of the Ce ion. The hybridization between Ce-4f electrons and the neighbouring conduction electrons is responsible for the anomalous properties observed in different systems. Depending on the strength of the f-ligand hybridization, one observes in these compounds phenomena such as magnetic ordering, heavy fermion behaviour, Kondo effect and valence fluctuations. The derived local magnetic moments associated with the state of Ce ions order antiferromagnetically in most cases. CeCuGe, CeCuSi and CeAuGe belong to a small family of equiatomic Ce based compounds that order ferromagnetically at low temperatures. The ordering temperatures are $T_C = 10$ K, 15.5 K and 10 K for CeCuGe, CeCuSi and CeAuGe respectively.

Here we report on the continuation of our studies into the thermodynamic and magnetic-field sensitivity of magnetic ordering, T_C in CeCuSi compound, which has been identified to exhibit ferromagnetic ground state below $T_C = 15$ K. CeCuSi crystallizes in an ordered hexagonal ZrBeSi-type structure (space group $P6_3/mmc$ No. 194). Magnetization and susceptibility measurements were performed and the fit to the Curie-Weiss law was done, calculating paramagnetic temperature, and effective moment. The ferromagnetic nature of the transition in this compound is indicated by a λ -type anomaly at low temperatures from specific heat (C_p) data. At higher temperatures, the magnetic contribution to the specific heat, $C_4f(T)$ (which is accessed by subtracting an isostructural non-magnetic reference data, LaCuSi) is characterized by a broad Schottky anomaly resulting from electronic excitations to crystal electric field (CEF) levels. Least-squares Schottky fit for a two-level system yielded energy separation value of about 110 K. The presence of CEF in this compound was confirmed by inelastic neutron scattering (INS) data.

Level (Hons, MSc, PhD, other)?

PhD

Consider for a student award (Yes / No)?

Yes

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

Yes

Primary author: Ms SONDEZI-MHLUNGU, Buyi (University of Johannesburg)

Co-authors: Prof. STRYDOM, Andre (University of Johannesburg); Prof. ADROJA, D. (Rutherford Laboratory)

Presenter: Ms SONDEZI-MHLUNGU, Buyi (University of Johannesburg)

Session Classification: CMPMS1

Track Classification: Track A - Condensed Matter Physics and Material Science