

# SAIP2014



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## Magnetic and thermodynamic properties of $Ce_{23}Ru_7Mg_4$ compound

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### Abstract :

Complex metal alloys have been shown to offer new possibilities in developing high efficiency thermoelectric material [1]. Among the correlated electron class of magnetic systems, the enhanced thermoelectric power characteristic of Kondo metals offers a distinct advantage in gaining thermoelectric efficiency. Here we present exploratory results of a study on the novel compound  $Ce_{23}Ru_7Mg_4$  which has 68 atoms per unit cell and therefore qualifies as a complex metal alloy. The magnetic susceptibility and heat capacity for  $Ce_{23}Ru_7Mg_4$  compound have been studied above room temperature to low temperature range and in the applied magnetic field up to 7 T. This compound crystallizes with the hexagonal non-centrosymmetric  $Pr_{23}Ir_7Mg_4$ -type structure, with space group  $P63mc$  [2]. The structure is built up from complex three dimensional networks of edge and corner-sharing  $RE_6Ru$  trigonal prisms. The magnetic susceptibility and specific heat both exhibit a distinct anomaly at  $\sim 2$  K which most probably suggests a paramagnetic to antiferromagnetic phase transition. The magnetic susceptibility revealed a magnetic moment  $\mu_{eff} = 2.235 \mu_B/Ce$  which is close to the value for cerium in pure Ce metal ( $\mu_{eff} = 2.54 \mu_B$ ), indicating a presence of well localized magnetic moments carried by the stable  $Ce^{3+}$  ions. The magnitude of the electronic specific heat coefficient  $\gamma = 127$  mJ/Ce-mol K<sup>2</sup> suggests correlated electron behavior in this compound. [1] S. Paschen, C. Godart and Y. Grin in Complex metallic alloys: fundamentals and applications, Jean-Marie Dubois; Esther Belin-Ferré (eds.), Weinheim: Wiley-VCH Verlag, 2011. [2] S. Linsinger, M. Eul, W. Hermes, R-D. Hoffmann and R. Pöttgen, Z. Naturforsch 64b (2009) 1345.

### Award :

No

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Yes

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