

# SAIP 2011



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## Intermediate valence and antiferromagnetic Kondo lattice behaviour in

$\text{Ce}(\text{Au}_{1-x}\text{Ni}_x)_2\text{Si}_2$

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### Content :

The transition from intermediate valence (IV) behaviour in  $\text{CeNi}_2\text{Si}_2$  to magnetically ordered Kondo lattice behaviour in  $\text{CeAu}_2\text{Si}_2$  is investigated through measurements of X-ray diffraction (XRD), electrical resistivity  $\rho(T)$ , magnetization  $\sigma(\mu_0H)$  and magnetic susceptibility  $\chi(T)$  on the polycrystalline  $\text{Ce}(\text{Au}_{1-x}\text{Ni}_x)_2\text{Si}_2$  ( $0 \leq x \leq 1$ ) alloy series. Lattice parameters as derived from XRD measurements deviate from Vegard's rule around  $x = 0.6 - 0.8$ .  $\rho(T)$  data indicate Kondo lattice behavior in the presence of a crystal field for  $x \leq 0.6$ , the occurrence of magnetic ordering for  $x = 0$  and fluctuating valency for  $x \geq 0.8$ .  $\chi(T)$  data at high temperatures, follow the Curie-Weiss relation for alloys in the concentration  $0 \leq x \leq 0.6$  (Kondo lattice region) and give effective magnetic moment values  $\mu_{\text{eff}}$  close to that expected for the free  $\text{Ce}^{3+}$ -ion. The low temperature  $\chi(T)$  data indicate the onset of antiferromagnetic ordering for  $x \leq 0.78$ . For alloys in the concentration range  $0.8 \leq x \leq 1$  (IV region),  $\chi(T)$  data are described within the framework of the paramagnon model.  $\sigma(\mu_0H)$  measurements indicate metamagnetic behavior for alloys in the concentration range  $0 \leq x \leq 0.1$ .

### Level (Hons, MSc, PhD, other)? :

Other

### Consider for a student award (Yes / No)? :

No

### Short Paper :

No

**Primary authors** : Prof. TCHOULA TCHOKONTE, Moise Bertin (University of the Western Cape)

**Co-authors** : Prof. DU PLESSIS, Paul de Villiers (University of Johannesburg) ; Prof. KACZOROWSKI, Dariuzs (Polish Academy of Sciences, Poland) ; Prof. DOYLE, Terry (iThemba LABS)

**Presenter** : Prof. TCHOULA TCHOKONTE, Moise Bertin (University of the Western Cape)

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