Smeared antiferromagnetic phase transition in $Ce_2Cu_{2-x}Ni_xIn$

A. P. Pikul[a], D. Kaczorowski[a] and P. Rogl[b]

[a]Institute of Low Temperature and Structure Research, Polish Academy of Sciences, ul. Okólna 2, 50–422 Wrocław, Poland

[b]Institute of Physical Chemistry, University of Vienna, Währingerstrasse 42, A–1090 Wien, Austria

9.7 cm

Ce_2Cu_2In and Ce_2Ni_2In crystallize in a primitive tetragonal structure of the Mo_2FeB_2 type. The former compound orders antiferromagnetically at the Néel temperature $T_N = 5.5$ K, while the latter one is a system with fluctuating valence [1]. Here we report on low temperature physical properties of the solid solution $Ce_2Cu_{2-x}Ni_xIn$ studied by means of x-ray powder diffraction, magnetization and electrical resistivity measurements, using polycrystalline specimens. We show that partial substitution of Cu by Ni results in a monotonic decrease of the unit cell volume. Magnetic moments of Ce^{3+} ions remain well localized with increasing x up to about 1.2, while the magnetic properties of the alloys with larger Ni contents suggest non-integer valency of cerium. In the localized regime, T_N is not suppressed to absolute zero, as might be expected. Instead, the antiferromagnetic anomaly quickly broadens with increasing x, and the ordering temperature is reduced only down to about 2.2 K for $x = 0.3$. For larger x any anomaly in the physical properties of $Ce_2Cu_{2-x}Ni_xIn$ is hardly visible. In other words, partial isostructural substitution of Cu by Ni in Ce_2Cu_2In does not result in moving the system through a quantum critical point, as observed in many otherwise similar compounds.

[1] D. Kaczorowski, P. Rogl, and K. Hiebl, Phys. Rev. B 54 (1996) 9891.

13.4 cm

Subject category :

1. Strongly Correlated Electrons and High Temperature Superconductivity

Presentation mode :
poster

Corresponding author :
A. P. Pikul

Address for correspondence :
Instytut Niskich Temperatur i Badań Strukturalnych Polskiej Akademii Nauk we Wrocławiu

Email address :
A.Pikul@int.pan.wroc.pl