9.7 cm

THE Sn HYPERFINE FIELDS IN RMn_6Sn_6 (R = Mg, Zr, Lu). EXPERIMENTAL AND THEORETICAL STUDY

[a]T. Mazet, [b]J. Toboła and [a]B. Malaman

[a]Laboratoire de la Chimie du Solide Mineral, Université Henri Poincaré,
54506 Vandoeuvre les Nancy Cedex, France

[b]Faculty of Physics and Nuclear Techniques, Academy of Mining and Metallurgy,
Al. Mickiewicza 30, 30-059 Kraków, Poland

Ternary RMn_6Sn_6 compounds are magnetic and form hexagonal structure ($P6/mmm$) involving three inequivalent Sn sublattices. The coordination and arrangement of the Mn magnetic moments in relation to the Sn sites determine local spin densities on these atoms. The ^{119}Sn Mössbauer effect measurements on the ferromagnetic $MgMn_6Sn_6$ result in the large values of H_{hf}: 220, 300 and 340 (in kGs) on Sn1, Sn2 and Sn3 sites, respectively. Conversely, $ZrMn_6Sn_6$ and $LuMn_6Sn_6$ show a purely antiferromagnetic structure (at least at RT), with (- + + -) ordering of the Mn magnetic moments layers. Thus, non-zero hyperfine fields on the two Sn sites only are measured.

Such behaviours are also studied by the KKR band structure calculations. The theoretical values of H_{hf} well correspond to the experimental data in the ferromagnetic $MgMn_6Sn_6$ (240, 315, 330 kGs). In order to consider a real magnetic cell in $ZrMn_6Sn_6$ and $LuMn_6Sn_6$ a doubled unit cell is taken into account in the KKR computations. However, a comparison with experiment seems less straightforward, due to a helimagnetic structure appearing in these samples at low temperature. On the other hand, the calculated Mn magnetic moments by the KKR method, both in the ferromagnetic and antiferromagnetic RMn_6Sn_6, remain in excellent agreement with the neutron data.

13.4 cm

Subject category :

3. Transition Metals, Alloys and Compounds

Presentation mode :
poster

Corresponding author :
Thomas Mazet

Address for correspondence :
Laboratoire de la Chimie du Solide Mineral, Université Henri Poincaré
54506 Vandoeuvre les Nancy Cedex, France

Email address :
Thomas.Mazet@lcsm.u-nancy.fr