CALCULATIONS OF THE THERMOELECTRIC POWER AND ELECTRICAL CONDUCTIVITY FOR $(\mathbf{Gd}_{(1-x)}\mathbf{T}_x)_n\mathbf{M}_m$ ALLOYS

M. Lipowczan[a], **J. Deniszczyk**[b] **and W. Borgieł**[a]

[a] Chełkowski Institute of Physics, University of Silesia
40-007 Katowice, Uniwersytecka 4

[b] Institute of Physics and Chemistry of Metals, University of Silesia
40-007 Katowice, Bankowa 12

9.7 cm

Based on the many body Hamiltonians different models were applied for the $(\mathrm{Gd}_x \mathrm{Re}_{1-x})_m\mathrm{M}_n$ alloys. These substitutional alloys represent very interesting alloy family which posses both well defined (no orbital contribution), randomly distributed localized spins (Gd) and itinerant electron bands which fillings depend on the concentration x. Because of the complicated many body task, only paramagnetic state of the investigated systems was considered. The influence of the external uniform magnetic field was also discussed. The main contribution to the thermoelectric power (TEP) and static (DC) electrical conductivity has a magnetic origin and is caused mainly by scatterings of the conducting electrons on the stochastic distributions of the large Gd spin ($S = 3.5$) over the lattice sites. The many body approximations used for our models are based on the Alloy Analogy aproximations for the real and fictitious electronic alloys. The band structure calculations which have brought informations on the widths and positions of the itinerant bands were performed. For sufficiently high temperatures possibility of lattice vibrations was proposed and investigated. The results on TEP and DC conductivity as a function of alloy concentration x fit well the experimental results.

13.4 cm

Subject category :

4. Rare Earths and Actinides, Alloys and Compounds

Presentation mode :
poster

Corresponding author :
M. Lipowczan

Address for correspondence :
Chełkowski Institute of Physics, University of Silesia
40-007 Katowice, Uniwersytecka 4

Email address :
marcinl@server.phys.us.edu.pl