Single-ion anisotropy effects in magnetic susceptibility of some Re^{IV} and $Re^{IV}M^{II}$ complexes

E. Babiak[a], R. Kubacik[a], Ł. Kucharski[a], P. Kozłowski[a], A. Drzewiński[b] and G. Kamieniarz[a]

[a]Faculty of Physics, A. Mickiewicz University, Poznan, Poland
[b]Institute of Physics, University of Zielona Gora, Zielona Gora, Poland

9.7 cm

In this communication we analyse the effects of single-ion anisotropy on the zero-field susceptibility behaviour as a function of temperature for an oxalate-Re^{IV} mononuclear complex [1] and heterotetranuclear oxalato-bridged $Re^{IV}M^{II}$ (M = Mn, Fe, Ni, Cu) complexes [2]. Re^{IV} is a $5d^3$ ion which ground state in the octahedral environment is given by the $^4A_{2g}$ term and is subject to a high value of the spin-orbit coupling and the strong magnetic anisotropy. Our analysis is based on the spin Heisenberg model and takes into account both the uniaxial and rhombic single-ion anisotropy term. We calculate within the exact diagonalisation technique the single-crystal and powder susceptibility for the systems in question. We find some symmetries in the behaviour of the single-crystal susceptibilities and their substantial dependence on the value of the rhombic parameter. We demonstrate that the differences in the single-crystal data are strongly reduced for the powder sample and we estimate some new values of the model parameters from a fit to experimental data.

[1] R. Chiozzone et al., Inorg. Chem. 38, 4745 (1999)
[2] J. Martinez-Lillo et al., Inorg. Chem., 48, 3027 (2009)

13.4 cm

Subject category :

2. Quantum and Classical Spin Systems

Presentation mode :
poster

Corresponding author :
Grzegorz Kamieniarz

Address for correspondence :
Zakład Fizyki Komputerowej
Wydział Fizyki
Uniwersytet im. Adama Mickiewicza w Poznaniu
ul. Umultowska 85, 61-614 Poznań

Email address :
gjk@amu.edu.pl