Single crystal EPR spectroscopy, magnetic studies and catalytic activity of a self-assembled [2 x 2] Cu^{II}_4 cluster obtained from a carbohydrazone based ligand.

Autorzy

Rahman Bikas

Hassan Hosseini-Monfared

Pavlo Aleshkevych

Ritta Szymczak

Miłosz Siczek

Tadeusz Lis

Rok wydania

2015

Czasopismo

Polyhedron

Numer woluminu

88

Strony

48-56

DOI

10.1016/j.poly.2014.11.038

Kolekcja

Naukowa

Język

Angielski

Typ publikacji

Artykuł

Streszczenie

A new tetranuclear [2 × 2] cluster of Cu(II) with a symmetric carbohydrazone based ligand, $[Cu_4L_4](NO_3)_4{\cdot}1.6(H_2O)$ (**1**), {where HL donates bis-[(*E*)-*N'*-(1-(pyridin-2-yl)ethylidene)]carbohydrazide} was synthesized and characterized by spectroscopic methods and X-ray analysis. The EPR spectra were performed on single crystals of complex **1** at various temperatures and allowed the identification and separation of two types of magnetic objects contributing to magnetism: single atoms of Cu(II) and a tetranuclear Cu_4 cluster. The main values of the *g*-factor and hyperfine structure were determined for single ions of Cu(II). The copper atoms in the tetramer are coupled antiferromagnetically with an isotropic antiferromagnetic exchange J = 215 K (149.4 cm^{-1}). A small anisotropic exchange of the order of 0.06 K (0.04 cm^{-1}) is responsible for the initial zero-field splitting of the energy levels in the tetramer spectrum. Magnetic measurements of complex **1** confirmed the existence of a strong antiferromagnetic exchange coupling between four Cu(II) ions. Complex **1** showed high potential for the catalytic and selective oxidation of *cis*-cyclooctene with aqueous H_2O_2.

Słowa kluczowe

Single crystal EPR, magnetic studies, Catalytic epoxidation, [2×2] CuII4 cluster, Exchange coupling

Adres publiczny

http://dx.doi.org/10.1016/j.poly.2014.11.038

Strona internetowa wydawcy

http://www.elsevier.com