

Magnetic dimensionality and the crystal structure of two copper(II) coordination polymers containing Cu₆ and Cu₂ building units.

Autorzy

Negar Rad-Yousefnia

Behrouz Shaabani

Maria Korabik

Marek Weselski

Monsoureh Zahedi

Ulli Englert

Rahman Bikas

Daria Szeliga

Marta Otręba

Tadeusz Lis

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Streszczenie

The electrostatic self-assembly reaction of the $[\text{Cu}(\text{HL})]_2^{2+}$ cation, where HL = 2-(2-aminoethylamino) ethanol, and the N_3^- or $[\text{Fe}(\text{CN})_6]^{4-}$ anion leads to the formation of two coordination polymers with the general formula of $[\text{Cu}_6(\mu_{1,1}\text{-N}_3)_6(\mu_{1,3}\text{-N}_3)_2(\mu_{1,1,3}\text{-N}_3)_2(\mu_{1,1,1,3}\text{-N}_3)_2(\text{HL})_2]_n$ (**1**) and $\{[\text{Cu}(\text{HL})]_2[\text{Fe}(\text{CN})_6] \cdot \text{H}_2\text{O}\}_n$ (**2**), respectively. The resulting compounds have been structurally characterized by a single-crystal X-ray diffraction technique. Compound **1** possesses a rare 3D structure. It contains centrosymmetric hexanuclear repeating units, which act as six-connected nodes in the final network and copper(II) ions are joined together by azide anions with four different types of bridging modes, $\mu_{1,1}$, $\mu_{1,1,3}$, $\mu_{1,1,1,3}$, and $\mu_{1,3}$. The structure of compound **2** is a 2D heterometallic Cu^{II}/Fe^{II} layer in which the $[\text{Cu}(\text{HL})]_2$ nodes and the octahedral $[\text{Fe}(\text{CN})_6]^{4-}$ linkers are joined by μ_2 - and unusual μ_3 -CN bridging modes. Detailed static and dynamic magnetic analyses of **1** reveal a dominant ferromagnetic intracluster interaction and a ferromagnetic 3D ordering transition below $T_c = 5$ K. The variable temperature magnetic susceptibility measurements of compound **2** show a very weak ferromagnetic coupling between the nearest Cu(II) ions. Also, EPR spectroscopy of these compounds has been investigated in the solid state. Nanocrystals of compound **2** have also been synthesized by a sonochemical process under different reaction conditions. The results show that the crystallinity degree and uniform distribution of nanosheets are inversely dependent on the irradiation time.

Adres publiczny

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