New dimeric copper(II) complex $[Cu(5\text{-}MeOsal)_2(\mu\text{-}nia)(H_2O)]_2$ with magnetic exchange interactions through H-bonds.

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Streszczenie

The synthesis and characterization (elemental analysis, IR, electronic and EPR spectra as well as magnetization measurements over the temperature range 1.8 K–300 K) of solid complex $[Cu(5\text{-}MeOsal)_2(\mu\text{-}nia)(H_2O)]_2$ (**1**; 5-MeOsal = 5-methoxysalicylate, nia = nicotinamide) is reported together with the crystal structure. In blue–green complex **1**, two $Cu(5\text{-}MeOsal)_2(H_2O)$ units are held together by a pair of bidentate nonchelating nicotinamide ligands, which form a $(CuNC_3O)_2$ ring. Each Cu atom adopts a distorted square-pyramidal geometry. The oxygen atoms from two unidentate 5-MeOsal anions occupy the *trans* position, a water molecule and the pyridine N atom of nicotinamide build the basal plane and a carboxamide O atom occupies the apical position. The separation between two Cu atoms within the centrosymmetric dimer is 6.940(2) Å. The dimeric units are self-assembled across a centre of symmetry by the formation of two pairs of strong hydrogen bonds, which create a one-dimensional polymeric structure with the interdimer Cu···Cu separation 4.901(2) Å. It is believed that these hydrogen bonds between the copper(II) atoms are responsible for the unique magnetic properties of compound **1**. The magnetic susceptibility of complex **1** exhibits a maximum at 6 K. A satisfactory explanation was found with the Bleaney–Bowers equation for Cu–Cu interaction through carboxylato groups and H-bond bridges ($2J$ = –6.83 cm^{-1}). An additional molecular field correction that was used to characterize the interaction across the nia bridges is assumed to be extremely weak (zJ' = –0.28 cm^{-1}).