

DOUBLE HELICAL WATER-CHAIN IN A ZEOLITE-LIKE NANOTUBULAR METAL-ORGANIC FRAMEWORK

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The enormous current interest in designing and synthesizing 3D metal-organic coordination networks (MOCN's) with large pores by self-assembly has been stimulated not only by their impressive topological structures, similar to those of zeolite-type materials, but also by versatile applications in the areas of gas storage, catalysis, molecular sieves and ion-exchange. At the same time, interest in water clusters and chains are enhanced due to many fundamental biological processes appear to depend on the unique properties of water chains. For example, gramicidin A is a β -helix membrane protein with pore-forming ability in which protons are envisioned to either hop along a single-file chain of water molecules or migrate as ionic water clusters.

The Poster shows the structure and properties of the compound $[\text{Cu}(\text{Etmal})(\text{H}_2\text{O})] \cdot 1.65\text{H}_2\text{O}$ (**1**) [H_2Etmal = ethylmalonic acid]. A 3D coordination polymer that shows the topology of a semiregular net of a zeolite-like material, where nanotubular pores are formed by a β -helix structure with an internal pore with a diameter of 9.5 Å. The channel wall was built up by the metal environment and the aliphatic side of the organic ligand, resulting in a relatively closed cavity. Inside this channel we found crystallization water molecules in a double helical arrangement sustained by strong hydrogen bonding between themselves and the helical matrix where both, donor and acceptor atoms, are available. This conformation of the water molecules is similar to that found in iodine arrangements in carbon nanotubes and it could be similar to the 1D water arrangements in the channels of transmembrane proteins as aquaporine1 or gramicidin A.

The chiral channels are obtained by the polymerization of achiral entities (Cu^{II} , H_2O and Etmal) that generates a 3D MOCN. In addition, the compound exhibits a ferromagnetic ordering below 2.95 K (See Figure 1)

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References:

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Figures:

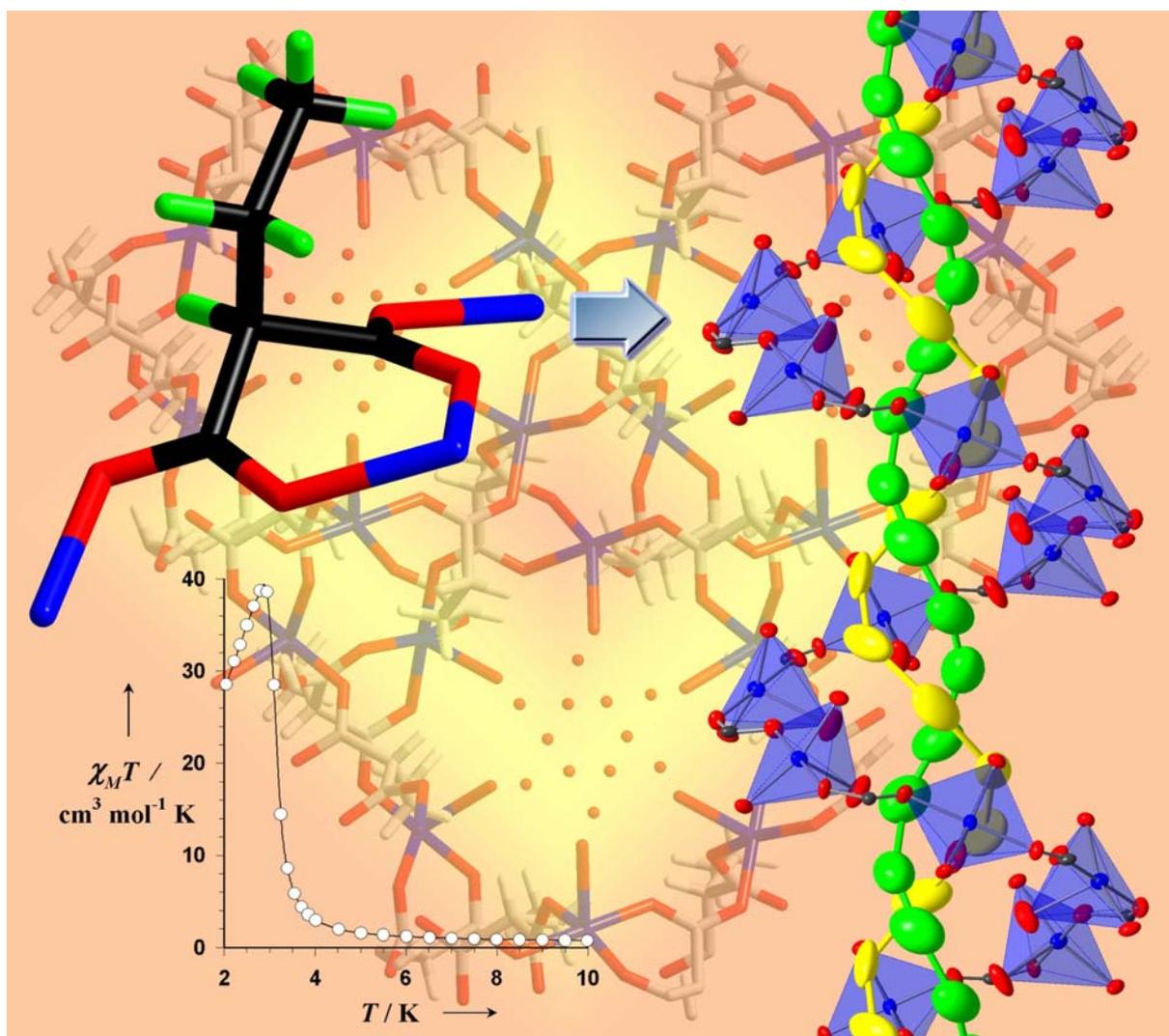


Figure 1.