FERROMAGNETIC COUPLING IN QUASI-1D Mn-PORPHYRIN BASED MOLECULAR MAGNETS

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9.7 cm

This work concerns magnetism of [MnR_4TPP][TCNE] charge-transfer molecular magnets. The initial [MnTPP][TCNE] compound is built of chains with MnTPP cations bound to TCNE anions. Magnetic moments of Mn^{III} and of the anion are strongly coupled in the chain and at $T_c = 18$ K transition from 1D to the bulk magnetic state takes place. The type of magnetic interaction between the chains is not clarified yet. We investigate structural modifications with alongated R = OC_nH_{2n+1} (n = 10, 12, 14) groups substituted at the periphery of the porphyrin disc. AC susceptibility and DC magnetization measurements show both ferromagnetic and spin-glass behaviour. In spite of the larger distance between the chains, in comparison to that of [MNTPP][TCNE], T_c is increased up to 22 K. The interchain coupling constant estimated from the quasi-1D model [1] for the compound with n = 12 is ≈ 0.15 K and equals ca. 0.1 % of the intrachain exchange. This value supports the hypothesis [2] according to which, for materials composed of strongly exchange-coupled magnetic chains, the classical dipolar interactions between the chains may stabilize the bulk magnetism.

[1] Shu-Qing Bao, Jue-Lian Shen, Guo-Zhen Yang, Phys. Lett. A **224** (1997) 203.

[2] C.M. Wynn et al., Chem.Materials **9** (1997) 2156.

13.4 cm

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