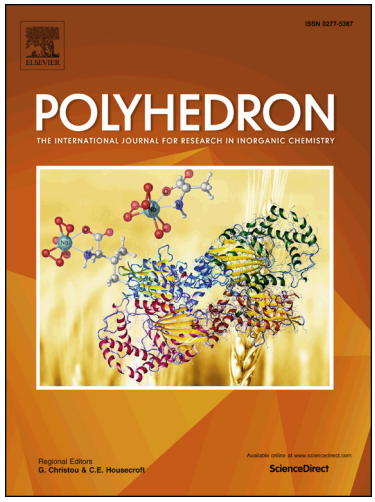

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Malay Dolai, Habib Ali Molla, Guillaume Rogez, Mahammad Ali

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Two $[Mn_3(\mu_3\text{-}O)]^{7+}$ based single chain magnets with different solvent ligation†

Malay Dolai[a], Habib Ali Molla[a], Guillaume Rogez[b] and Mahammad Ali*[a]

[a] *Department of Chemistry Jadavpur University, Kolkata 700 032, India; Fax: 91-33-2414-6223, E-mail: mali@chemistry.jdvu.ac.in*

[b]*IPCMS-UMR7504, Département de Chimie des Matériaux Inorganiques, 23, rue du Loess B.P. 43 67034 STRASBOURG CEDEX 2, FRANCE.*

ABSTRACT

$[Mn^{III}_3(\mu_3\text{-}O)]^{7+}$ based EE-azido-bridged 1D chains $[\{Mn_3O(5\text{-Br-salox})_3(N_3)(H_2O)_4\}.3H_2O]_n$(**1**) and $[\{Mn_3O(5\text{-Br-salox})_3(N_3)(H_2O)_3(DMF)\}.2H_2O.DMF]_n$(**2**) (5-Br-saloxH$_2$ = 2-hydroxy-5-bromo-benzaldehyde oxime) have been synthesized and characterized by single crystal X-ray diffraction analysis. The complex **1** was synthesized by the reaction between ligand and metal precursor in the presence of azide ion in MeOH, while complex **2** can be obtained in two ways: in the first method, the same reaction as in **1** , with only difference in solvent composition – a mixture of solvents DMF/MeOH (2:3/ v/v) was used. In another method, **2** was isolated simply by the recrystallization of **1** from DMF. Magnetic studies on these complexes reveal that both **1** (ΔE = 45. 9 K**;** τ_0 = 6.6×10^{-10}) and **2** (ΔE = 54 and 49.7 K; τ_0 = 1.4×10^{-12} s and 7.6×10^{-12} s) exhibit SCM behaviour with a slight difference in magnetic properties due to the only difference in coordinated/non-coordinated solvents.

1.Introduction

The development of molecule-based magnetic materials like Single Molecule Magnets (SMMs) and Single Chain Magnets (SCMs) is now an important research topic in the contemporary chemistry and physics[1] due to their characteristic features that include quantum phenomena[2] and finite size effects[3] and their potential applications in information storage at the molecular level [4]. The design of SCMs requires large uniaxial anisotropy, strong intrachain magnetic interactions between the high-spin magnetic units, and good isolation of the chains in order to prevent two-dimensional (2D) and three- dimensional (3D) ordering. This has opened up a new strategy to create SCM with exciting new perspectives to store information in low-dimensional materials. However, it took almost forty years to get the first experimental evidence of such behaviour in a real one-dimensional SCM compound $[Co(hfac)_2(NITPhOMe)]$[5]. The 1D chains with oxide-centered trinuclear manganese units $[Mn^{III}_3(\mu_3\text{-}O)]^{7+}$ as the building block and N_3^- ,$RCOO^-$ etc as linkers have been well known in recent years[6]. It was interesting to observe that magnetic