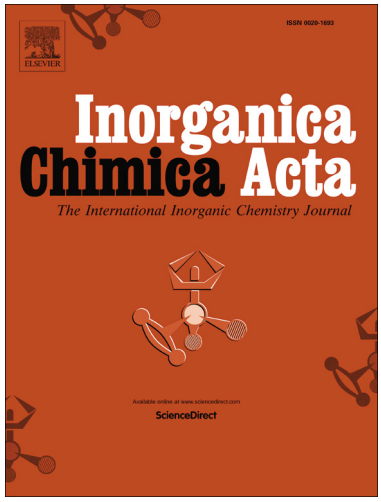

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Synthesis, Crystal Structure, and Magnetic Properties of a Series of Binuclear Lanthanide Compounds Derived From the 4-Bromo-2-((quinolin-8-ylimino)methyl)phenol Ligand

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Abstract

A series of binuclear lanthanide compounds, derived from the Schiff-base ligand 4-bromo-2-((quinolin-8-ylimino)methyl)phenol (HL), namely $[Ln_2(L)_2(CH_3CH_2CH_2COO)_2(NO_3)_2(MeOH)_2]$ (Ln = Gd (**1**), Tb (**2**), Dy (**3**), Ho (**4**)), has been synthesized. Compounds **1-4** have a similar dinuclear lanthanide core bridged by a butyrate ion. Magnetic studies reveal that compound **1** has a weak ferromagnetic interaction. On the other hand, compound **3** displays slow magnetic relaxation under an external dc field with the anisotropic barrier of 27.08 K and pre-exponential factor $\tau_0 = 4.12 \times 10^{-6}$ s. Therefore the $Dy^{(III)}$ compound is a field-induced SMM.

Keywords: Lanthanides; Schiff base; Magnetic properties; Single molecule magnet

1. Introduction

Since the discovery of the first single molecule magnet (SMM) $[Mn_{12}]$ acetate [1] in the early 1990s, a large number of compounds exhibiting this property have been reported. Most of them, especially those reported in the early years, contain only 3d ions [2]. Following the increased knowledge of the magnetic and chemical properties of SMMs, heavy lanthanide (Ln) ions, such as Tb^{III}, Dy^{III}, and Ho^{III}, have become good candidates for the preparation of such materials because they have a large unquenched orbital angular momentum [3], which may bring significant anisotropy to the system. The design of lanthanide compounds is receiving increasing attention, not only because of their interesting structure, but also because of their remarkable magnetic properties [4,5,6]. As is known, ligand design is important not only for the