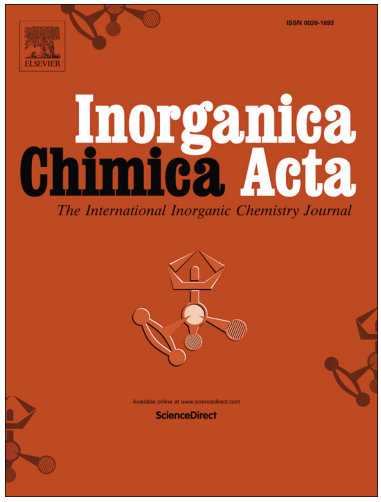

Research paper

Electron-Donating Effect Dominated 5,6-dimethoxy-2-(2,2,2-trifluoroethyl)-1-indone Dysprosium SMM

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Electron-Donating Effect Dominated 5,6-dimethoxy-2-(2,2,2-trifluoroethyl)-1-indone Dysprosium SMM

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Abstract

A series of three *β*-diketone mononuclear lanthanide complexes, namely, $Dy(5,6\text{-DTFI})_3(H_2O)_2\cdot H_2O\cdot 2CH_2Cl_2$ (**1**), $Tb(5,6\text{-DTFI})_3(H_2O)_2\cdot H_2O\cdot 2CH_2Cl_2$ (**2**) and $Ho(5,6\text{-DTFI})_3(H_2O)_2\cdot H_2O\cdot 2CH_2Cl_2$ (**3**) (5,6-DTFI = 5,6-dimethoxy-2-(2,2,2-trifluoroethyl)-1-indone) have been isolated by reactions of 5,6-DTFI and $LnCl_3\cdot 6H_2O$ (Ln = Dy, Tb, Ho). X-ray crystallographic analysis reveals that complexes **1–3** are all eight-coordinated mononuclear structures. Magnetic studies indicate that complex **1** is of single-molecule magnetic behaviors under 0 Oe. Notably, the ligands play essential role on regulating their magnetism. The corresponding structural and magnetic parameters have been discussed in details.

Keywords: *β*-diketone, dysprosium complex, ligand, substituent group

Introduction

In the past few decades, scientific interest has evolved towards the development of single-molecule magnets (SMMs) with slow relaxation of magnetization and quantum tunneling of the magnetization characteristics deriving from molecular-based blocking anisotropy.[1] It has been a burgeoning topic of intense interest to chemical, physical, and materials scientists owing to their exotic technological applications in quantum computing, high-density information memory storage, and molecular spintronics.[2] Up to now, many research groups have focused their attention on the synthesis of new types of SMMs.[3] The recent development of lanthanide ions as ideal candidates for the isolation of high barrier SMMs has shifted synthetic efforts, which is due to the considerable intrinsic magnetic anisotropy of the late 4f elements with large spin ground state and high spin-orbit coupling.[4]