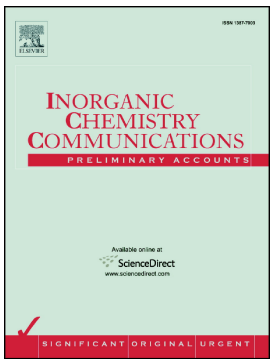

Structures, luminescence and magnetic properties of four phenoxo-O bridged Ln2 compounds: Distinct single-molecule magnets behaviors were observed in two Tb2 compounds

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Structures, luminescence and magnetic properties of four phenoxo-O bridged Ln_2 compounds: distinct single-molecule magnets behaviors were observed in two Tb_2 compounds

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Abstract: Four new dinuclear lanthanide compounds, $[Ln(hfac)_2L]_2$ (Ln(III) = Eu (**1**) and Tb (**2**)) and $[Ln(tfac)_2L]_2\cdot(C_7H_{16})_x$ (Ln(III) = Tb (**3**), Yb (**4**), HL = 2-[[(4-iodophenyl)imino]methyl]-8-hydroxyquinoline, hfac = hexafluoroacetylacetonate, tfac = trifluoroacetylacetonate), have been synthesized, structurally and magnetically characterized. The X-ray structural analysis exhibit that **1**-**4** are phenoxo-O-bridged dinuclear compunds and central Ln(III) ions are eight-coordinated with two bidentate $hfac^-$ and two μ_2-O bridging 8-hydroxyquinoline Schiff base ligands. Magnetic measurements indicated that slow magnetic relaxation behaviors were observed in **2** under 0 dc field, with an optimized dc field of 2000 Oe for **2**, the quantum tunneling of the magnetization was suppressed with $\Delta E/k_B$ of 6.72 K. However, no evident ac magnetic signals were observed in **3** under 0 dc field. The distinct single-molecule magnets behaviors are mainly due to the slight different coordination environments around central Tb^{III} ions of **2** and **3**.

Keywords: dinuclear lanthanide complexes; luminescence properties; single-molecule magnets behaviors.

In recent years, lanthanide polynuclear compounds have attracted great attention in the chemistry and materials fields, because of not only their intriguing structures, but also their potential applications such as luminescent sensing, molecular magnetism, and catalysis [1-3]. For magnetic properties aspect, because of the different local magnetic anisotropy and the large-spin multiplicity of the spin ground-state, lanthanide cations have been widely used to build molecule-based magnetic materials, Such as single-molecule magnets (SMMs), single-chain magnets (SCMs) and molecular magnetic coolers materials [4-6]. As one area of molecular magnetism materials, the investigation of single molecule magnets (SMMs) is particular interesting due to their fascinating magnetic behaviors and the potential applications in high-density information storage, molecular spintronics and quantum computing [7]. Since the first lanthanide-based single-molecule magnet (SMM), the$TbPc_2$ compound, reported by Ishikawa in 2003 [8], the heavy lanthanide ions such as Dy(III), Tb(III), Er(III) and Yb(III), have become the most attractive candidates for constructing SMMs [9]. Therefore, the lanthanide-based SMMs have been at the forefront of major advances in the field of SMMs in recent years [10]; and lots of lanthanide-based SMMs displaying excellent and interesting magnetic behaviors have been

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