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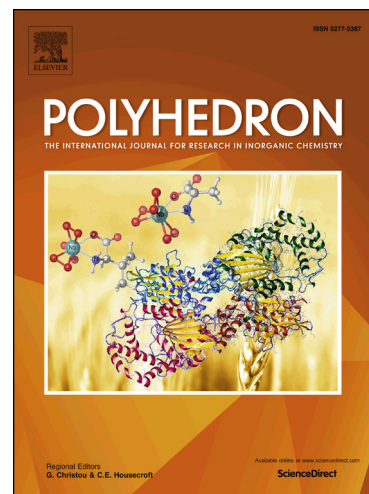
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Near-infrared luminescence and solvent modulation of the magnetic relaxation behavior of dinuclear lanthanide complexes

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Abstract

Seven new dinuclear centrosymmetric complexes, $[\text{Ln}_2(\text{dbm})_2\text{L}_2(\text{DMF})_2] \cdot 2\text{DMF}$ ($\text{Ln} = \text{Nd}$ (1), Eu (2), Tb (3), Dy (4), Er (5), Yb (6)) and $[\text{Dy}_2(\text{dbm})_2\text{L}_2(\text{CH}_3\text{OH})_2] \cdot 2\text{CH}_3\text{OH}$ (7) ($\text{Hdbm} = 1,3$ -diphenyl-1,3-propanedione, $\text{H}_2\text{L} = 2$ -[(2-(amino)benzhydrazide)-methyl]-8-hydroxyquinoline, $\text{DMF} =$ dimethylformamide) have been synthesized and structurally characterized. Dynamic magnetic studies reveal the slow magnetic relaxation of complexes 4 and 7 are influenced by a fast quantum tunneling relaxation of the magnetization (QTM). However, the different magnetic relaxation behaviors were observed apparently in the two Dy_2 complexes under a 3000 Oe *dc* field and modulated by the subtle change of solvents from DMF to CH_3OH . For complex 7, the temperature dependence curves of in-phase (χ') and out-of-phase (χ'') show better frequency-dependent signals, suggesting a slow relaxation of magnetization, typical of SMM behavior. Fitting the dynamic magnetic data of complex 7 to the Arrhenius law gives the energy barrier $U_{\text{eff}}/k_{\text{B}} = 44.06$ K with the pre-exponential factor $\tau_0 = 2.17 \times 10^{-7}$ s under a 3000 Oe *dc* field.

Keywords: 8-hydroxyquinoline Schiff base derivative; dinuclear lanthanide complexes; single-molecule magnets; magnetic relaxation behavior.

1. Introduction

A great deal of single-molecule magnets (SMMs) exhibiting slow magnetic relaxation behaviors have been reported because of their huge potential applications

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