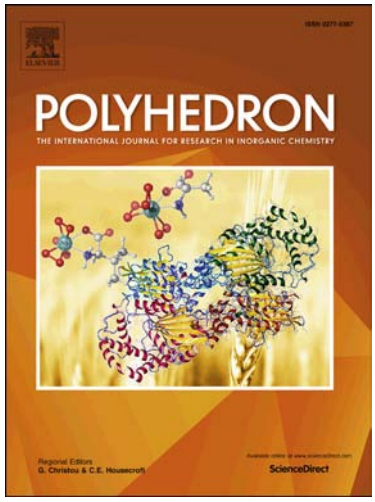

End-to-end azides as bridging ligands in lanthanide coordination chemistry: Magnetic and Magnetocaloric Properties of Tetranuclear Ln_4 (Ln = Gd, Dy) complexes exhibiting a rare rhombus topology

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End-to-end azides as bridging ligands in lanthanide coordination chemistry: Magnetic and Magnetocaloric Properties of Tetranuclear Ln_4 (Ln = Gd, Dy) complexes exhibiting a rare rhombus topology

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Abstract

The synthesis and magnetic properties of two new isostructural tetranuclear lanthanide complexes, $[Ln_4(N_3)_4(Tpz)_8]$ (Ln = Gd^{III} (**1**), Dy^{III} (**2**), and Tpz = tris(pyrazolyl)borate) are reported. In these complexes the lanthanide ions are eight coordinate with distorted geometries and are bridged by end-to-end azido ligands in a rare rhombus topology. Direct current magnetic susceptibility studies revealed the presence of weak ferromagnetic exchange interactions between the metal ions which were quantified in the case of the isotropic Gd_4 analogue to give J = 0.0080(2) cm^{-1} and g = 2.01(1). Complex **2** exhibits frequency and temperature dependent out-of-phase (χ'') *ac* magnetic susceptibility signals under a 0.1 T applied field, suggestive of SMM behavior. Low temperature magnetization studies revealed that compound **1** exhibits an appreciable magnetic entropy change, $-\Delta S_m$, which reaches a value of ~20.9 J kg^{-1} K^{-1} at T = 3 K for ΔH = 7 T. Theoretical calculations further support the experimental results.