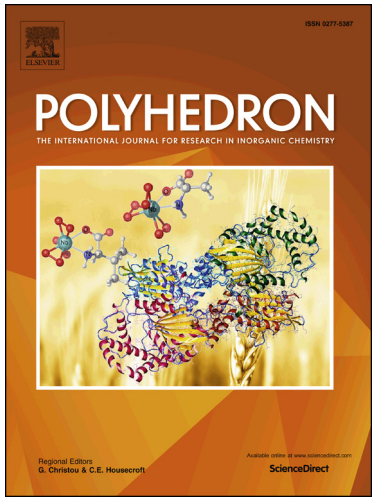

Two rhombus-shaped tetranuclear gadolinium clusters showing magnetic refrigeration

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Two rhombus-shaped tetranuclear gadolinium clusters showing magnetic refrigeration

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Abstract

Two new tetranuclear gadolinium clusters, $[Gd_4(\mu_3\text{-}OH)_2(L1)_6(beac)_4]$ (**1**) and $[Gd_4(\mu_3\text{-}OH)_2(L2)_6(tmhd)_4]$ (**2**) (HL1 = 5-(3-chlorobenzylidene)-8-hydroxylquinoline, HL2 = 5-(2-thenylidene)-8-hydroxylquinoline, beac = 1-benzoylaceton, tmhd = 2,2,6,6-tetramethyl-3,5-heptanedione), have been synthesized, then structurally and magnetically characterized. The X-ray structural analysis showed that both clusters **1** and **2** contain one Gd_4 center with a rhombus-shaped arrangement, and all of the Gd(III) ions are located in a distorted square-antiprismatic coordination sphere. Magnetic property measurements indicate that **1** and **2** show magnetic refrigeration with $-\Delta S_m$ = 20.43 J kg^{-1} K^{-1} for ΔH = 7 T at 2.0 K for **1** and $-\Delta S_m$ = 19.94 J kg^{-1} K^{-1} for ΔH = 7 T at 2.5 K for **2**.

***Keywords*:** tetranuclear gadolinium clusters; magnetic property; magnetic refrigeration.

1. Introduction

Lanthanide polynuclear complexes have emerged as an active area of research in the recent past due to their potential applications in molecular magnetism, luminescent sensing and catalysis [1-3]. From the magnetic properties aspect, the research of molecular magnetic materials for refrigeration has been a hotspot of inorganic chemistry and materials chemistry in these years due to the hope of replacing the expensive helium-3 for cryogenic refrigeration [4]. Magnetic refrigeration is based on the magnetocaloric effect (MCE), which depends on the entropy change of a material when placed in a magnetic field [5]. Molecules with

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