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Butterfly shaped tetranuclear dysprosium compound displaying slow magnetic relaxation features

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Abstract:

One new tetranuclear dysprosium compound, namely $[\text{Dy}_4(\mu_3\text{-OH})_2(\text{L})_6(\text{tmhd})_4] \cdot \text{CH}_3\text{CN}$ (**1**) (HL = 5-(4-methylbenzylidene)-8-hydroxyquinoline; tmhd = 2,2,6,6-tetramethyl-3,5-heptanedione) was successfully synthesized and characterized. The structure of **1** was established by the single crystal X-ray diffraction technique, and the center Dy(III) ions was bridged by $\mu_3\text{-OH}$ molecules and phenoxide oxygen atoms, displaying a ‘butterfly’ arrangement. Magnetic studies reveal that weak ferromagnetic interaction between adjacent Dy(III) exists in **1**. Additionally, it also exhibits slow magnetic relaxation behaviors with the energy barrier of 46.4 K.

1. Introduction

Since the discovery of the famous $[\text{Mn}_{12}\text{O}_{12}(\text{OAc})_{16}(\text{H}_2\text{O})_4]$ that exhibits slow magnetic relaxation, single-molecule magnets (SMMs) have received much attention due to their prospects of application in information storage and quantum computing [1]. For the past several years, for further development of this field, much efforts have been focused on the pursue of an high anisotropic energy barrier [2]. Lanthanide compounds are good candidates for achieving this purpose compared to the transition-metal based SMMs because of their large magnetic anisotropy. Thus, many Dy-based compounds with dazzling of topologies based on dimeric [3], triangular [4], square-shape [5], or square-based pyramid [2c, 6], or defect-dicubane [2b, 7], have

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