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PII: S0277-5387(18)30218-3  
DOI: <https://doi.org/10.1016/j.poly.2018.04.041>  
Reference: POLY 13143

To appear in: *Polyhedron*

Received Date: 19 March 2018  
Accepted Date: 27 April 2018

Please cite this article as: Q-L. Wang, R-F. Wu, C-Z. Cai, R-X. Yue, Y. Gao, P-F. Shi, W-M. Wang, A series of rhombus-shaped  $\text{Ln}_4$  clusters: syntheses, structures, luminescence properties and the SMM behavior of the  $\text{Dy}_4$  analogue, *Polyhedron* (2018), doi: <https://doi.org/10.1016/j.poly.2018.04.041>

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# A series of rhombus-shaped Ln<sub>4</sub> clusters: syntheses, structures, luminescence properties and the SMM behavior of the Dy<sub>4</sub> analogue

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## Abstract

A series of tetranuclear lanthanide(III) clusters, namely, [Ln<sub>4</sub>(μ<sub>3</sub>-OH)<sub>2</sub>L<sub>6</sub>(acac)<sub>4</sub>]·xCH<sub>3</sub>CN (Ln(III) = Tb(**1**), Dy(**2**) and Ho(**3**), HL = 5-(4-o-hydroxybenzylidene)-8-hydroxylquinoline; acac = acetylacetone), have been synthesized and completely characterized. The X-ray structural analysis exhibit that clusters **1-3** contain one Ln<sub>4</sub> center with rhombus-shaped arrangement, and each Ln(III) ion of them is located in a distorted square-antiprismatic coordination sphere. Magnetic measurements indicated that single molecule magnets behaviors were observed in **2**, with energy barrier ( $\Delta E/k_B$ ) of 55.17 K and  $\tau_0 = 8.19 \times 10^{-7}$  s. Additionally, luminescence properties study reveal that **1** and **2** display the characteristic Tb<sup>III</sup> and Dy<sup>III</sup> luminescence at room temperature.

**Keywords:** tetranuclear lanthanide(III) clusters; structures; magnetic properties; luminescence properties; single molecule magnets behaviors

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