

## A family of $[\text{Mn}^{\text{III}}_6\text{Ln}^{\text{III}}_2]$ rod-like clusters.

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### Rok wydania

2015

### Czasopismo

Dalton Transactions

### Numer woluminu

44

### Strony

6082-6088

### DOI

10.1039/c5dt00300h

### Kolekcja

Naukowa

### Język

Angielski

### Typ publikacji

Artykuł

### Streszczenie

Employment of LH3 (= 2-( $\beta$ -naphthalideneamino)-2-hydroxymethyl-1-propanol) in mixed-metal manganese-lanthanide cluster chemistry has led to the isolation of five new octametallc heteronuclear isostructural  $[\text{Mn}^{\text{III}}_6\text{Ln}^{\text{III}}_2]$  complexes. More specifically, the reaction of  $\text{Mn}(\text{ClO}_4)_2 \cdot 6\text{H}_2\text{O}$  with LH3 and the corresponding lanthanide nitrate in MeCN in the presence of base, NEt<sub>3</sub>, yielded five complexes with the general formula  $[\text{Mn}^{\text{III}}_6\text{Ln}^{\text{III}}_2\text{O}_2(\text{OH})_2(\text{H}_2\text{O})_2(\text{LH})_6(\text{NO}_3)_6] \cdot 6\text{MeCN} \cdot 0.5\text{H}_2\text{O}$  (Ln: Gd, 1.6MeCN.0.5H<sub>2</sub>O; Tb, 2.6MeCN.0.5H<sub>2</sub>O; Dy, 3.6MeCN.0.5H<sub>2</sub>O; Er, 4.6MeCN.0.5H<sub>2</sub>O). Furthermore, the YIII analogue,  $[\text{Mn}^{\text{III}}_6\text{Y}^{\text{III}}_2\text{O}_2(\text{OH})_2(\text{H}_2\text{O})_2(\text{LH})_6(\text{NO}_3)_6] \cdot 6\text{MeCN} \cdot 0.5\text{H}_2\text{O}$  (5.6MeCN.0.5H<sub>2</sub>O), was also synthesized in the same manner. All five clusters describe a central rod-like topology consisting of four face-sharing defective cubane metallic units, forming a planar hexametallc  $[\text{Mn}^{\text{III}}_4\text{Ln}^{\text{III}}_2]$  core, which is further capped by two Mn<sup>III</sup> ions. Dc magnetic susceptibility studies in the 5 – 300 K range for complexes 1-5 reveal the presence of dominant antiferromagnetic exchange interactions within the metallic clusters, while ac magnetic susceptibility measurements show temperature and frequency dependent out-of-phase signals for the DyIII analogue (3.6MeCN.0.5H<sub>2</sub>O), suggesting potential single molecule magnetism character. Furthermore, the YIII analogue yielded a diamagnetic ground-state for the  $[\text{Mn}^{\text{III}}_6]$  core, thus proving that the SMM character displayed by 3.6MeCN.0.5H<sub>2</sub>O is due to the presence of the DyIII centres.

### Adres publiczny

<http://dx.doi.org/10.1039/c5dt00300h>

### Strona internetowa wydawcy

<https://www.rsc.org/>

Plik został wygenerowany dnia 2026-05-12 16:26:59

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