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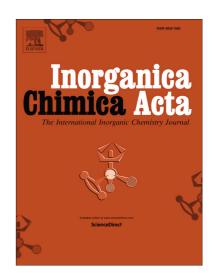
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ACCEPTED MANUSCRIPT

Supertetrahedral T2 Clusters in 3d-4f $\{Fe_4Ln_6\}$: Synthesis, Crystal Structure, Magnetic and Photoluminescent Properties

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ABSTRACT

Two new isomorphous Iron(III)-lanthanide(III) coordination clusters of general formula $[Fe_4Ln_6(bpte)_4(\mu_4-O)_4(EG)_4(\mu_3-OMe)_{3.3}(\mu_3-Cl)_{0.70}Cl_2(MeOH)_2][Fe_4Ln_6(bpte)_4(\mu_4-O)_4(EG)_4(\mu_3-OMe)_4Cl_2(MeOH)_2]\cdot 30H_2O\cdot MeOH (H_2bpte = 1,2-bis(3-(pyridin-2-yl)-1H-1,2,4-triazol-5-yl)ethane, EG = ethylene glycol, Ln = Dy(1), Ho(2)) have been successfully synthesized under hydrothermal conditions. The crystal structure of 2 consists of two asymmetric units having two isostructural cores <math>\{Fe_4Ho_6(\mu_4-O)_4\}$ of T2 supertetrahedral cluster nuclei ultra-structural unit. Both complexes 1 and 2 are found to be isomorphous which is confirmed by FTIR, elemental analysis, PXRD, and thermal studies. These are the first supertetrahedral T2 coordination clusters reported as 3d-4f system. The magnetic measurements indicate that antiferromagnetic coupling in both of these complexes. The solid-state photoluminescent measurements for 1 and 2 were done but only 1 gave rise to a measurable emission peaks which are associated with the $4f \rightarrow 4f$ transitions with a maximum at 574 nm (cyan emission).

Keywords

Coordination Clusters, Lanthanides, Transition metal, T2 supertetrahedral, 3d-4f complexes

1. Introduction

In recent years, the synthesis and characterization of high-nuclearity metal complexes like polyoxometalates (POMs), metal chalcogenides ^{1,2} and metal-organic frameworks (MOFs) ³ have received considerable attention in chemistry, physics and materials science. An example of these architecture structures are supertetrahedral with T2, T3 and T4 topologies, which are usually

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