www.elsevier.com/locate/jssc

Structural variations in terbium(III) complexes with 1,3-adamantanedicarboxylate and diverse co-ligands

Pierre Thuéry

PII: S0022-4596(15)00115-2
DOI: http://dx.doi.org/10.1016/j.jssc.2015.01.036
Reference: YJSSC18842

To appear in: *Journal of Solid State Chemistry*

Received date: 15 December 2014
Revised date: 23 January 2015
Accepted date: 24 January 2015

Cite this article as: Pierre Thuéry, Structural variations in terbium(III) complexes with 1,3-adamantanedicarboxylate and diverse co-ligands, *Journal of Solid State Chemistry,* http://dx.doi.org/10.1016/j.jssc.2015.01.036

Structural variations in terbium(III) complexes with 1,3-adamantanedicarboxylate and diverse co-ligands

Pierre Thuéry[a,*]

[a] *CEA, IRAMIS, NIMBE, LCMCE, UMR 3685 CEA/CNRS, Bât. 125, 91191 Gif-sur-Yvette, France.*

E-mail: pierre.thuery@cea.fr

ABSTRACT

Terbium nitrate was reacted with 1,3-adamantanedicarboxylic acid (LH_2) under solvo-hydrothermal conditions with either *N,N*-dimethylformamide (DMF) or *N,N*-dimethylacetamide (DMA) as organic solvents. Hydrolysation of the latter co-solvents resulted in the formation of formate or acetate ions, respectively, which are present as co-ligands in the 1D coordination polymer $[Tb(L)(HCOO)(H_2O)_2]$ (**1**) and the 2D assembly $[Tb(L)(CH_3COO)(H_2O)]$ (**2**). The increase in dimensionality in the latter arises from the higher connectivity provided by acetate versus formate, the L^{2-} ligand being bis-chelating in both cases. The complex $[Tb_2(L)_3(H_2O)_5][Tb_2(L)_3(H_2O)_4]\cdot 3H_2O$ (**3**), another 1D species, crystallizes alongside crystals of **2**. Further addition of cucurbit[6]uril (CB6), with DMF as co-solvent, gave the two complexes $[Tb_2(L)_2(CB6)(H_2O)_6](NO_3)_2\cdot 6H_2O$ (**4**) and $[H_2NMe_2]_2[Tb(L)(HCOO)_2]_2\cdot CB6\cdot 3H_2O$ (**5**). Complex **4** crystallizes as a 3D framework in which $Tb(L)^+$ chains are connected by tetradentate CB6 molecules, while **5** unites a carboxylate-bridged anionic 2D planar assembly and layers of CB6 molecules with counter-cations held at both portals.

Keywords: Terbium(III); Coordination polymers; Structure elucidation; Carboxylate ligands

1. Introduction

The use of hydrothermal methods for the synthesis of hybrid metal–organic polymeric species is widespread, in particular in the case of those based on trivalent lanthanide cations, which elicit much interest, mostly for their distinctive optical properties.[1] However, an interesting modification of the synthesis conditions consists in using mixtures of water and organic solvents.