

Abstract

This thesis focuses on the synthesis, structural characterization by x-ray powder and single crystal diffraction, IR spectroscopy and magnetic properties of two series of coordination complexes based on two derivatives of cinnamic acid and lanthanide ions. The reaction of 2-ethoxycinnamic led to six dinuclear complexes forming three iso-structural series with general formula:

- $[\text{Ln}^{\text{III}}(\text{L}^1)_3(\text{DMSO})(\text{H}_2\text{O})]_2$ (Ln=Ce (III) (**1**), Nd (III) (**2**))
- $[\text{Ln}^{\text{III}}(\text{L}^1)_3(\text{DMSO})_x(\text{DMF})_y(\text{H}_2\text{O})]_2$ (Ln=Gd (**3**), Dy (**5**) et Er (**6**))
- $[\text{Tb}^{\text{III}}(\text{L}^1)_3(\text{DMF})(\text{H}_2\text{O})]_2$ (**4**)

Investigations of their magnetic properties reveals a genuine Single Molecule Magnet behaviour observed for the dysprosium-based compound **5**, while a field-induced slow relaxation of the magnetization is found for compounds **1**, **2** and **3**.

While the reaction with 3-ethoxycinnamic acid with the same lanthanide ions, led us to nine extended structures forming four iso-structural series with corresponding formula:

- $\{[\text{Ln}(\text{L}^2)_3(\text{H}_2\text{O})] \cdot \text{DMF}\}_n$ (Ln=Ce (**1**), Nd (**2**) et Gd (**3**))
- $\{[\text{Ln}(\text{L}^2)_3][\text{Ln}(\text{L}^2)_3(\text{H}_2\text{O})] \cdot \text{DMF}\}_n$ (Ln=Gd (**4**), Tb (**5**), Dy (**6**) et Er (**7**))
- $\{[\text{Dy}(\text{L}^2)_3][\text{Dy}(\text{L}^2)_3(\text{H}_2\text{O})] \cdot \text{DMSO}\}_n$ (**8**)
- $\{[\text{Yb}(\text{L}^2)_3][\text{Yb}(\text{L}^2)_3(\text{H}_2\text{O})] \cdot \text{DMSO}\}_n$ (**9**)

Despite all compounds are based on the formation of infinite lanthanide-carboxylate chains, the structural study shows differences in the coordination environment of the lanthanide ions, and in the bridging modes of the carboxylate groups. This is also reflected on the supramolecular packing of the formed chains. Investigations of their magnetic properties reveal a field-induced slow relaxation for compounds **2**, **4** and **9**. Magnetic measurements revealed different magnetic interactions between the lanthanides ions, ferromagnetic interactions were highlighted for compound **4** (Gd) and **7** (Er), whereas for the other compound based on Gd (**3**), no significant magnetic interaction was observed, which could be justified by the different nature of the carboxylate bridges and the intermetallic distances.

Key words: Carboxylate bridges / lanthanides ions / cinnamic acid / DRX / Magnetic properties.