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Synthesis of novel 1D materials by self-assembly of Ln^{3+} and $[Ru^{III}Cl_2(ox)_2]^{3-}$ building blocks

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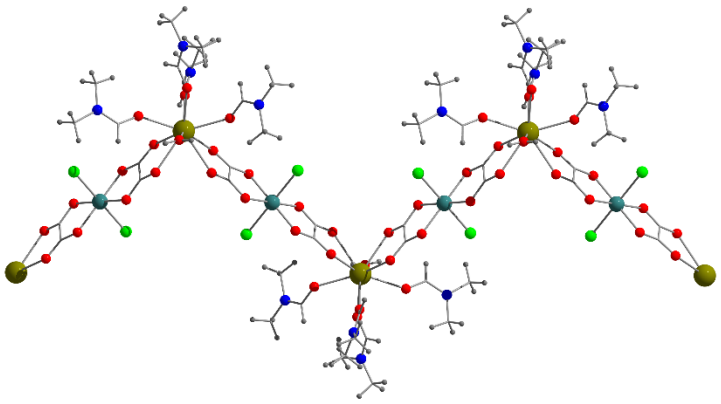
Ruthenium(III) coordination compounds are of great interest due to their possible applications such as catalysts, antitumor agents, or components in magnetic devices or solar cells. Additionally, oxalate groups are well known by their ability to act as bridging ligands in the formation of coordination polymers. In this work, the mononuclear compound *trans*-$(PPh_4)_2[RuCl_2(Hox)(ox)]\cdot 5H_2O$ (**1**) (ox = oxalate) was synthesized by hydrothermal synthesis from $RuCl_3\cdot 3H_2O$, oxalic acid and potassium oxalate, and was isolated as tetraphenylphosphonium salt from a strongly acidic aqueous solution. The reaction of **1** with $LnCl_3\cdot xH_2O$ in water: dimethylformamide (dmf) yields yellow crystals of $[Ln(dmf)_4(H_2O)_x(\mu\text{-}ox)_2Ru]_n$ (Ln = La (**2**), Ce(**3**), Gd (**4**), Tb (**5**), Dy(**6**) and Ho(**7**)). The new compounds were preliminary characterized by FT-IR and UV-vis spectroscopy, C, H and N elemental analysis and X-ray fluorescence. Their crystal structure is made up of $[Ln(dmf)_4]^{3+}$ or $[Ln(dmf)_4(H_2O)]^{3+}$ units linked by $[RuCl_2(ox)_2]^{3-}$ anions to form neutral zig-zag chains. Each $[RuCl_2(ox)_2]^{3-}$ unit contains a Ru(III) atom in a distorted octahedral geometry. The oxalate ligands act as didentate toward both metallic centers. Smaller lanthanide ions such as Dy(III) are 8-coordinated by two oxalate groups from two $[RuCl_2(ox)_2]^{3-}$ anions and four O atoms from dmf molecules. Larger lanthanide ions such as La(III) are 9-coordinated, with an additional O atom from one water molecule.



Molecular structure of (**2**), with hydrogen atoms ommited for clarity.

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