

MS30-P30 Metal-organic frameworks assembled from lanthanide and 2,5-pyridinedicboxylate with cubane-like $[Ln_4(OH)_4]$ building units

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Lanthanide-organic frameworks (LOFs) have recently gained tremendous attention due to their luminescence¹ and magnetic properties². However, the unique features of Ln^{3+} make them ideal for developing new multifunctional materials. Herein, three novel LOFs based on 2,5-pyridinedicboxylate (**25p**) ligand, formulated as $[Yb_4(OH)_4(25p)_4(H_2O)_3] \cdot H_2O$ (**25pYb**), $[Y_4(OH)_4(25p)_4(H_2O)_3] \cdot H_2O$ (**25pY-1**) and $[Y_6(OH)_8(25p)_5(H_2O)_2]$ (**25pY-2**), have been obtained as single phases under hydrothermal conditions. **25pYb** and **25pY-1**, crystallize in the triclinic space group, $P\bar{1}$, with $a = 8.6075(5)$ Å, $b = 14.8478(7)$ Å, $c = 15.9164(9)$ Å, $\alpha = 86.277(4)^\circ$, $\beta = 80.196(5)^\circ$, $\gamma = 81.785(4)^\circ$ for **25pYb**, and $a = 8.7166(6)$ Å, $b = 14.966(1)$ Å, $c = 15.966(1)$ Å, $\alpha = 86.260(6)^\circ$, $\beta = 80.036(6)^\circ$, $\gamma = 81.599(6)^\circ$ for **25pY-1**, while, **25pY-2** crystallizes in the monoclinic space group, $P2_1/c$, with $a = 24.912(7)$ Å, $b = 13.7340(8)$ Å, $c = 14.3385(10)$ Å, $\beta = 100.551(7)^\circ$. The compounds have been characterized by single-crystal X-ray diffraction, X-ray powder diffraction, thermal analyses (TG-MS), scanning electron microscopy (SEM-EDX), and powder X-ray thermodiffraction analysis. **25pYb** is isostructural to **25pY-1** and their structures are based on isolated tetranuclear cuban-like $[Ln_4(OH)_4]^{8+}$ clusters, which are interconnected to eight neighbouring clusters through **25p** ligands leading to neutral 3D framework. While **25pY-2** is based on two independent cuban-like $[Y_4(OH)_4]^{8+}$ clusters, which are joined together through Y1 cation leading to the formation of a hexanuclear $[Y_6(OH)_8]^{10+}$ clusters, which in turn are joined via Y2 cation resulting in infinite inorganic chain extending along c -axis, and these chains are connected through **25p** ligands leading finally to 3D framework. The luminescence properties of Eu^{3+} and Tb^{3+} doped **25pY-1** and **25pY-2** compounds have also been investigated and exhibit, respectively, strong red and green light emissions which are due to the efficient energy transfer process from the **25p** ligand to Eu^{3+} and Tb^{3+} .

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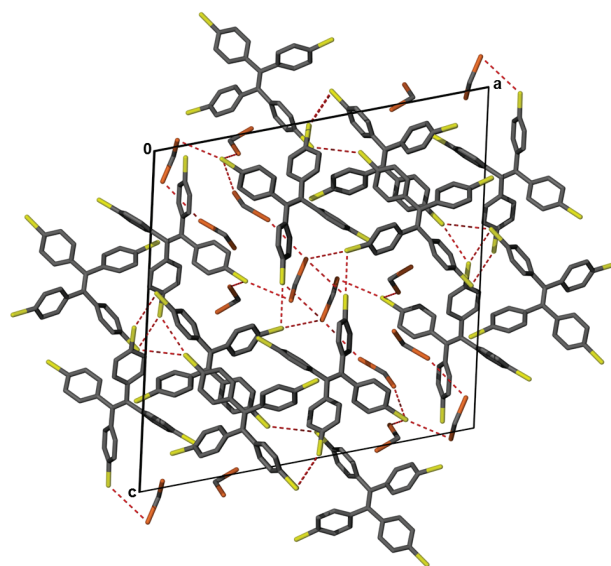


Figure 1. Cuban-like $[Yb(OH)_4]^{8+}$ cluster (a). The two independent cuban-like clusters (b). Projection of **25pYb** along the a -axis (c). Perspective view of the **25pY-2** along b -axis (d). Green emission for **25pYTb-1** (e) and red emission for **25pYEu-2** (f) upon UV light excitation.

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