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Lanthanide-organic frameworks (LOFs) have recently gained tremendous attention due to their luminescence and magnetic properties. However, the unique features of Ln\textsuperscript{3+} make them ideal for developing new multifunctional materials. Herein, three novel LOFs based on 2,5-pyridinedicaboxylate (25p) ligand, formulated as [Yb\textsubscript{2}(OH)\textsubscript{2}(25p)]\textsubscript{(SH\textsubscript{2}O\textsubscript{3})\textsubscript{2}H\textsubscript{2}O (25pYb)], [Y\textsubscript{2}(OH)\textsubscript{2}(25p)]\textsubscript{(SH\textsubscript{2}O\textsubscript{3})\textsubscript{2}H\textsubscript{2}O (25pYb)], and [Y\textsubscript{2}(OH)\textsubscript{2}(25p)]\textsubscript{(SH\textsubscript{2}O\textsubscript{3})\textsubscript{2}H\textsubscript{2}O (25pYb-2)], have been obtained as single phases under hydrothermal conditions. 25pYb and 25pY-1 crystallize in the triclinic space group, P\texttextsuperscript{-1}, with a = 8.6075(5) Å, b = 14.8478(7) Å, c = 15.9164(9) Å, α = 86.277(4)°, β = 80.196(5)°, γ = 81.785(4)° for 25pYb, and a = 8.7166(6) Å, b = 14.966(1) Å, c = 15.966(1) Å, α = 86.260(6)°, β = 80.036(6)°, γ = 81.599(6)° for 25pY-1, while, 25pY-2 crystallizes in the monoclinic space group, P2\texttextsuperscript{1}/c, with a = 24.912(7) Å, b = 13.7340(8) Å, c = 14.3385(10) Å, β = 100.551(7)°. 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 cubane-like [Ln\textsubscript{4}(OH)\textsubscript{4}]\textsuperscript{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 cubane-like [Y\textsubscript{4}(OH)\textsubscript{4}]\textsuperscript{8+} clusters, which are joined together through Y1cation leading to the formation of a hexanuclear[Y\textsubscript{6}(OH)\textsubscript{8}]\textsuperscript{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\textsuperscript{3+} and Tb\textsuperscript{3+} doped 25pYb-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\textsuperscript{3+} and Tb\textsuperscript{3+}.


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Figure 1. Cubane-like [Yb\textsubscript{2}(OH)\textsubscript{2}]\textsuperscript{6+} cluster (a). The two independent cubane-like clusters (b). Projection of 25pYb along the a-axis (c). Perspective view of the 25pYb-2 along b-axis (d). Green emission for 25pYb-1(e) and red emission for 25pYb-2 (f) upon UV light excitation.

Keywords: LOFs, Clusters, Luminescence