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Novel cobalt(II) coordination complexes based on 3,4,5-trifluorobenzeneseleninic acid and different N-donor ligands

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Abstract

Three novel cobalt(II) coordination complexes constructed by 3,4,5-trifluorobenzeneseleninic acid (L) and different N-donor ligands, namely, $[\text{Co}(4,4'\text{-bpy})(\text{L})_2]_n$ (**1**), $[\text{Co}(2,2'\text{-bpy})(\text{L})_2]_n$ (**2**), $[\text{Co}_2(\text{en})_4(\text{L})_2(\text{NO}_3)_4] \cdot (\text{CH}_3\text{CN})_2$ (**3**). (4,4'-bpy = 4,4'-bipyridine, 2,2'-bpy = 2,2'-bipyridine, and en = ethylenediamine) have been designed, synthesized and characterized by IR spectroscopy, elemental analysis, single-crystal X-ray diffraction analyses. In the three complexes above, the 3,4,5-trifluorobenzeneseleninic acid ligand adopt *anti-anti* bridging coordination mode and all the cobalt ions show distorted octahedral configurations. Complex **1** displays a 2D layer structure, which is further connected by $\pi \cdots \pi$ interactions to give rise to a 3D supramolecular structure. The structure of complex **2** exhibits 1D tube-like double chain structure and the neighboring chains are further linked by hydrogen-bonds $\text{C-H} \cdots \text{F}$ and $\pi \cdots \pi$ interactions to form a 3D supramolecular structure. However, complex **3** is a monomer which can be connected into a 2D supramolecular layer through the intermolecular $\text{C-H} \cdots \text{O}$ hydrogen-bonds interaction. In addition, the magnetic properties of complexes **1** and **2** are characterized.

Keywords: cobalt(II) coordination complexes; 3,4,5-trifluorobenzeneseleninic acid; N-donor ligands; X-ray crystallography; Structural characterization

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