

Rectangular grids formed by hydrogen-bonding interactions between successive chains of linear polymers [Co(II)-4,4'-bpy-Co(II)]_n and their inclusion properties: Synthesis and single crystal investigations

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Three cobalt(II) coordination polymers [Co(4,4'-bpy)(H₂O)₂(ClO₄)₂].4,4'-bpy.H₂O **1**, [Co(4,4'-bpy)(H₂O)₄](ClO₄)₂. 4,4'-bpy. H₂O **2** and [Co(4,4'-bpy)(H₂O)₄](succinate). 2H₂O linking the metal centres via exobidentate ligand 4,4'-bipyridyl have been synthesized and structurally characterized. The crystal structures of all these complexes have in common a one-dimensional linear polymer linking the Co centres by 4,4'-bpy; **1** is a neutral complex, with the perchlorate ion coordinated to the metal, whereas **2** and **3** are cationic with perchlorate and butanedioate anions present respectively in the lattice.

The interesting feature of all the polymeric networks is the presence of strong O–H...N interactions between the included 4,4'-bpy moieties in **1** and **2** with the coordinated water molecules and O–H...O interaction of the succinate dianion with the coordinated water in **3** forming an H-bonded rectangular sheet structure which crosslinks the adjacent layers. All the structures have non-interpenetrating cavities of rhombic shape (as shown in the figure) which are occupied either by water molecules or counter anions involved in strong H-bonding with the coordinated water molecules. Consequently, a rational approach to achieve higher dimensional network structures has been attempted using appropriate ligands.

