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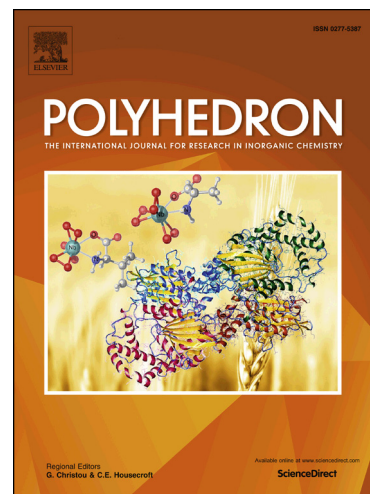
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Syntheses, structural diversity and dye adsorption properties of various Co(II) coordination polymers based on rigid tris(imidazolyl) and dicarboxylate ligands

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Abstract

Three novel Co(II) coordination polymers, namely $\{[\text{Co}(\text{tib})_2] \cdot 2\text{HNO}_3 \cdot 2\text{H}_2\text{O}\}_n$ (**1**), $\{[\text{Co}(\text{tib})(4,4'\text{-dpt})(\text{H}_2\text{O})_2] \cdot 5\text{H}_2\text{O}\}_n$ (**2**) and $\{[\text{Co}_2(\text{tib})_2(1,3\text{-dpb})_2] \cdot \text{H}_2\text{O}\}_n$ (**3**) (tib = 1,3,5-tris(1-imidazolyl)-benzene, 4,4'-dpt = p-terphenyl-4,4'-dicarboxylic and 1,3-dpb = 1,3-di(4'-carboxyl-phenyl)benzene) were synthesized under solvo/hydrothermal conditions. These complexes were characterized by elemental analysis, IR spectra, powder X-ray diffraction (PXRD), thermogravimetric (TG) analysis and single-crystal X-ray diffraction. Complex **1** shows a rare **kgd** 2D-network compared with the normal (3,6)-connected networks (**anh**, **ant**, **apo**, **brk**, **pyr**, **rtl**), which is further assembled into a 3D architecture through H-bonds and C-H...O bonds. Complex **2** exhibits a **hcb** 2D-network, which is further assembled into a 3D supramolecular framework through hydrogen bonding interactions, while complex **3** shows an unprecedented 3-nodal (3,4,6)-connected 3D framework with the Schläfli symbol $(6^2 \cdot 7)^2(6^4 \cdot 7^5 \cdot 8^4 \cdot 9 \cdot 10)(6^4 \cdot 8^2)$. Interestingly, the whole structure of the tib-metallic complex **3** also shows an unprecedented 3D framework with $(6^2 \cdot 8^2 \cdot 10^2)(6^2 \cdot 8)^2$ topology, which is influenced by the “V”-shaped 1,3-dpb ligands in **3**. Furthermore, dye adsorption studies indicate that complexes **1** and **2** can selectively adsorb MGO and GR, while complex **3** can selectively adsorb MO.

Keywords: Cobalt coordination polymers; Tib-metallic structure; Dye adsorption.

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