A Hybrid Cobalt Hydroxyacetate: Ionothermal Synthesis, 3-D Co-O-Co Connectivity and Spin Glass Behavior

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Synthesis of $[\text{Co}_3(\text{OH})(\text{Oac})_2]_2$ (I): A mixture of $\text{Co(OAc)}_2\cdot4\text{H}_2\text{O}$ (0.150g, 0.6mmol) [bmm][BF$_4$] (1.260g, 1ml) were sealed and heated in a 15 mL Teflon-lined stainless steel autoclave at 180 °C for 5 days. After cooling to room temperature and washing with anhydrous ethanol. Purple block crystals were collected with ~75% yield. Anal. Calcd for I: C$_{8}$$H_{14}$$\text{Co}_3$$O_{10}$: C, 21.50; H, 3.16, Co, 39.55, O, 35.79. Found: C, 21.23; H, 3.06, Co, 39.98. IR(KBr, cm$^{-1}$): 3585w, 3427m, 3027w, 2995w, 2856w, 2766w, 1575s, 1424s, 1345s, 1033s, 954w, 688s, 611s.

Figure S1 View of perpendicular arrangement of the vertex-sharing octahedral ($\text{CoO}_3$)$_\infty$ chains in $a$- and $b$-axis directions.

Figure S2 polyhedral view of three-dimensional structure formed by connection of
vertex-sharing octahedral chains via Co(1) atoms. Green and purple octahedra represent Co(1) and Co(2), respectively.

**Figure S3** TGA and DTA curves of 1 in air at the heating rate of 10°C per min.

**Figure S4.** The magnetic hysteresis loop of 1 measured at 2, 2.6, 2.8 and 3 K.