Non-traditional thermal behavior of Co(II) coordination networks showing slow magnetic relaxation.

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Three new coordination polymers, one-dimensional ones $[Co(5,6\text{-}(Me)_2\text{-}bzim)_2(dca)_2]$ (**1**) and $[Co(5\text{-}Mebzim)_2(dca)_2]_n$ (**2**) and two-dimensional polymer $[Co(2\text{-}Mebzim)(dca)_2]_n$ (**3**), show DC magnetic data consistent with the $S = 3/2$ spin system with large zero-field splitting $D > 0$, which was confirmed by high-field HF EPR and FIRMS measurements. The experimental spectra of all complexes were simulated with axial g tensor components, a very large positive D value and different E/D ratios. These systems exhibit a slow magnetic relaxation under the moderate DC magnetic field with two relaxation channels. The high-frequency relaxation time develops according to combined Raman and phonon bottleneck relaxation mechanisms resulting from the unexpected thermal reciprocating behaviour when the low temperature relaxation time for the HF channel during cooling is shortened.

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