A new class of thermo- and solvatochromic metal–organic frameworks based on 4-(pyridin-4-yl)benzoic acid

Abstract

Using 4-(pyridin-4-yl)benzoic acid, 44pba (1) as a ligand, two new metal-coordination networks $[\text{Co}_4(44\text{pba})_8]_n\cdot[(\text{DMF})_3\cdot(\text{EtOH})_{0.25}\cdot(\text{H}_2\text{O})_4]_n$ (2) and $[\text{Ni}_4(44\text{pba})_8]_n\cdot[(\text{DMF})_{3.5}\cdot(\text{EtOH})\cdot(\text{H}_2\text{O})_{1.5}]_n$ (3) were synthesized by solvothermal methods and structurally characterized. Compounds 2 and 3 are isostructural but differ in their solvent content. Each is a 2D-network which forms a spiral parallel to [001], giving rise to three distinct large channels, accounting for some 47% of the unit cell volume. Both 2 and 3 display water-induced phase transformations with chromotropism, which has been confirmed by TGA and XRPD analysis. Solvatochromism in 2 is also evident with crystals exhibiting a range of colours depending on the solvent included. This phenomenon has been characterized using TGA, XRPD and UV-vis spectrophotometry.