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Single crystal to single crystal transformations in Co(II)-tricarboxylate metal-organic frameworks.

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Metal-organic frameworks (MOFs) are an emerging class of crystalline materials made by connecting a metal ion or cluster to polytypic organic linkers. They have a wide range of potential applications in gas storage, catalysis, drug delivery, sensing, separation, and magnetism.^{3,4}

Single crystal to single crystal (SC-SC) transformation is a phenomenon where significant changes in the crystal structure occur in the solid state without destroying the integrity of the crystal such that it can still be analyzed by means of X-ray diffraction. Single crystal transformations are important for the development of new and technologically useful materials including devices and sensors.

In this work, various MOFs including $\{Co_3(\mu_3-O)(BTC)_2(H_2O)_4.5(EtOH)_0.5(DMF)_2\}_n$ (1), $\{Co_{1.5}(\mu_3-O)(BTB)(H_2O)_3.5(DMF)_1.5\}_n$ (2), $Co_3(\mu_3-O)(BTB)_2(OH)_2 \cdot 32(H_2O) \cdot 13.2(3)$, $Co_{1.5}(\mu-OH)_0.5BTB(OH)_2(DMF)_0.5 \cdot 0.5(H_2O)_6$ (4) and $Co_{0.25}C_6.75H_4.5N_{0.25}O$, (4'), (BTC= 1,3,5-benzenetricarboxylate, BTB=4,4',4''-benzene-1,3,5-triyltrisbenzoate, DMF= N,N-dimethylformamide, EtOH=ethanol) were synthesized with ethanol and DMF using solvothermal methods. They were fully characterized using X-ray diffraction methods, infrared spectroscopy, elemental analysis and thermal methods. X-ray analysis reveals that (1) crystallizes in the orthorhombic system with space group of Iba_2 , while (2), (3) and (4) crystallize in the orthorhombic system, space group $Pnma$. (4') crystallizes in the cubic system, space group $Pm\bar{3}n$. The structures of these MOFs have been elucidated and their applications were investigated.

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