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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 {Co3(μ3-O)(BTC)2(H2O)4.5(EtOH)0.5(DMF)2}n (1), {Co1.5(μ3-O)(BTB)(H2O)3.5(DMF)1.5}n (2), Co3(μ3-O)(BTB)2(OH2)32(H2O)13.2(3), Co1.5(μ-OH)0.5BTB(OH2)(DMF)0.50.5(H2O)6 (4) and Co0.25C6.75H4.5N0.25O, (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 Iba2, while (2), (3) and (4) crystallize in the orthorhombic system, space group Pnma. (4') crystallizes in the cubic system, space group Pm-3n. The structures of these MOFs have been elucidated and their applications were investigated.

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