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Novel Layered Indium Polymeric Framework: Structure and Catalytic Properties

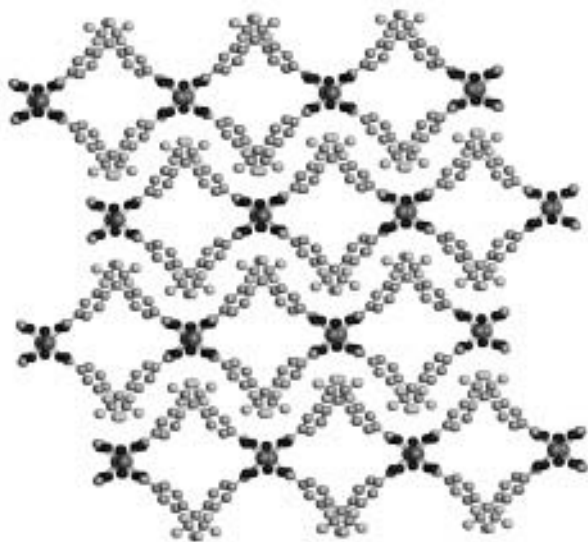
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There currently is a considerable interest in metal-organic polymeric materials inspired by their intriguing structural diversity and potential functions as microporous solids for molecular adsorptions, ion exchange, and heterogeneous catalysis. Benzene multicarboxylate ligands have been found to be useful building blocks in construction of organic-inorganic materials with desired topologies owing to their rich coordination modes. Particularly, in our previous studies [1, 2] on the indium metal-organic frameworks (MOFs) with benzenepolycarboxylic acids, the obtained materials have proven to possess intriguing structural features as well as interesting catalytic properties both in hydrogenation of nitroaromatics, and oxidation of sulfide reactions [1], and in acetalization of aldehydes [2]. Herein, we present the synthesis and crystal structure of the new polymeric indium MOF obtained in the course of hydrothermal reaction of the InCl_3 and 4,4'-(hexafluoroisopropylidene)bis(benzoic) acid, H_2L , in the presence of pyridyl (Py). Its structure was determined by X-ray single-crystal diffraction. Structurally speaking we can conclude that the metal/connector rate is 1:1, the polymeric structure being 2D layered framework.

The material obtained is thermally stable up to $\sim 420^\circ\text{C}$. Catalytic activity of the new MOF has been evaluated as well.



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Isostructural strontium formate, fumarate and acetylenedicarboxylate

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Recent preclinical and clinical investigations have revealed that Sr^{2+} reduces bone resorption while at the same time it provides a stimulation of new bone formation [1]. This combined action on bone metabolism sets Sr^{2+} apart from existing osteoporosis therapies and has led to a growing interest in Sr^{2+} salts with different organic anions. Several organic strontium salts have recently been synthesized and structurally characterized by single-crystal methods, c.f. [2, 3]. However, many salts could not be produced as large enough crystals for single-crystal structure determination. One of those was the strontium fumarate. A powder diffraction database search showed it to be similar to both strontium acetylenedicarboxylate [4] and a high temperature form of strontium formate [5]. The formate exists in several forms, of which only the dihydrate has been fully characterized [6].

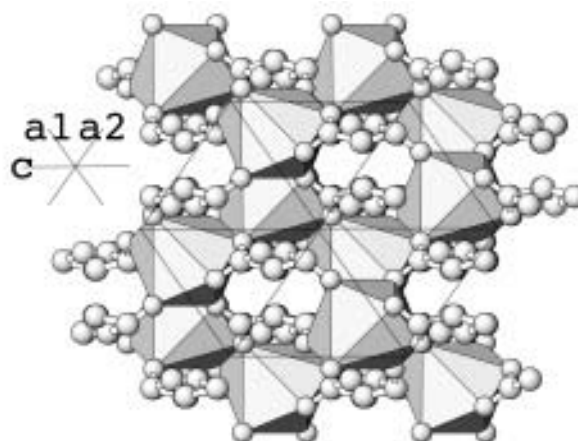


Figure 1. Strontium fumarate, $I4_1/amd$, $a=7.2470(1)$, $c=10.0114(1)$ Å

The purpose of the present study was, by means of X-ray powder diffraction, to clarify the structural relationships between the title compounds at different temperatures. Strontium formate and fumarate were studied by X-ray synchrotron powder diffraction at beamline I711 at MAX-lab, Lund, Sweden, using a wavelength of 1.2518 Å, between 100 and 600 K. Strontium formate (573 K) and strontium fumarate (293 K) were found to be isostructural with strontium acetylenedicarboxylate [4], where the strontium cations adopt a diamond structure (Fig. 1). The formate and fumarate show different structures at different temperatures and, for the formate, different dehydration stages. The structural relationships will be demonstrated and discussed.

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