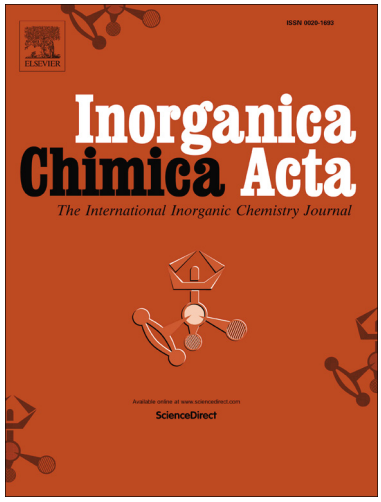

Research paper

Six metal-organic frameworks assembled from asymmetric triazole carboxylate ligands: synthesis, crystal structures, photoluminescence properties and anti-bacterial activities

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PII: S0020-1693(17)31262-8
DOI: https://doi.org/10.1016/j.ica.2017.12.036
Reference: ICA 18070

To appear in: *Inorganica Chimica Acta*

Received Date: 10 August 2017
Revised Date: 2 December 2017
Accepted Date: 29 December 2017

Please cite this article as: Q. Zhang, C. Yue, Y. Zhang, Y. Lü, Y. Hao, Y. Miao, J. Li, Z. Liu, Six metal-organic frameworks assembled from asymmetric triazole carboxylate ligands: synthesis, crystal structures, photoluminescence properties and antibacterial activities, *Inorganica Chimica Acta* (2017), doi: https://doi.org/10.1016/j.ica.2017.12.036

Six metal-organic frameworks assembled from asymmetric triazole carboxylate ligands: synthesis, crystal structures, photoluminescence properties and antibacterial activities

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Abstract

Based on an asymmetric 1-(2-carboxyethyl)-1*H*-1,2,4-triazole-3-carboxylic acid (H_2ctp), six new MOFs $[Cd(ctp)(H_2O)]_n$ (**1**), $[Cd_2(ctp)_2(phen)]_n$ (**2**) [phen=1,10-Phenanthroline monohydrate], $[Cd_2(ctp)_2(pbbbm)(H_2O)_2]_n$ (**3**) [pbbbm=1,4-bis(benzimidazole-1-ylmethyl)benzene)], $[Mn(ctp)(H_2O)]_n$ (**4**), $\{[Pb_2(ctp)_2]\cdot H_2O\}_n$ (**5**) and $[Cu(ctp)(H_2O)_2]_n$ (**6**) have been synthesized and structurally characterized by single-crystal X-ray diffraction, elemental analysis and IR spectroscopy. **1**, **4** and **5** display (4,4)-connected 3-D frameworks which all can be simplified into the Schläfli symbol of $(4^2\cdot6^3\cdot8)$ with *sra* topology, while **2** is also a (4,4)-connected 3-D network which has the Schläfli symbol of $(4^2\cdot8^4)$ with *pts* topology. **3** exhibits a 2-D structure with 3,4L83 topology and **6** is a 1-D chain structure. The fluorescent properties of **1**-**3** and **5** have been studied in the solid state at room temperature. **5** has significantly stronger fluorescence emission than **1**-**3** due to its crystal structure features. The antibacterial activities of **1**-**6** against four strains bacteria of *Bacillus subtilis*, *Staphylococcus aureus*, *Salmonella enteritidis* and *Escherichia coli* have been examined. The results indicated that **2** has better activity against *Bacillus subtilis* than **1**, **3**, **4** and **6** due to the effect of chelation, auxiliary ligands and the Cd(II) ion with the feature of strong toxicity.

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