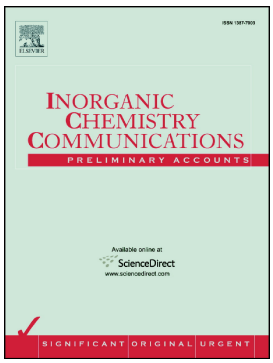

Two novel luminescent Cd(II)/Zn(II) coordination polymers based on 4,4′-(1H-1,2,4-triazol-1-yl)methylene-bis(benzonic acid) for sensing organic molecules and Fe3+ ion

Ya-Ru Huang, Ling-Ling Gao, Jie Zhang, Xiao-Qing Wang, Li-Ming Fan, Tuo-Ping Hu

PII: S1387-7003(18)30098-4
DOI: doi:10.1016/j.inoche.2018.03.010
Reference: INOCHE 6914

To appear in: *Inorganic Chemistry Communications*

Received date: 30 January 2018
Revised date: 23 February 2018
Accepted date: 9 March 2018

Please cite this article as: Ya-Ru Huang, Ling-Ling Gao, Jie Zhang, Xiao-Qing Wang, Li-Ming Fan, Tuo-Ping Hu , Two novel luminescent Cd(II)/Zn(II) coordination polymers based on 4,4′-(1H-1,2,4-triazol-1-yl)methylene-bis(benzonic acid) for sensing organic molecules and Fe3+ ion. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Inoche(2017), doi:10.1016/j.inoche.2018.03.010

Contents lists available at SciVerse ScienceDirect

Inorganic Chemistry Communicaitons

journal homepage: www.elsevier.com/locate/icc

Two Novel Luminescent Cd(II)/Zn(II) Coordination Polymers Based on 4,4'-(1H-1,2,4-triazol-1-yl)methylene-bis(benzonic acid) For Sensing Organic Molecules and Fe^{3+} Ion

Ya-Ru Huang[a], Ling-Ling Gao[a], Jie Zhang[a], Xiao-Qing Wang[a], Li-Ming Fan[a], Tuo-Ping Hu[a*]

[a] Department of Chemistry, College of Science, North University of China, Taiyuan 030051, China.

ARTICLEINFO

Aritcle history:
Received xxxxxx
Accepted xxxxxx
Available online xxxxxx

Keywords:
Coordination polymers
Luminescent detection
Organic solvent molecules
Metal ions

ABSTRACT: Two novel coordination polymers, *{[Cd(TZMB)(1,4-bib)$_{0.5}$]·(H$_2$O)$_{1.5}$}* (**1**) and *{[Zn(TZMB)(1,4-bib)$_{0.5}$]}$_n$* (**2**), have been synthesized under solvothermal conditions. Complex **1** displays a 3D structure with the $(4^7.8^4)(4.7^2.8^3)$ topology and Complex **2** is a 3D structure with the point symbol of $\{4.8^2\}\{4.8^5\}$. And complex **1** shows good luminescent quenching effect for organic solvent molecules (actone and p-nitrophenol) and Fe^{3+}.

In recent years, nitrobenzene derivatives as raw materials are widely used in the syntheses of the dyes and pesticides, but casual emissions of them also pollute the environment [1–2]. Meanwhile, the random disposal of heavy metal ions poses a great threat to mankind. Hence, sensitive and selective detection of them become a pressing issue in protecting environment. And some methods have been used to detect the above-mentioned pollutants, such as ion mobility spectroscopy (IMS), Raman spectroscopy, X-ray methods and so on [3–5]. But these measurements are not always convenient and available because of the high cost and low sensitivity of instruments. In view of the above situation, so it is a realistic job exploring a simple, inexpensive, and sensitive method to detect these substances. A large number of references have been reported on the use of fluorescent complexes as probes, which are superior to traditional methods in terms of cost and sensitivity [6–7].

As we all known, during the process of synthesizing luminescent coordination polymers (LCPs), the selection of metal salts and organic ligands is two key factors, which affect properties of LCPs [8–9]. Firstly, d^{10} metal ions (Zn(II)/Cd(II)) are one of very important candidates on account of their excellent optical properties; Secondly, a ligand containing imidazole and carboxyl groups can adopt diverse coordination modes forming structure-stable and property-excellent LCPs. Inspired by the above mentioned facts, the ligand 4,4'-(1H-1,2,4-triazol-1-yl)methylene-bis(benzonic acid) (H_2TZMB) was chosen as a main linker, and two novel CPs, namely *{[Cd(TZMB)(1,4-bib)$_{0.5}$]·(H$_2$O)$_{1.5}$}* (**1**) and *{[Zn(TZMB)(1,4-bib)$_{0.5}$]}$_n$* (**2**), have been constructed with the help of transition metal ions and 1,4-bib ligands (Scheme S1) under hydrothermal condition and characterized by single-crystal X-ray diffraction analysis, elemental analysis, infrared spectrum analysis (IR), thermogravimetric analysis (TG), topological analysis and powder X-ray diffraction (PXRD). Furthermore, luminescent properties of **1** and **2** were also investigated.

The experimental sections, including instruments and structure refinement, have been listed in the Electronic supplementary information (ESI). Crystallographic data for complexes **1** and **2** are given in Table S1. Selected bond lengths and angles of title complexes are listed in Table S2.

A mixture of H_2TZMB (0.024 mmol, 7.8 mg), 1,4-bib (0.024 mmol, 5.0 mg) and $Cd(NO_3)_2·6H_2O$ (0.024 mmol, 7.40 mg) was dissolved in 3 ml H_2O and 0.05 mL NaOH (0.25 mol·L^{-1}) aqueous solution, and then they were sealed in a 25 ml Teflon-lined stainless steel vessel. After that, the reaction vessel was heated at 110°C for 3000 min. Finally, colorless block crystals of **1** were obtained by cooling to room temperature slowly. And the synthesis process of complex **2** was similar to that of **1**.

**Corresponding author.*
E-mail address: hutuopingsx@126.com.