

Accepted Manuscript

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PII: S0020-1693(18)30177-4
DOI: <https://doi.org/10.1016/j.ica.2018.04.046>
Reference: ICA 18237

To appear in: *Inorganica Chimica Acta*

Received Date: 31 January 2018
Revised Date: 18 April 2018
Accepted Date: 22 April 2018

Please cite this article as: X. Guo, P. Wang, J. Xu, L. Shen, J. Sun, Y. Tao, X. Chen, S. Jing, L. Wang, Y. Fan, A 2D zinc coordination polymer constructed from long and flexible *N*-containing tricarboxylate ligand for encapsulating Ln^{3+} ions and luminescent sensing, *Inorganica Chimica Acta* (2018), doi: <https://doi.org/10.1016/j.ica.2018.04.046>

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A 2D zinc coordination polymer constructed from long and flexible *N*-containing tricarboxylate ligand for encapsulating Ln³⁺ ions and luminescent sensing

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Abstract

A new anionic coordination polymer (CP) has been solvothermally prepared with the long and flexible *N*-containing tricarboxylate ligand 5-[(3-(4-carboxyphenyl)-1H-pyrazol-1-yl)methyl]isophthalic acid (H₃L) and zinc ions. {(Me₂NH₂)[Zn(L)(H₂O)]·DMF}_n (**1**) (DMF = *N,N*-dimethylformamide) exhibits a fascinating undulant two dimensional (2D) layered structure and adjacent layers are further linked by π - π interactions to form three dimensional (3D) frameworks with the rhombic channels along the *b* axis, in which the (Me₂NH₂)⁺ cations are located. **1** emits blue light in solid state and possesses highly stability in different organic solvents. Moreover, it exhibits excellent luminescent sensing properties for Fe³⁺ and Cr₂O₇²⁻ with high sensitivity and selectivity, respectively. The *K*_{sv} value of Fe³⁺ ion is $2.06 \times 10^4 \text{ M}^{-1}$, while $1.35 \times 10^4 \text{ M}^{-1}$ for Cr₂O₇²⁻ ion. The luminescence quenching can be attributed to resonance energy transfer between **1** and analytes. Furthermore, the lanthanide ions doped materials Ln³⁺@**1** are successfully prepared by cation-exchange, in which Eu³⁺/Tb³⁺ codoped materials show tunable luminescence

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