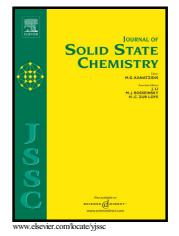
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Two 3D metal-organic frameworks as multi-functional materials to detect Fe³⁺ ions and nitroaromatic explosives and to encapsulate Ln³⁺ ions for white-light emission

Bing Ma^a, Jianing Xu^a, Hui Qi^b, Jing Sun^a, Juan Chai^a, Jia Jia^c, Shubo Jing^a, Yong Fan^{*a} and Li Wang^{*a}

^a State Key Laboratory of Inorganic Synthesis & Preparative Chemistry, College of Chemistry, Jilin University, Changchun 130012, Jilin, P. R. China.
E-mail: lhl222@jlu.edu.cn; Fax: +86-431-85168439; Tel: +86-431-85168439

^b The Second Hospital of Jilin University, Changchun 130012, P. R. China. E-mail: qihui1977@sohu.com

^c College of Chemistry, Baicheng Normal University, Baicheng 137000, Jilin, P. R. China. E-mail: jj_zhx@126.com

Abstract

Two metal-organic frameworks (MOFs), namely $\{[Zn_3(L)_2(4,4)^2$ bipy)(DMF)₂]²H₂O $_{n}$ (1) and {[Cd₃(L)₂(4,4'-bipy)(H₂O)₂]²DMF $_{n}$ (2) (4,4'-bipy = 4,4'-bipyridine, DMF = N, N-dimethylformamide), were solvothermally prepared based on a rigid tricarboxylic acid 3-(3,5-dicarboxylphenyl)-5-(3-carboxylphenyl)-1-H-1,2,4-triazole (H₃L). X-ray crystallographic analysis reveals that 1 and 2 are isostructural and both emit blue light. Notably, 1 exhibits good luminescent sensing for nitro-containing compounds and Fe^{3+} ions. In addition, the emission colors of 1 can be tuned from yellow to white and to blue by encapsulating different mole ratios of Eu^{3+} and Tb^{3+} ions and changing the excitation wavelength. A white emission with the Commission International de l'Eclairage (CIE) coordinates of (0.331, 0.337), which fall within the white-light region, emerges upon excitation at 340 nm.

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