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# Two 3D metal–organic frameworks as multi-functional materials to detect Fe<sup>3+</sup> ions and nitroaromatic explosives and to encapsulate Ln<sup>3+</sup> ions for white-light emission

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## Abstract

Two metal-organic frameworks (MOFs), namely  $\{[\text{Zn}_3(\text{L})_2(4,4'\text{-bipy})(\text{DMF})_2]2\text{H}_2\text{O}\}_n$  (**1**) and  $\{[\text{Cd}_3(\text{L})_2(4,4'\text{-bipy})(\text{H}_2\text{O})_2]2\text{DMF}\}_n$  (**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 ( $\text{H}_3\text{L}$ ). 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<sup>3+</sup> 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<sup>3+</sup> and Tb<sup>3+</sup> 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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