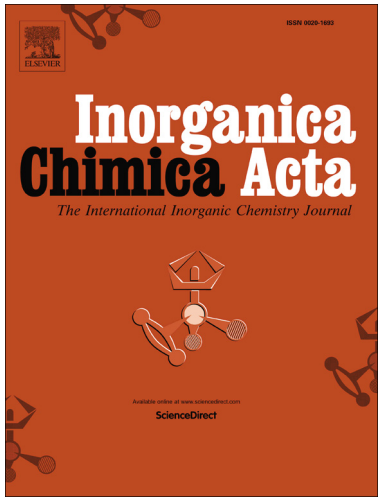


Research paper

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# A Dual Linker Metal-Organic Framework Demonstrating Ligand-Based Emission for the Selective Detection of Carbon Tetrachloride

*Nathan D. Rudd,[a] Hao Wang,[a] Simon J. Teat[b] and Jing Li[a,]**

[a]*Department of Chemistry and Chemical Biology, Rutgers University, 610 Taylor Road, Piscataway, New Jersey 08854, USA*

[b]*Advanced Light Source, Lawrence Berkeley National Laboratory, 1 Cyclotron Road, Berkeley, CA 94720, USA*

**Abstract:** A novel luminescent metal-organic framework (LMOF) was synthesized through the incorporation of a molecular fluorophore and an anthracene-based colinker into a Zn-based structure. The compound crystallizes in a body-centered orthorhombic crystal system (space group: *Imma*). The three-dimensional porous network of *$Zn_4(adc)_4(tppe)$* (LMOF-271) exhibits no interpenetration and is classified as a 2-nodal, (4,6)-c net (sqc124 type) with (4-c)(6-c)2 stoichiometry. LMOF-271 contains two-dimensional sheets of paddle-wheel-type Zn-SBUs interconnected by anthracene-based colinkers, with tetradentate chromophores linking the nets together. Pristine LMOF-271 emits blue light ($\lambda_{em}$ = 475 nm) upon UV excitation ($\lambda_{ex}$ = 365 nm). LMOF-271 selectively detects the toxic environmental contaminant carbon tetrachloride over similar volatile organic solvents, namely dichloromethane and chloroform. This work represents the first study making use of a LMOF to selectively and effectively detect carbon tetrachloride via luminescence signal change with a high $K_{SV}$ value of 48,903 $M^{-1}$ and a detection limit of 22 ppb.

*Keywords: luminescent metal-organic framework, ligand-based emission, VOC detection, Stern-Volmer Analysis*