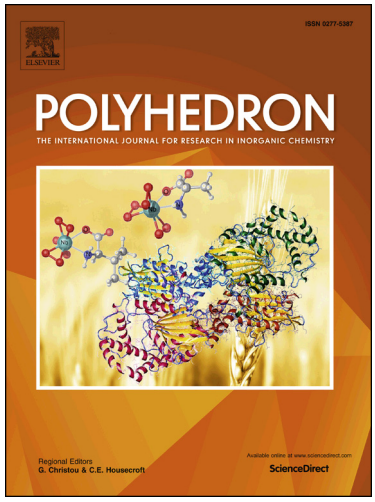

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Synthesis and Spectroscopic Characterization of a Photo-stable Tetrazinc(II)-Schiff base Cluster: A Rare Case of Ligand Centric Phenoxazinone Synthase Activity

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A B S T R A C T

Herein, the synthesis and structural characterization and catalytic activity of a novel tetranuclear zinc(II)-Schiff base complex, $[Zn_4(\mathbf{L})_2(\mu_3\text{-}OCH_3)_2(CH_3OH)_2].2CH_3OH$ (**1**), [**L** = *N,N′*-bis(3-methoxysalicylidene)-1,3-diamino-2-propanol] was presented. Single crystal X-ray diffraction structural analysis revealed that the tetra-zinc(II) cluster crystallized in a monoclinic system with $P2_1/c$ space group. Interestingly, three different molecular bridges (methoxido-, alkoxido- and phenoxido-) simultaneously co-existed in assembling tetra-zinc(II) core, which was a very rare observation. To the best of our knowledge, this compound would be the first compound where a diverse coordination aspect was covered by a single solvent as terminal coordinator (CH_3OH), bridging(μ_3-CH_3OH) and solvent for crystallization in the existing scientific literature. The compound showed good photo-stability and excellent luminescence property with higher lifetime at transition state in ethanol. This zinc(II) complex revealed crucial role as an effective catalytic system towards oxidation of 2-aminophenol (2-AP) in ethanol. Additionally, the tetra-zinc(II) complex displayed potential phenoxazinone synthase like activity with momentous turn over number, $k_{cat}(h^{-1}) = 6.19\times10^2$ in ethanol under aerobic condition. ESI-MS and EPR spectral analysis of the reaction mixture between Zn(II) complex and 2-AP recommended that the course of catalysis proceeded through substrate-catalyst adduct formation and authenticated the radical mechanistic pathway in favour of oxidative coupling product. This tetranuclear zinc(II)-Schiff