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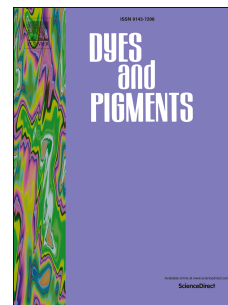
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A Unique Multifunctional Cluster-based Nano-porous Terbium Organic Material: Real-Time Detection of Benzaldehyde, Visually Luminescent Sensor for Nitrite and Selective High Capacity Capture of Congo Red

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Abstract: In this work one rigid asymmetrical tricarboxylate ligand p-terphenyl-3,4",5-tricarboxylic acid (H₃L) ligand has been synthesized, one unique nano-porous Terbium luminescent metal-organic framework {[Tb(L)(H₂O)(DMF)]·DMF}_n (**1**) has been prepared using solvo-thermal techniques. Structural analysis demonstrated that these di-nuclear Tb₂O₂ clusters are bridged via rigid ter-phenyl backbones of L³⁻ generating one unique three-dimensional(3D) cluster-based nano-porous framework of **1**. In **1** nano-porous channels with dimensionality of 9.788(1) Å × 19.209(3) Å can be found along the crystallographic *a* direction. According to a PLATON calculation, there exists approximately 33.7 % of the crystal volume (6286.8 Å³ potential solvent areas) accessible to guest molecules. Powder X-ray diffraction (PXRD) determination also confirms pure phases of **1**. Photo-Luminescent experiments suggested that **1** shows real-time sensitive sensing for benzaldehyde. Addition of only 1

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