

Fabrication and characterization of new Co(II)-MOF/polyvinylidene fluoride (PVDF) bead composites as visual sensors for detection of industrial acid vapors

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Visual sensors based on Metal-Organic Frameworks (MOFs) in the detection of gases and vapors are known as vapochromic systems. The color change of MOFs is easily visible with the naked eye and is the simplest answer in sensing and detecting gaseous species [1]. In this work, a cobalt-organic framework (Co(II)-MOF) has been prepared by the reaction of mixed bis-pyridyl and dicarboxylate linkers under ultrasound irradiation. The composite mixture of these nanocrystals with organic polymer polyvinylidene fluoride (PVDF) was prepared using phase inversion method and the resulting mixture was shaped into composite beads. The sensing properties of the prepared bead composites toward vapors of concentrated industrial acids such as hydrochloric acid (HCl), nitric acid (HNO₃), and sulfuric acid (H₂SO₄), as well as thionyl chloride (SOCl₂) vapors were investigated. The color change of nanoparticles was observed from purple to green, yellow, blue-violet and dark green, respectively.

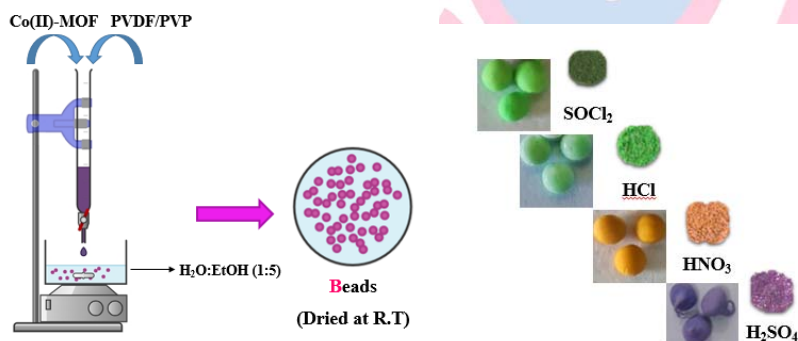


Fig.1. Preparation and color change of the composite beads after exposure to acid vapors

Keywords: Metal–organic framework (MOF), Sensing, Bead composite

References

- [1] C. Zhang, L. Sun, Y. Yan, Y. Liu, Z. Liang, Y. Liu, J. Li, Metal–organic frameworks based on bipyridinium carboxylate: photochromism and selective vapochromism. *J. Mater. Chem. C*, 5 (2017) 2084–2089.