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Exploring the Gas Sensing Performance of Cu-Doped Iron Oxide Derived from Metal-Organic Framework

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Abstract : Hydrogen sulfide (H_2S) detection is essential for environmental monitoring and industrial safety due to its high toxicity, even at low concentrations. This study explores the H_2S gas sensing properties of Cu-doped Fe_2O_3 materials derived from metal-organic frameworks (MOFs), which offer high surface area and controlled porosity for optimized gas sensing. The structural and morphological characteristics of the synthesized material were thoroughly analyzed using techniques such as X-ray Diffraction (XRD), Field Emission Scanning Electron Microscopy (FE-SEM), and UV-Vis Spectroscopy. The resulting sensor exhibited remarkable sensitivity and selectivity, achieving a detection limit at the ppb level for H_2S. The study indicates that Cu doping significantly enhances the gas sensing performance of Fe_2O_3 by introducing abundant active sites within the material. These enhanced sensing properties emphasize the potential of MOF-derived Cu-doped Fe_2O_3 as a highly effective material for H_2S gas sensors in various applications.

Keywords : detection limit, doping, MOF, sensitivity, sensor
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