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A novel highly sensitive and selective H₂S gas sensor at low temperatures based on SnO₂ quantum dots-C₆₀ nanohybrid: experimental and theory study

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ABSTRACT

In this study, SnO₂ quantum dots-fullerene (SnO₂ QDs-C₆₀) nanohybrid as novel sensing material was synthesized by a simple hydrothermal method. The structure and morphology of the synthesized sample were studied by using X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR) and transmission electron microscopy (TEM). The prepared hybrid was used as gas sensors for detection of different gasses including 70 ppm H₂S, 1% methane, and 1% propane at low temperatures of 100-200 °C. The results indicated that the SnO₂ QDs-C₆₀ nanohybrid has high response and high selectivity to 70 ppm H₂S, 1% methane, and 1% propane gasses at low temperatures. The highest response (R_{air}/R_{gas}) of 66.0 and 5.4 to 70 ppm H₂S and 1% methane gasses at 150 °C and the response of 2.7 to 1% propane at 200 °C were observed for

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