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Characterization of mesoporous Zn doped $NiCo_2O_4$ rods produced by hydrothermal method for NO_x gas sensing application

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ABSTRACT

We report the characterization and NO_x gas sensing properties of Zn doped $NiCo_2O_4$ mesoporous rods obtained through a simple hydrothermal approach. X-ray powder diffraction confirms the spinel structure with cell parameter (*a*) of 8.110 Å. X-ray photoelectron spectroscopy studies reveal the oxidation states of metal oxides. N_2-adsorption-desorption analysis and electron microscopic studies show the mesoporous nature of the sample. The specific surface area is found to be 76 m^2 g^{-1} with an average pore diameter of 21 nm. The thick film of Zn doped $NiCo_2O_4$ mesoporous rods exhibit good gas sensing characteristics towards NO_x. Gas response of the sensor increases with concentration of NO_x from 2 ppm to 200 ppm. It has a response time of 28 s and recovery time of 30 s towards 10 ppm NO_x gas at 200 ^oC. The NO_x gas concentration dependent responses and cyclic tests of the sensor demonstrate better reliability and reproducibility with regards to NO_x gas sensing.

Keywords: Spinel-type oxides, mesoporous rods, NOx gas sensor, selectivity.

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