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Solid state sensor of zinc oxide nanorods for methane gas detection at room temperature

S Karder and Sh Nasirian

Department of Electrical and Computer Engineering, Mazandaran University of Science and Technology, Babol, Iran

E-mail: ShahruzNasirian@ustmb.ac.ir

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Abstract

In the present work, zinc oxide (ZnO) nanorods were synthesized by a simple hydrothermal method and its methane gas sensing features were studied under different gas concentrations and various relative humidity degrees at room temperature. ZnO nanorods characterization was done by X-ray diffraction (XRD) and field effect scanning electron microscopy (FE-SEM). The results showed the wurtzite phase of the crystallized hexagonal structure with a porous architecture. A high response of 77.1% was obtained under 0.15 vol% methane gas concentration at 30% relative humidity, while a low response of 32.2% was achieved toward 0.037 vol% methane gas level at 90% relative humidity. Moreover, the low response/recovery time of 95.4/45.9 s was obtained under 0.15 vol% gas concentration. The solid state sensor of the ZnO nanorods displayed the high response and good selectivity to methane gas in comparison to other air components at environmental conditions. Finally, the methane gas sensing mechanism of the ZnO nanorods sensor was discussed as well.

Keywords: zinc oxide nanorods, gas sensor, methane gas, room temperature, relative humidity

For full article, refer to the Persian section