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Production of $\text{TiO}_2\text{-SnO}_2$ nano structural thin films prepared by electron beam and sol-gel methods as the ethanol sensor

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Abstract

Nanostructured $\text{TiO}_2\text{-SnO}_2$ thin-film ethanol sensors have been fabricated on glass substrates using electron beam and sol-gel methods. The surface structure, morphology and optical transmission characteristics of the films are analyzed by X ray diffraction, scanning electron microscopy, and UV/VIS/NIR spectrometry. The $\text{TiO}_2\text{-SnO}_2$ films are less than 300 nm thick and consist of nanocrystallines of about 20 nm and 33nm for electron beam and sol-gel methods, respectively. The sensing characteristics of $\text{TiO}_2\text{-SnO}_2$ nano structure thin film in electron beam and sol-gel methods, in the flow rate of ethanol at 1800, 2000 and 2400 cc/min and at the operating temperature of 200°C, are measured. In both methods, the sensing property is increased by incrementing the gas flow rate, but in the sol gel method, the sensing property is reduced due to the lattice defects and the limitation in the sensitivity zones.

Keywords: $\text{TiO}_2\text{-SnO}_2$ nano structure thin film; electron beam evaporation; sol gel; ethanol sensor

For full article, refer to the Persian section