عنوان مقاله:

Sensing Behavior Study of Manganese Zinc Ferrite Nanoparticles Against Carbon Tetrachloride at Various Temperatures

محل انتشار:

مجله مهندسی برق مجلسی, دوره 16, شماره 3 (سال: 1401)

تعداد صفحات اصل مقاله: 5

نویسندگان:

Gholam Reza Aboutalebi - *Department of Electrical Engineering, Majlesi Branch, Islamic Azad University, Majlesi, Isfahan ۹۶۳۱۶۵۶۷۶۹, Iran.*

Hamid Reza Ebrahimi - *Advanced Engineering Research Center, Majlesi Branch, Islamic Azad University, Majlesi, Isfahan, Iran*

Hossein Emami - *Department of Electrical Engineering, Majlesi Branch, Islamic Azad University, Majlesi, Isfahan ۹۶۳۱۶۵۶۷۶۹, Iran*

Saeid Daneshmand - *Department of Mechanical Engineering, Majlesi Branch, Islamic Azad University, Majlesi, Isfahan ۹۶۳۱۶۵۶۷۶۹, Iran*

Gholam Reza Amiri - *Department of Physics, Falavarjan Branch, Islamic Azad University, Isfahan, Iran*

خلاصه مقاله:

In this study, zinc ferrite nanoparticles with a diameter of less than ۵۰ nm were synthesized. Using XRD (X-ray Diffraction), Scanning Electron Microscope (SEM) and Transmission Electron Microscope (TEM) the morphology and structure of this ferrite was investigated. The formation of spinel phase in Zn-Mn ferrite was shown by X-ray analysis. SEM photograph has shown spherical shape of nanoparticles and the dimensions of the samples were confirmed by Transmission Electron Microscope (TEM) at the nanoscale. Using the Debye-Scherrer formula, the size of Mn ferrite nanoparticle crystals was calculated to be about ۱۳ nm. To check the properties related to the sensitivity of this ferrite, a fully insulated Plexiglass box was used and placed in it. By injecting ۱ mL of liquid and vapor it, we will have ۲۰۰ ppm concentration of each sample in this box. Then the injected vapored sample in this box is exposed to the ferrite. After this step, the conductivity of the ferrite in a closed circuit was changed. By changing the sample type, amount of this conductivity was varied. Five gases were tested in this project: ethanol, dimethyl formamid, carbon tetrachloride, acetonitrile and acetone. Among these samples the carbon tetrachloride had the best sensitivity performance. Finally, the sensor equation for carbon tetrachloride was extracted by applying different concentrations of it from ۲۰ to ۲۰۰ ppm.

کلمات کلیدی:

Carbon tetrachloride sensor, ferrite, Gas sensor, manganese zinc ferrite nanoparticle, Sensitivity, X–ray diffraction