Investigation on Novel Poly (3-hexylthiophene)-ZnO Nanocomposite Thin Films Gas Sensor

C. Baratto, G. Faglia, M. Ferroni, G. Sberveglieri
Department of Chemistry and Physics
C.N.R. - INFM & University of Brescia
Brescia, Italy
barattog@ing.unibs.it

M.Z. Atashbar, E. Hrehorova
Department of Electrical and Computer Engineering
Western Michigan University
USA
massood.atashbarg@wmich.edu

Abstract

In this paper, investigation on novel hybrid Poly (3-hexylthiophene)-ZnO nanocomposite thin films and their gas sensing electrical characterization is reported. Nanocomposite films were studied by Fourier transform infrared (FTIR) spectroscopy and their sensing properties were characterized by volt-amperometric technique. All films contain typical peaks of pure P3HT however, several differences in the absorption bands of nanocomposites were observed at 820cm^{-1}, 796 cm^{-1}, 748 cm^{-1} confirming the presence of the ZnO incorporated therein. The morphology, analyzed by SEM showed uniform thin films. Nanocomposite solutions were deposited on the alumina substrate prepatterned with Pt contacts and heater to form sensor. Sensors sensitivity were tested toward NO2 (lOO ppb-5 ppm), NH3 (25 ppm) and CO (500 ppm) and ethanol (500 ppm) diluted in humid air (50% RH). Sensors showed a high relative response of 2.2 to 200 ppb of NO_2 while virtually no response to CO, and ethanol was recorded. Very small response also to NH_3 was recorded thus indicating a good selectivity to NO_2 for the sensor developed.