

Abstract

ZnO is one of the metal oxide which has been extensively studied due to its wide range applications in gas sensing field [1]–[5] As well as being a well-known n-type semiconductor with a wide band gap [1], ZnO has the benefit of environment friendly, low-cost, and easy preparation. Thanks to these characteristics, ZnO is considered as an ideal gas sensitive material [4], [6]and intensively studied for gas sensor application. In comparison with all the gas sensing studies done in the literature, NO₂ is rarely sensed by ZnO thin films. Besides, the Ga doped ZnO thin film are almost never studied for NO₂ sensing properties.

Ga doped ZnO thin films have been deposited by Radio–Frequency (RF) magnetron sputtering on fused silica substrates. The structural analysis of the n-type sensitive material showed a preferential orientation in the [001] direction. The micro sensor platforms have been fabricated with ZnO:Ga thin film deposited using a reliable stencil mask onto interdigitated electrodes containing micro-hotplates. The as fabricated micro sensor allows to sense sub-ppm concentration (500 ppb) of nitric dioxide. This system reveals promising sensing performance with a sensitivity R_g/R_a up to 15 at low temperature (50 °C).

Keywords—ZnO:Ga, thin film, RF-sputtering, gaz sensor, micro-hotplate, NO₂.

Reference

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