

# **Abstract**

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## **Fabrication and Characterization of Gas Sensor Micro-Arrays**

A novel structures of nanomaterials gas sensors array constructed using ZnO, and ZnO doped with Al via sol–gel technique. Two structure arrays are developed the first one is a double sensor array based on doping with percentages of 1% and 5%. The second is a quadrature sensor array based on several doping ratios concentrations (0%, 1%, 5% and 10%). The morphological structures of prepared ZnO were revealed using scanning electron microscope (SEM). X-ray diffraction (XRD) patterns reveal a highly crystallized wurtzite structure and used for identifying phase structure and chemical state of both ZnO and ZnO doped with Al under different preparation conditions and different doping ratios. Chemical composition of Al-doped ZnO nanopowders was performed using energy dispersive X-ray (EDS) analysis. The electrical characteristics of the sensor are determined by measuring the two terminal sensor's output resistance for O<sub>2</sub>, H<sub>2</sub> and CO<sub>2</sub> gases as a function of temperature.