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Electrodeposited nano-crystalline cuprous oxide thin films for gas sensing applications

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The purpose of this study was investigation of gas sensing properties of electrochemically deposited n-type Cuprous Oxide (Cu_2O) thin films for Nitrogen (N_2) gas and LP gas. Cu_2O films were electrodeposited in a cupric acetate bath and were characterized using Photocurrent Spectral response. Resistance of Cu_2O thin films to N_2 gas and LP gas were measured while exposing the film samples to the respective gases in a chamber. Gas flow rates were controlled at different levels using flow meters. For both gases, the effect of the operating temperature on performance of sensitivity, response time and recovery time were investigated. n-type Cu_2O thin films showed a good sensing response to both gases at room temperature. Increasing the film temperature in the range of 28 °C (room temperature) -125 °C increased the sensitivity for both gases. Compared to N_2 gas, LP gas showed a higher sensitivity to increasing temperature which depended on the flow rate. At 125 °C, the sensitivity for LP gas at flow rates of 0.05 lpm and 0.15 lpm increased by approximately 400% and 900% respectively compared to that at room temperature.

Keywords: electrochemical, gas sensing, LP gas, Resistance, thin films

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