Detection of H₂S at Room Temperature Using ZnO Sensors Based on Hall Effect

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In this paper, a novel selective gas sensor for detection of H₂S gas is proposed based on Hall Effect. ZnO sensors based on Hall Effect were fabricated from ZnO nanonails prepared by a hydrothermal method and their gas-sensing properties were investigated. The sensor was placed in a magnetic field perpendicular to the current which is moving through the sensor. At room temperature (RT), it was observed that the sensor can be used as selective hydrogen sulfide gas sensor because output voltage decreases in the presence of H₂S gas. Furthermore, the change in output voltage was found to be reversible and a drift in recovery from the original value of voltage was also observed on the removal of H₂S gas environment. A Typical room temperature response of 70.4 was achieved at 100 ppm of NO₂ with a response and recovery times of 35 and 82 s respectively. Along with the investigation of the performance of the sensors, the mechanisms of H₂S gas sensing of the Hall Effect sensor are also discussed in this study. The low cost and low power consumption of the sensor makes it a promising hydrogen sulfide gas sensor.

Keywords: Gas sensor; Room temperature H₂S sensor; ZnO; Hall Effect

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