

## **AMMONIA GAS SENSING PERFORMANCE OF Cr<sub>2</sub>O<sub>3</sub>-LOADED TiO<sub>2</sub> THICK FILM RESISTORS**

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### **ABSTRACT**

This work investigated the use of Cr<sub>2</sub>O<sub>3</sub> loaded TiO<sub>2</sub> thick films gas sensor. The titania thick films were prepared by a standard screen printing technique. Pure TiO<sub>2</sub> was observed to be insensitive to NH<sub>3</sub> gas. In order to check the NH<sub>3</sub> gas sensitivity various concentrations (1 wt. %, 3 wt. %, 5 wt. %, 7 wt. % and 10 wt. %) of Cr<sub>2</sub>O<sub>3</sub> was added in TiO<sub>2</sub>. The maximum sensitivity (88.23 %) was obtained for NH<sub>3</sub> at of 5 wt. % Cr<sub>2</sub>O<sub>3</sub> loaded TiO<sub>2</sub> thick films at 250 0C. The sample was observed to be oxygen deficient. Upon exposure to NH<sub>3</sub> gas, the barrier height of TiO<sub>2</sub>-Cr<sub>2</sub>O<sub>3</sub> intergranular regions decreases markedly due to the chemical transformation of Cr<sub>2</sub>O<sub>3</sub> into well conducting chromic ammonium hydroxide leading to a drastic decrease in resistance. The crucial gas response was found to NH<sub>3</sub> gas at 250 0C and no cross response was observed to other hazardous and polluting gases. Phase evaluation of screen printed thick films of TiO<sub>2</sub>-Cr<sub>2</sub>O<sub>3</sub> composite was examined by XRD technique. XRD showed polycrystalline nature with anatase and rutile structure. SEM investigation revealed that the size of particles ranged from 180 to 200 nm. The effect of loading of Cr<sub>2</sub>O<sub>3</sub> concentration in TiO<sub>2</sub> thick films on the gas sensitivity, selectivity, response and recovery times of the sensor in the presence of NH<sub>3</sub> gas were studied and discussed.

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