

Fabrication of micro gas sensor by MEMS processes for carbon monoxide and methane detection with low power consumption

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Abstract

Many trials to develop the high-sensitive semiconductor gas sensors have been performed, and most applications were limited within safety systems in domestic and industrial areas. However, recently, the gas sensors were required high sensitivity, reproducibility, selectivity and low power consumption because of increasing application fields [1,2].

We have designed and fabricated micro platform for gas sensor by micro electro-mechanical systems (MEMS) technology. The micro platform was consisted of Pt heater and interdigitated sensing electrode and its size was 2.5 mm × 2.5 mm. The Pd-SnO₂ was prepared by precipitation and impregnation method as a detection material, and mounted on MEMS platform. Gas detection performances were investigated with operation circuit at operating temperature of 270 °C for carbon monoxide and 330 °C for methane. The sensitivities were 18.70 mV and 33.65 mV at 75 ppm CO and 9,000 ppm CH₄, respectively. Power consumption was in range of 65~80 mW with effective gas detection performances.

References

- [1] Takuya Suzuki, Kenji Kuniyama, Mitsuo Kobayashi, Soichi Tabata, Katsuki Higaki, Hisao Ohnishi, Sensor and Actuators B, 109 (2005) 185-189
 [2] Soichi Tabata, Katsuki Higaki, Hisao Ohnishi, Takuya Suzuki, Kenji Kuniyama, Mitsuo Kobayashi, Sensor and Actuators B, 109 (2005) 190-193

Figures

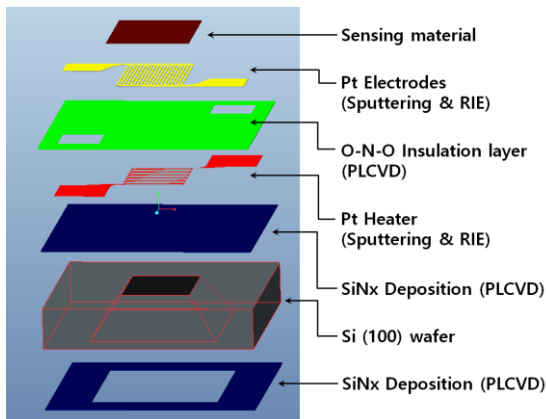


Fig. 1. The structure of micro platform

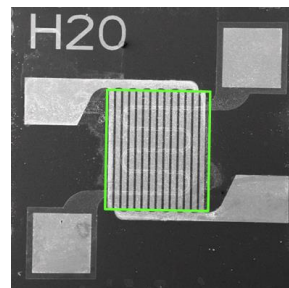


Fig. 2. Top view of fabricated micro platform

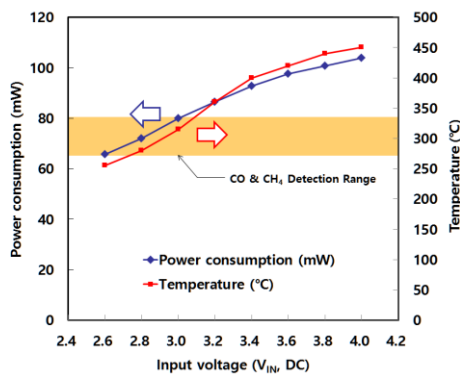


Fig. 3. Power consumption and operation temperature

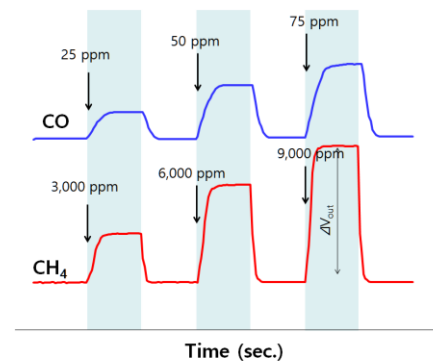


Fig. 4. Sensitivities for CO and CH₄ gases