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Highly selective and stable mixed-potential type gas sensor based on stabilized zirconia and $Cd_2V_2O_7$ sensing electrode for NH_3 detection

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Abstract:
Among engine aftertreatment systems, selective catalytic reduction (SCR) that uses urea as reducing agent has been recognized as the most promising technology to eliminate the NO_x emissions from diesel vehicles. In this system, a urea solution is injected into an exhaust line to react with the NO_x from combustion exhaust. To accurately control the amount of urea injected and to avoid NH_3 slips that aggravate air pollution problems, a powerful NH_3 gas sensor for on-board diagnosis (OBD) as closed-loop feedback control system must be employed. In this study, we investigate a new $Cd_2V_2O_7$ composite oxide material as SE for YSZ-based mixed-potential-type sensor, which can be used to detect NH_3 at elevated temperatures. The response for the sensor attached with $Cd_2V_2O_7$–SE to 100 ppm of NH_3 was approximately –67mV. The response time of the fabricated sensor to 100ppm NH_3 was 5s, which exhibited the fast response rate. Moreover, ΔV almost varied linearly with the logarithm of NH_3 concentration in the range of 10–200 ppm, which the sensitivity was –66 mV/decade. In addition, the detailed sensing characteristics and sensing mechanism of this sensor were identified and discussed.

Key words: NH_3 sensor, stabilized zirconia, $Cd_2V_2O_7$, mixed potential

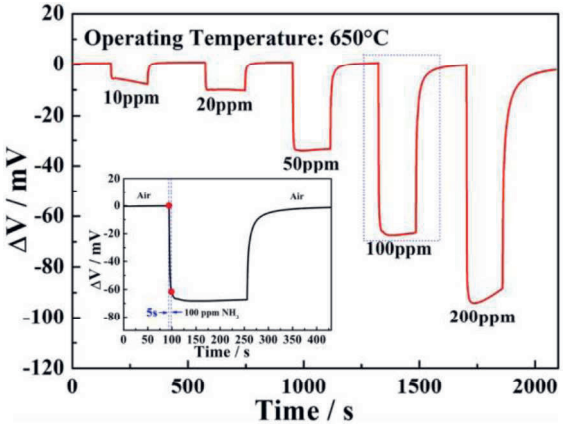

Fig. 1. Response transients of the sensor utilizing $Cd_2V_2O_7$-SE toward different concentrations of NH_3 at 650°C

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