

# Development of Gas Sensor Technology for Safety and Health

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## Abstract

We have been studying the development of gas sensor technology to fabricate high-performance gas sensors for a safe and secure society. Controlling the nanoscale microstructure of the gas sensing materials and introducing the new concepts to the gas detection are our strategies for sensitive and selective detection of harmful gases, such as NO<sub>x</sub>, CO and VOCs (volatile organic compounds). In addition, we now focus on the detection of the specific very low concentration gases in the breath or emitted from the skin, in order to apply gas sensors to healthcare monitoring.

The following three topics will be delivered in my presentation.

- 1) High-performance semiconductor gas sensors by meso- and macro-porous structural control of metal oxides  
Surfactants and polymethyl methacrylate microspheres were used to control meso- and macro porous structure of metal oxides, respectively. The improvement of H<sub>2</sub> and NO<sub>2</sub> sensing properties by the porous structural control will be reported.
- 2) Solid electrolyte CO gas sensors operable at room temperature by strict design of electrode materials  
The important role of metal oxides added to the Pt sensing and reference electrodes of a potentiometric NASICON (Na<sub>3</sub>Zr<sub>2</sub>Si<sub>2</sub>PO<sub>12</sub>) gas sensor will be reported.
- 3) MEMS (micro electro mechanical systems) gas sensors useful for healthcare applications by controlling the target gas adsorption and combustion behavior of sensor materials.  
The potential of adsorption/combustion-type MEMS gas sensors, in detecting selectively a low concentration of VOCs, which are possible biomarkers for diagnosis of specific diseases and health checking, will be reported.

*Key words: Semiconductor gas sensors, Solid electrolyte gas sensors, MEMS gas sensors, CO, VOCs*