Docket #: S15-461

A micro-fabricated chemical gas sensor for detection of volatile pollutants and explosives

Stanford researchers have designed and tested an electrochemical gas sensor which can detect volatile organic species in the gas phase and differentiate multiple species with a single chip. Selective detection is achieved due to the unique redox potential of chemical species.
The ability to perform galvanostatic measurements when the electrodes are exposed to volatile organic species dispersed in a gas phase allows their detection and identification as they are oxidized and/or reduced at a specific applied voltage. By varying the material of the electrodes, specific species can be targeted. The selection of the electrode material is made on physico- chemical or electrocatalytic criteria.

Figure

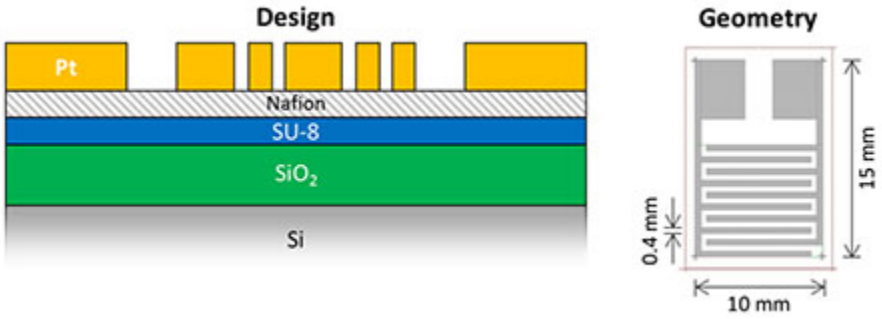


Figure description - Sensor design and geometry

Stage of Research

- Completed testing for CO detection
- Quasi reference electrode successfully implemented and tested
- Current research focus is the integration of the full reference electrode and obtention of more detection results

Applications

- **Gas sensors**

Advantages

- Detects volatile organic species in the gas phase
- Can differentiate multiple species with a single chip
- High selectivity and ability to precisely identify the species present in the environment
- Can be mass produced with form factor at the millimeter scale
- Uses Nafion polymer in micro-fabrication process
- Integrated reference electrode will considerably improve in the identification of the detected species
- Benefits from electrocatalytic research on materials for the choice of electrodes

Publications

- U.S. Published Patent Application 20170199147, "ELECTROCHEMICAL SENSOR".
- Manuscript "Micro Electrochemical Gas Sensor for selective detection of Volatile Organic Pollutant"
- Poster presentation "A Small, Simple, and Selective Gas Sensor", Hilton Head 2016

Patents

- Published Application: 20170199147
- Issued: 10,261,046 (USA)

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