



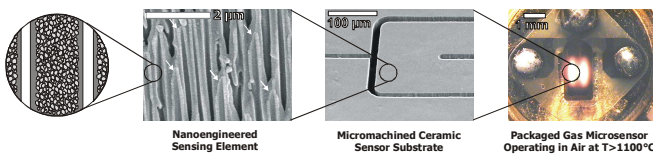
Sensitive and Selective Formaldehyde Sensor

TECHNOLOGY PROFILE

Indoor air is frequently contaminated with chemical emissions, smoke, dust, mites, and other pollutants, and there is an increasing demand for clean indoor air in homes, commercial buildings, offices, hospitals and schools. The EPA estimates that poor indoor air quality is responsible for over 125 million lost school days and over 10 million lost work days each year, and affects 33 to 50% of the commercial buildings in the US. Some of the most objectionable pollutants are Volatile Organic Chemicals (or VOCs), found in fuels, cleaning agents, glues, resins, building materials, cosmetics and other sources. One of the most common, toxic and hard to detect VOCs is formaldehyde. Formaldehyde is found in flooring materials, wall coverings, disinfectants, dry cleaning, cosmetics, paint and many other sources. When formaldehyde levels exceed 0.1 ppm the human body begins to experience adverse effects. The World Health Organization recommends that exposure should not exceed 0.05 ppm.

The Synkera's approach utilizes the conductivity change induced, upon exposure to formaldehyde, in a layer of tin oxide. Cross-sensitivity to other VOCs is eliminated by patterning of the tin oxide surface by an inert protecting layer with sub-nanometer pores, each shaped to selectively host a single formaldehyde molecule. The sensors are built on Synkera's patented microsensor platform. This ceramics-based, nanostructured sensor platform offers significant benefits in terms of rapid response, advanced temperature operating modes (e.g., cyclic and pulsed heating), potential for sensor array integration, and low-cost mass-manufacturing.

Incorporation of this novel sensing material into a high-area nanostructured sensor platform will enable production of highly sensitive, selective, low-power, and low-cost formaldehyde microsensors. Synkera has been funded by NIEHS to demonstrate the feasibility of this exciting new sensing approach through a Phase I SBIR grant.

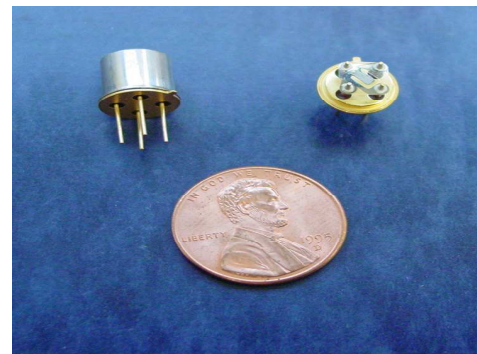


Anodic aluminum oxide-based microsensor platform

Targeted features of the proposed sensor include:

- **Low detection limit** (<0.05 ppm) enabled by complex nanostructured materials.
- **High sensitivity**, typical of solid-state sensors.

- **Outstanding selectivity** enabled by a new approach to sensor element design, eliminating one of the major drawbacks of current solid-state sensor technology.
- **Large dynamic range**, making the sensors useful in many diverse applications.
- **Low power consumption** enabled by miniaturized, micromachined ceramic sensor platform.
- **Outstanding reproducibility** and **low cost** enabled by unique manufacturing methods.
- **Long lifetime** and **excellent reliability** enabled by all-ceramic design of sensor element.



Synkera microsensors packaged on standard TO-39 header

Joint development partnerships are being sought to further develop the featured air quality sensor technology for specific applications, including detection of formaldehyde and VOC's. Areas of potential collaboration include specific application development, field-testing, instrument integration, and market introduction. If you have a special application you would like to discuss, or questions you would like answered please contact:

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