

1-1-2007

Acoustic Wave Sensors

Purdue ECT Team

Purdue University, ectinfo@ecn.purdue.edu

DOI: 10.5703/1288284315925

Follow this and additional works at: <http://docs.lib.purdue.edu/ectfs>



Part of the [Civil Engineering Commons](#), and the [Construction Engineering and Management Commons](#)

Recommended Citation

ECT Team, Purdue, "Acoustic Wave Sensors" (2007). *ECT Fact Sheets*. Paper 216.
<http://dx.doi.org/10.5703/1288284315925>

This document has been made available through Purdue e-Pubs, a service of the Purdue University Libraries. Please contact epubs@purdue.edu for additional information.



ACOUSTIC WAVE SENSORS

THE NEED

Modern office buildings are generally considered safe and healthful working environments. However, energy conservation measures have minimized the infiltration of outside air and contributed to the buildup of indoor air contaminants. Investigations of indoor air quality (IAQ) often fail to identify any harmful levels of specific toxic substances. The efforts to pursue stronger and more efficient system for sensing the environmental contamination have been highly focused after September 11th. Recently, the Surface Acoustic Wave (SAW) system which is one of the new technologies for sensing has been served a wide range of defense and commercial markets.

THE TECHNOLOGY

A variety of portable environmental monitoring systems have been designed, built, and field tested using SAW devices to provide rapid, reversible, sensitive, and quantitative detection of individual volatile organic compounds (VOCs). The SAWS devices are coated with visco-elastic polymers. Two independent responses of the SAW sensor (wave velocity and attenuation) are measured to provide information about the chemical species absorbed by the coating. The changes in the wave velocity and attenuation occur because the film coating the sensor softens and becomes heavier when it absorbs the contaminant. Sensing is rapid and reversible, and coatings can be optimized for particular chemical selectivity and sensitivity. SAW technology allows the manufacturing of a smaller, lighter and most importantly, more chemical specific instruments. Three products manufactured by Microsensor Systems Inc. are introduced.

HAZMATCAD

The HAZMATCAD instruments represents SAW based chemical warfare agent detection. It is rugged, lightweight and battery powered - perfect for use in difficult environments. Designed for operation in a level A environment, HAZMATCAD has an uncomplicated user interface allowing rapid field deployment (see Figure1).



FIGURE 1 HAZMATCAD

CW SENTRY PLUS

The CW Sentry Plus is a wall mounted SAW based chemical agent warfare detector in a hardened twenty-four hour, seven day a week platform(see Figure2). The instruments can be used as stand alone monitor or as multiple monitors linked to existing building security systems for maximum fixed asset protection. The unit completes an analysis cycle three times a minute for rapid response to the release of chemical warfare agents.



FIGURE 2 CW SENTRY PLUS

MINICAD MKII

The MiniCAD mkII is a small, portable, nerve and blister agent only detector(see Figure3). It was designed for special operations and protective services applications in mind. It's reduced size and hands free



operation allows operators to concentrate on their primary mission while giving them the protection of more sophisticated instruments.



FIGURE 3 MINICAD MKII

THE BENEFITS

The HAZMATCAD incorporates all the features mentioned above with the added benefits of being able to detect up to four classes of toxic industrial chemicals. The presents of hydride, halogen, choke and blood agent vapors can be quickly determined, giving the user the ability to screen for the greatest potential of threats. The CW Sentry Plus uses redundant sampling pumps and can draw a sample from up to three meters. An internal check source and self diagnostics are used to verify performance.

The MiniCAD mkII features replaceable batteries and optional external power pack giving it an eight hour operation life. It incorporates LED and audible alarms, data logging and can be secured by the nylon protective covering to bunker or duty gear.

STATUS

The products introduced above provide instruments and sensors for the detection of nerve agents, blister agents and several classes of toxic industrial chemicals (TIC's) that may be used in chemical warfare, terrorist incidents or hazardous material spills. Customers include federal agencies (special operations, protective services, explosive ordnance disposal) and municipal authorities (first responders, fire and police departments) such as SWAT teams, bomb squads, and emergency medical technicians.

BARRIERS

The acoustic wave sensors require sufficient temperature stability.



POINTS OF CONTACT

Henry (Hank) Wolhtjen, Microsensor Systems,

Phone: 270-745-0099 Fax: 270-745-0095 Email: sales@microsensorsystems.com

REFERENCES

1. Microsensor Systems Inc. (MSI) Web site <http://www.msanorthamerica.com/>
2. Portable Acoustic Wave Sensor Systems Web site
<http://www.sandia.gov/mstc/technologies/microsensors/paws.html>

REVIEWERS

Peer reviewed as an emerging construction technology

DISCLAIMER

Purdue University does not endorse this technology or represents that the information presented can be relied upon without further investigation.

PUBLISHER

Emerging Construction Technologies, Division of Construction Engineering and Management, Purdue University, West Lafayette, Indiana