

# Embedded gas sensing device promises simple, accurate volatile organic compounds detection

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In Review of Scientific Instruments, researchers at Gdańsk University of Technology describe a measurement device designed to analyze air samples containing various volatile organic compounds. Credit: Kwiatkowski, Drozdowska, and Smulko

Emitted as gases from certain solids or liquids, volatile organic

compounds (VOCs) include a variety of chemicals. Many of these chemicals are associated with a range of adverse human health effects, from eye, nose, and throat irritation, to liver, kidney, and central nervous system damage.

The ability to detect VOCs in [air samples](#) simply, quickly, and reliably is valuable for several practical applications, from determining [indoor air quality](#) to screening patients for illnesses.

In *Review of Scientific Instruments*, researchers at Gdańsk University of Technology, in Poland, describe a [measurement device](#) designed to analyze air samples containing various VOCs.

The setup "utilizes commercial and prototype resistive gas sensors of low-energy consumption to detect [volatile organic compounds](#), such as methane, ethanol, toluene, methylene, nitrogen dioxide, formaldehyde, ammonia, among others, in air samples," said researcher Andrzej Kwiatkowski. "The sensors change their resistance in the presence of VOCs, which exist in the environment and [exhaled breath](#)."

After [environmental conditions](#) like humidity, temperature, and air pressure are monitored, the device inhales an air sample, either from the atmosphere or from a breath sample, enabling the sensors within its 220-milliliter aluminum gas chamber to analyze and respond to detection of VOCs in real situations.

Consisting of the gas chamber, a set of electrical valves, and an electrical micropump, the device is controlled by a touch-screen electronic module that can process and save data. Sensor responses are recorded and can be parametrized for further data processing using various detection algorithms.

In [practical applications](#), the instrument can detect and measure the

presence of VOCs within the span of 10 minutes.

"The setup is a low-cost device of simplified maintenance and service," said Janusz Smulko, one of the co-authors. "Additional environmental sensors boost the accuracy of gas sensing by correcting effects induced by temperature and humidity changes. The device can monitor the air quality collected in a human environment, such as in an office or warehouse, to detect molds or bacteria by emitted smells.

"In medical applications, doctors can investigate the exhaled breath of patients by this noninvasive method to signal the need for a more detailed checkup."

The researchers are currently applying it in hospital studies to determine the difference in the exhaled breath between healthy volunteers and patients infected by the COVID-19 virus.

**More information:** "Embedded gas sensing set-up for air samples analysis" *Review of Scientific Instruments*, [aip.scitation.org/doi/10.1063/5.0050445](https://aip.scitation.org/doi/10.1063/5.0050445)

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