

Breath or urine analysis may detect cancer, diabetes

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(PhysOrg.com) -- A future sensor may take away a patient's breath while simultaneously determining whether the patient has breast cancer, lung cancer, diabetes or asthma. A University of Missouri researcher is developing a device that will analyze breath or urine samples for volatile markers inside the body that indicate disease. These volatile markers, such as alkanes, acetones or nitric oxide, give doctors clues about what is happening inside the body and can be used as a diagnostic tool.

"Little traces of certain [gas molecules](#) in the breath or urine tell us if anything unusual is going on in the body," said Xudong "Sherman" Fan, investigator in the Christopher S. Bond Life Sciences Center.

"Measuring these volatile markers would be a non-invasive way to determine if a disease is present without having to draw blood or complete a biopsy. In addition to the biomarkers already discovered, many more potential volatile markers are still under investigation."

The [sensor device](#) known as the opto-fluidic ring resonator (OFRR) is an optical [gas sensor](#) that consists of a polymer-lined glass tube that guides the flow of a [gas vapor](#) and a ring resonator that detects the molecules that pass through the glass tube. As the gas vapor enters the device, molecules in the vapor separate and react to the polymer lining. Light makes thousands of loops around the gas or liquid sample. The more the light loops around the sample, the more the light energy interacts with the gas vapor. These repetitive interactions enable the detection of vapor molecules down to a very small quantity.

Optical gas [sensors](#) have broad applications in the fields of industry, military, environment, medical care and homeland security. In addition to OFRR's application in the medical industry, the device also can improve the detection of explosives on the battlefield. Currently, the existing gas vapor [sensor technology](#) is very bulky with equipment weighing more than 100 pounds and is difficult to use in the field.

"We hope to design a vapor sensor that has ultra-high sensitivity, specific and rapid response to a certain molecule, as well as the ability of on-the-spot chemical analyses, which usually requires the sensor to be small, portable, reusable and have less power consumption," said Fan, who also is assistant professor of biological engineering in the MU College of Engineering and the MU College of Agriculture, Food and Natural Resources. "If the gas sensor is portable, military personnel can determine more quickly whether an area is dangerous."

Fan's research is funded by the National Science Foundation and has been published in peer-reviewed journals such as Optics Letters, Optics Express and Analytical Chemistry.

Source: University of Missouri-Columbia ([news](#) : [web](#))

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