Nano World: Breath test for breast cancer

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Breath tests for breast cancer might arise via pockets only square nanometers or billionths of a meter in size, experts told UPI's Nano World.

"If this is successful, this could lead to a quick, non-invasive and inexpensive test that could be widely dispersed over the counter to bring breast cancer screening even to people who don't have expensive health plans," said researcher Joerg Lahann, a chemist and materials scientist at the University of Michigan at Ann Arbor.

Past research found molecules generated by breast cancer can be found in breath and urine. Lahann and his colleagues are developing surfaces placed over electrodes that could in theory detect these compounds, known as metabolites.

The surfaces are only a single molecule deep. These molecules normally stand up straight in rows much like a bed of nails. When straight, the pockets between these molecules attract the metabolites. When a voltage is applied, the straight molecules bend, blocking access to the pockets and ejecting their contents.

The pockets would attract a variety of molecules toward them, not just the metabolites, Lahann said. In order to specifically attract metabolites, the plan is to switch the voltage on and off, varying the voltage each time.

"The hope is that by doing, say, 15 different measurements, you can find

that no two different kinds of molecules have the same pattern on slightly differing surfaces. You would have a fingerprint," he explained. "We hope to switch fast enough, say 10, 15, maybe 20 times, to perform all the analyses you'd need with just one inhalation."

Detecting breast cancer often "is either invasive, requiring biopsies, or you requires X-ray or other expensive equipment," Lahann said. "Many therapies we have now are really good -- you just have to catch breast cancer early on."

The scientists may also have to rely on several different kinds of switchable surfaces in a device, Lahann noted. "It's too early in the research to be sure right now," he said.

Lahann and his colleagues have received a three-year U.S. Department of Defense grant for their research. "If the basic concept turns out to be feasible, we hope we can move toward a commercializable stage five to 10 years after that," Lahann said.

"It's a really novel concept, using these switchable surfaces for cancer detection. It has a lot of great potential," said chemical engineer Robert Langer of the Massachusetts Institute of Technology in Cambridge.