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# U. of I. professor's artificial 'nose' could sniff out bombs



A sign directs travelers to a security checkpoint at Chicago's O'Hare International Airport. (Scott Olson / Getty Images)

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Blue Sky Innovation

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A University of Illinois team has developed technology that could detect homemade bombs like those used in the Brussels airport attacks last month.

Chemistry professor Kenneth Suslick created a sort of digital "nose" that can sense certain chemicals in the surrounding environment — including triacetone triperoxide, or TATP, an explosive compound made of ingredients found in hair salons and hardware stores.

"It would be a very useful technology if one could replace dogs as our primary chemical sensor," Suslick said. "Dog may be man's best friend, but he's neither quantitative nor, ultimately, highly reliable."

The "nose" is actually a group of sensors embedded with stripes of dye that are compared before and after exposure. Based on how the colors change, scientists can tell which chemicals are present.

The sensor array could be packaged into a small device that would be more portable than the printer-sized machines security agents currently use to test passengers for residue from military-grade bombs. Those machines require extra steps that can slow down the screening process and can't detect chemicals used in homemade bombs, Suslick said.

Then there's the risk of waiting until the security screening area of an airport to begin detection.

"The fundamental problem with any security issue in public spaces is beyond the secure zone, there's a bottleneck," Suslick said. The Brussels bombings occurred outside of the security checkpoint.

Last July, Suslick and his colleagues published their findings from a study investigating the technology's potential for identifying explosives in the journal Chemical Science. The research was funded in part by the U.S. Department of Defense.

"It's a useful additional tool that one would want to be able to have readily available, not just for the detection of TATP, but there are many toxic chemicals and flammable chemicals that are available off the shelf," Suslick said.

He said a portable device with the artificial nose could be programmed to alert the user, or someone in a command center, when dangerous chemicals are detected.

Suslick said he didn't develop the technology with any one use in mind.

"I was hoping it would do everything," he said.

In 2015, the artificial nose was used to detect pollution levels surrounding valuable Disney artwork in a traveling exhibit that went to Shanghai and Beijing. Suslick said the arrays worked for 90 to 108 days in those settings before becoming overloaded and requiring replacement. In busier areas, where more people and chemicals are present, such as airports, they may need to be replaced sooner.

Suslick said a company he had a hand in founding, iSense, is in the processing of commercializing the artificial nose technology. The company's first project is creating a tool to quickly detect blood infections by embedding the technology in culture tubes used in labs or hospitals, he said.

Representatives from iSense did not respond to multiple requests for comment on the progress of commercialization.

Whether the tools are eventually adopted in hospitals, museums or airports, the color-based display

should make the technology easy for anyone to understand, Suslick said.

"We're very visual creatures," he said. "The idea of being able to see an odor is something people grasp intuitively."

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