ELECTRONICS

Simple shoe bomb detector created

By Ben Coxworth

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The handheld TATP detector prototype (Photo: Kenneth Suslick)

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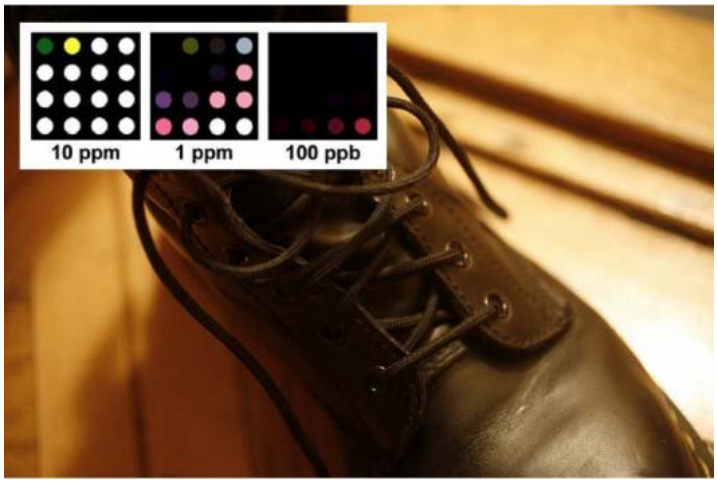
Much as we might hate having to take our shoes off when going through airport security, it's become necessary ever since a terrorist managed to get a shoe bomb aboard an American Airlines flight in December of 2001. Unfortunately, the X-raying of shoes is not enough to detect triacetone triperoxide (TATP). This easily-made explosive has been used in several bombing attempts, and is very difficult to detect in an airport environment. It doesn't fluoresce, absorb ultraviolet light or readily ionize, and can only be detected with large, expensive equipment and extensive sample preparation. Now, chemists from the University of Illinois have announced a simple new way of detecting even minute concentrations of TATP, using a piece of plastic and a digital camera.

Kenneth Suslick and Hengwei Lin created a colorimetric sensor array, that incorporates 16 differently-colored dots printed on an inert plastic film. Like a litmus paper that reacts to pH, the dots change color according to the TATP concentration in the air, thanks to a solid acid catalyst that breaks TATP down into detectable components. Before and after being exposed to the air around shoes or other items, the array must be imaged with a scanner or digital camera to process the results.

“Imagine a polka-dotted postage stamp sensor that can sniff out the shoe-bomber explosive simply by using a digital camera to measure the changing colors of the sensor's spots,” Suslick said. “The pattern of the color change is a unique molecular fingerprint for TATP at any given concentration and we can identify it in a matter of seconds.”



The array only reacts to TATP, so factors such as humidity or the presence of other chemicals won’t affect the readings. It is able to detect TATP vapor down to two parts per billion, and is said to have a long shelf life.

Suslick and Lin have already designed a prototype handheld TATP-detecting device, that uses white LED lights and a cell phone-like camera. It is currently in the process of being commercialized.

The U Illinois research was recently published in the *Journal of the American Chemical Society*.

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