Super-sensitive explosive detector developed

Device capable of detecting concealed explosives and landmines with more sensitivity than a trained dog has been developed. The new detector, which works at a distance, could potentially be used to identify suicide bombers or find explosive booby-traps, the researchers suggest.

(19.04.2005)

The team, from the Massachusetts Institute of Technology in Cambridge, US, used a laser to improve upon an existing method of sensing explosives. This method is based on fluorescent semi conducting organic polymers which become less fluorescent when they come into contact with molecules emitted by explosive materials. This decrease is easily spotted using a simple photo detector.

But the MIT team found that firing a laser at the fluorescent polymer material with sufficient intensity makes it up to 30 times more sensitive. This should make it possible to detect just one femtogram of explosive vapor (10^-15 gram). And a suitable blue LED laser could easily be incorporated into a portable detector, the researchers say.

“We hope with this advance, we can further this to many more applications,” MIT researcher Aimée Rose told New Scientist. She suggests that the technique might be used to find particularly hard-to-detect explosives - such as RDX - or improved to detect substances from an even greater distance.

Electronic dog

The lasing action increases sensitivity by creating a higher density of excited electrons in the fluorescent polymer. It is the drawing-away of electrons by the vapor-phase explosive molecules that reduces the polymers fluorescence.

Even without the lasing, polymer-based sensors can detect buried landmines from above the ground. But the new sensor might be able to detect a bomb from tens of meters away. However, Rose notes the possible range of the sensor will depend on the particular explosive under detection.

Remarkably, the new sensor promises to be even more sensitive than a trained dog - the canine olfactory system is currently the most effective means of detecting landmines and bombs in the field.

“But the nice thing about having an electronic sensor is that you can set your sensitivity threshold” to suit your purpose, Rose adds. “So developing an electronic equivalent of a dog is very attractive.”

A company called Nomadics, based in Oklahoma, US, is currently working on a commercial detector incorporating the laser and polymer sensor. The company has received $40 million in funding from the US government since 1996.


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