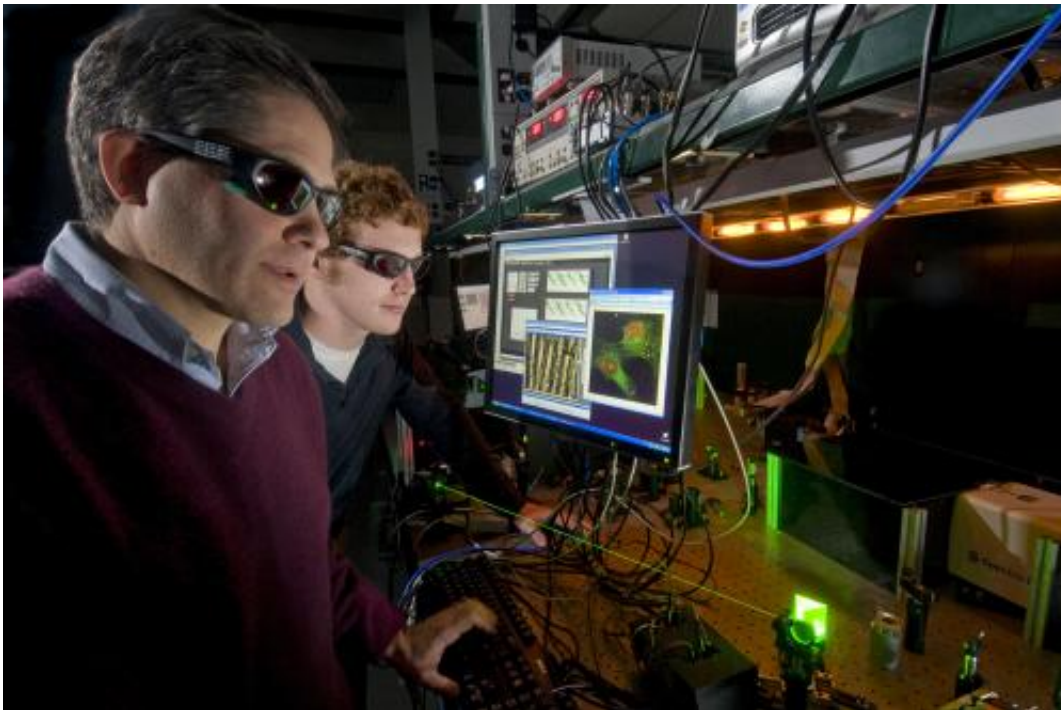


Bomb-detecting lasers could improve security checkpoints

September 9 2013



Marcos Dantus, MSU chemistry professor and founder of BioPhotonic Solutions, has invented a bomb-detecting laser that can be used at security checkpoints. Credit: MSU

Michigan State University research has put the possibility of bomb-detecting lasers at security checkpoints within reach.

In the current issue of *Applied Physics Letters*, Marcos Dantus, MSU chemistry professor and founder of BioPhotonic Solutions, has

developed a [laser](#) that can detect micro traces of explosive chemicals on clothing and luggage.

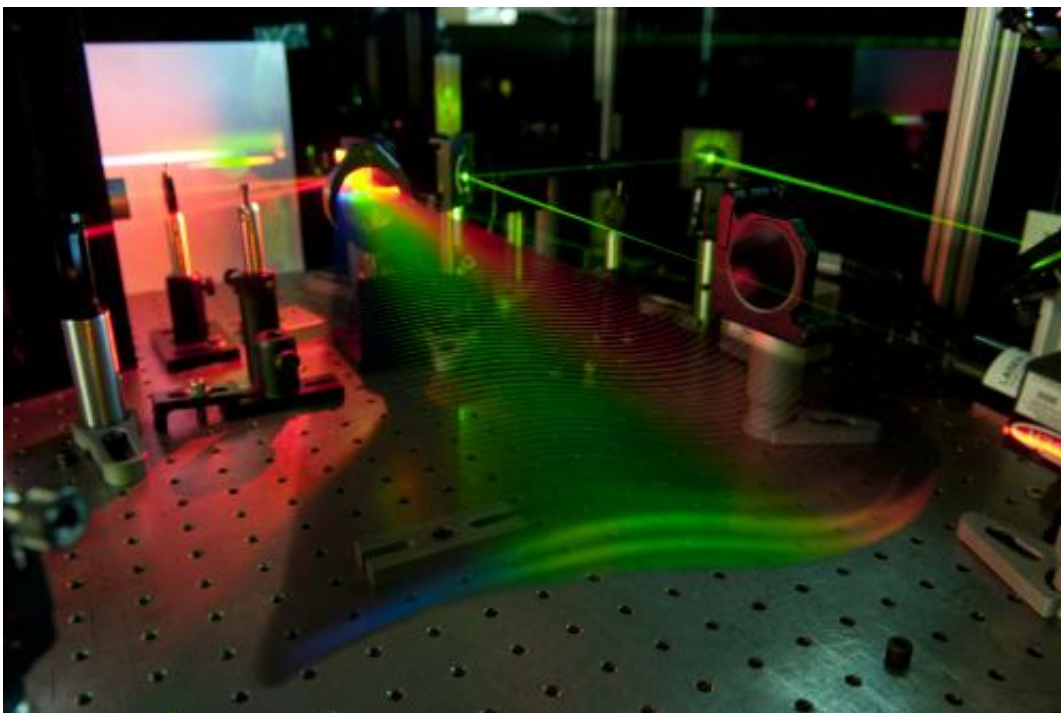
"Since this method uses a single beam and requires no bulky [spectrometers](#), it is quite practical and could scan many people and their belongings quickly," Dantus said. "Not only does it detect the [explosive material](#), but it also provides an image of the chemical's exact location, even if it's merely a minute trace on a zipper."

This doesn't mean that security forces will be armed with handheld laser in airports, however. This laser would more likely be in a [conveyor belt](#), like the X-ray scanners already used for airport security. The low-energy laser is safe to use on luggage as well as passengers, he added.

For decades, scientists have been working to develop lasers that are powerful enough for detection, but safe enough to use on people. Dantus' initial spark for this breakthrough came from collaboration with Harvard University that developed a laser that could be used to detect cancer, but has the beam output of a simple presentation pointer.

"While working on [biomedical imaging](#), I began exploring additional applications," Dantus said. "We soon learned how effective it was for detecting traces of [hazardous substances](#) from distances up to 10 meters away."

Dantus' bomb-detecting laser works as a single beam, but uses two pulses. The first resonates with certain chemical frequencies found in explosives. The second, a shadow pulse, serves as a reference. A discrepancy between the two pulses indicates the presence of explosive materials.



Not only does the laser detect explosive material, but it also provides an image of the chemical's exact location, even if it's merely a minute trace on a zipper.
Credit: MSU

"The laser is not affected by the color or surface of clothes or luggage," Dantus said. "The resonant pulse and the shadow pulse are always in balance unless something is detected. Our method has Raman chemical specificity, excellent sensitivity and robust performance on virtually all surfaces."

An aerospace company has already expressed interest in furthering this technology. With additional funding, a standalone prototype could be created in about one year, he added.

Provided by Michigan State University

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