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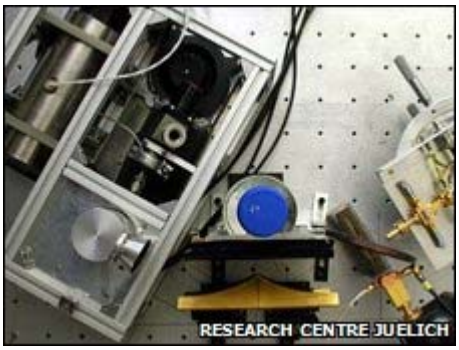
'Quick test' for airport liquids

By Jason Palmer
Science and technology reporter, BBC News



Scientists say they have developed a quick technique for detecting liquids that could be used as explosives.

If commercialised, the new method could potentially end restrictions on liquids carried onto commercial airlines.

The light-based approach uses cheap components and can reliably identify a range of liquids in just one-fifth of a second, the German scientists say.

The work, published in the journal Superconductor Science and Technology, could have additional applications.

A number of research efforts are under way to solve the liquids problem for airline passengers.

There are, in fact, several techniques which could be employed. These include nuclear magnetic spectroscopy, which uses the magnetic properties of chemical nuclei to obtain information about a sample.

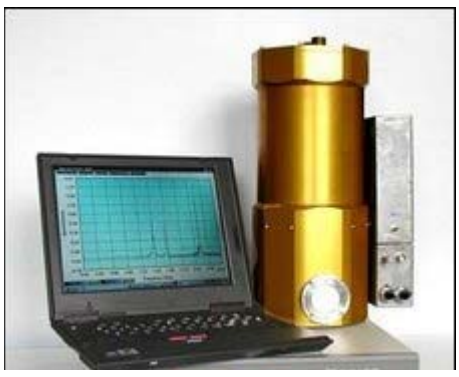
However, all of the available options are either too expensive or require too much time for the practical screening of thousands of pieces of luggage.

Chemical 'fingerprint'

Now, a group at the Forschungszentrum (Research Centre) Juelich in Germany has proposed a technique they call Hilbert spectroscopy.

Their idea is to use a very wide spectrum of light to identify either liquids that could be mixed to form an explosive, or that are already mixed.

All materials reflect light in a way that is particular to their identity, and many techniques used in both security and scientific research rely on measuring the reflection or absorption of light to identify materials.



However, in practice, measurements on baggage are confused by the packaging and items inside.

Researchers behind the new technique say they have managed to get around this problem by using a wide range of frequencies between a few gigahertz and a few terahertz -which is between 100 and 10,000 times lower in frequency than the visible light that passes easily through labels and packaging.

The trick, they say, is to use a "nano-electronic" device known as a Josephson junction. This allows the frequencies of light reflected from a

sample to be quickly added up. This in turn provides a chemical "fingerprint" of the item being analysed.

The principal advantage of using the Josephson junction is that it can span the low and high frequency ranges covered by other, significantly more expensive devices, said Yuri Divin, of the Forschungszentrum Juelich.

"No one type of spectroscopy can operate from a few gigahertz to a few terahertz [in the way] Hilbert spectroscopy [can]," he told BBC News.

"[In] applications where you need high-speed operation - such as security screening - it should happen fast and in a "broadband" [way] to make it reliable with a low number of false alarms. Hilbert spectroscopy does that," he added.

Dr Divin conceded that further developments are necessary to refine the approach. But the researchers are confident the technique can be applied to security screening.

"We've shown that it works, and it works well. But this is only the scientific part we have published," Dr Divin said.

"In commercial devices, the prototype can be used as it is or integrated with a 2D scanner."

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