Reverse Photoacoustic Standoff Spectroscopy

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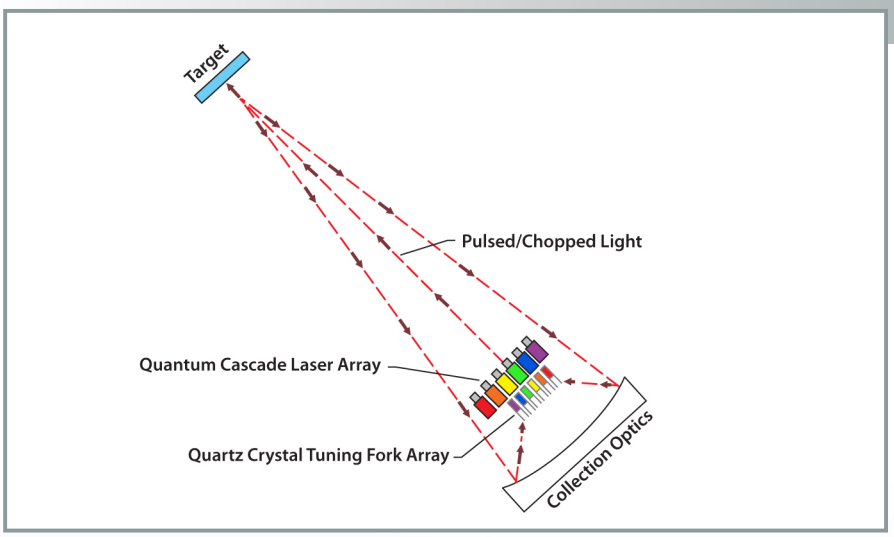

Technology Summary

A device that can detect chemicals at a distance was invented by ORNL researchers. This device is designed for identification of solid substances, but can also be used with liquids or gases. It is especially useful for the detection of explosive chemicals.

In an open environment, it has been challenging to use photoacoustic methods due to sound wave distortion from environmental interference or distance from the target. This invention can generate photoacoustic spectrum with both biologically safe optical power levels and greatly enhanced distances.

The device uses a chopped/pulsed light beam which, when aimed at a target of interest, scans through a range of wavelengths. The target's optical absorbance is measured by monitoring the intensity of light collected at the sensing element. As the wavelength of light is changed, the target will either absorb or reject each optical frequency. An identifying spectrum of the target is made by showing the intensity variation of the sensor element as a function of illuminating wavelength.

Advantages

- Works with small samples
- Does not use resonant chambers/cavities
- Does not use windows of humidity sensitive materials
- Works at much greater distances, allowing for standoff detection
- Compact
- Highly sensitive

Potential Applications

- Explosive detection
- Chemical detection
- Medical diagnostics
- Solid, liquid, and gaseous substance detection

Patent

Charles W. Van Neste, Lawrence R. Senesac, and Thomas G. Thundat, *Reverse Photoacoustic Standoff Spectroscopy,* U.S. Patent Application 12/189,663, filed August 11, 2008.

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