



### STAND-OFF DETECTION OF EXPLOSIVES AND HAZARDOUS CHEMICALS

#### Advantages/Features

- Detection of wide range of traditional and homemade explosives
- Eye-safe IR laser interrogation
- Portable and handheld
- Adjustable wavelengths for detection of different hazardous chemicals and explosives
- Applicable in mobile and static applications
- Adaptable to detecting drugs of abuse

#### Applications

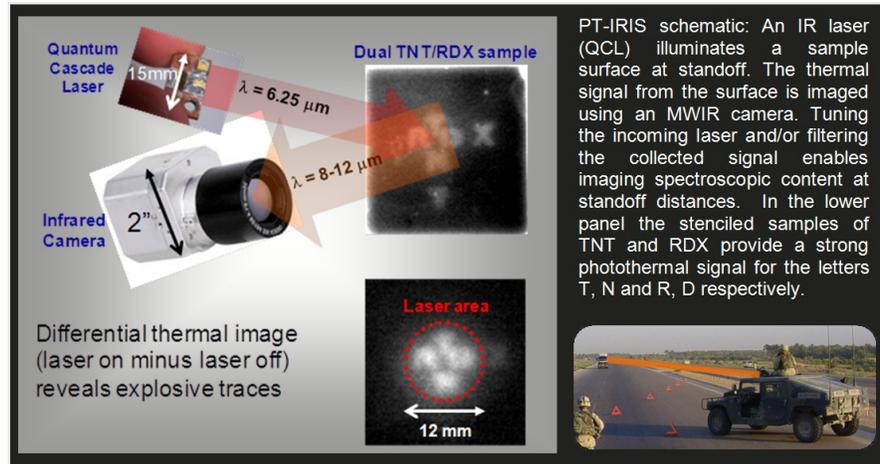
- Standoff IED detection
- Drug enforcement
- Handheld/portable systems
- VBIED and PBIED
- Counter-IED
- Left-of-boom
- Defeat the network

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PT-IRIS schematic: An IR laser (QCL) illuminates a sample surface at standoff. The thermal signal from the surface is imaged using an MWIR camera. Tuning the incoming laser and/or filtering the collected signal enables imaging spectroscopic content at standoff distances. In the lower panel the stenciled samples of TNT and RDX provide a strong photothermal signal for the letters T, N and R, D respectively.

The Naval Research Laboratory (NRL) has developed a Photo-Thermal Infrared Imaging Spectroscopy (PT-IRIS) technology for standoff detection of explosives, illicit drugs, chemical warfare agents, and biological warfare agents. PT-IRIS has been demonstrated for standoff or proximity detection of explosives. This approach employs quantum cascade lasers (QCLs) to illuminate a sample surface with one or more wavelengths, which are selectively absorbed by analytes of interest. With eye-safe QCL power levels, this results in modest, selective heating (1-2 deg C) of particulate explosives within a few milliseconds, which can be readily monitored at video frame rates of commercial IR cameras. Utilizing compact QCL light sources and an IR focal plane array to image the illuminated area, a portable, handheld system design can be realized. A schematic showing the principle of operation for PT-IRIS is shown in the figure above. As an eye-safe system, PT-IRIS is ideal for probing surfaces of vehicles, places, people, packages, and boarding passes for explosives and other hazardous chemicals of interest.

#### References

"Stand-Off Detection of Trace Explosives by Infrared Photo-Thermal Spectroscopy." *Applied Physics Letters*, December 2008, 93(22).

"Advances in Stand-Off Detection of Trace Explosives by Infrared Photo-Thermal Imaging." *Proc. SPIE 7664*, 76641J, 2010.

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