

NRL Develops Technique To Speed Detection Process

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(PhysOrg.com) -- Researchers at the Naval Research Laboratory are developing a device to enable rapid detection and identification of bacteria, chemicals, and explosives in the environment or on the battlefield.

The new device, called the Swept Wavelength Optical resonant-Raman Device (SWOrRD), illuminates a sample with a sequence of as many as 100 [laser](#) wavelengths and measures the spectrum of light scattered from the sample at each laser wavelength. The assembly of scattered light-spectra constitutes a two-dimensional (2D) signature of the sample from which the components of the sample can be determined, with an appropriate algorithm. A code to perform an identification in near real-time is also being developed at NRL.

According to NRL's Dr. Jacob Grun, the research team leader, "When the laser wavelengths resonate with chemical bonds of the sample being examined, then light scattered at each wavelength contains additional information about the sample's identity. The 2D signature, rich in such information, helps to identify the sample's components even when a number of different chemicals or bacteria are mixed within that sample, as they normally would be in the environment or battlefield. This is much more difficult to do if only a single laser [wavelength](#) is used for illumination. SWOrRD also opens the possibility that a single detector can be used to identify biological agents as well as chemicals and explosives."

The new technique has both civilian and military applications. Potential uses include rapid screening in hospital, public health, food and water safety, decontamination, and border security applications. For military applications, the ability to quickly detect and identify multiple threats with a single device that has a minimal supply chain and that can be reprogrammed in the field to adjust to unexpected threats is crucial for protection of troops in the field. The technique also provides a test bed on which simpler devices suitable for large-scale deployment, utilizing few laser wavelengths, can be designed and evaluated.

During their studies, the NRL research team measured 2D spectra of five bacterial species and five explosives and showed the distinguishability of the signatures. The team was able to show that [bacteria](#) with similar RNA sequences were distinguishable by this method. The team then used the new technique to measure 2D signatures of potential environmental interferents, also with positive results.

Provided by Naval Research Laboratory

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