

RAMiTS (RAM Integrated Tunable Sensor)

A newly developed Raman integrated tunable sensor (RAMiTS) is capable of analyzing a sample in seconds, and instantly notifying the user of the sample's identity. In addition, identification can be performed through transparent containers simply by pointing a fiber optic probe at the sample.

Technical Concept

ORNL's Advanced Biomedical Science and Technology Group has developed a lightweight, portable sensor for the identification of chem-bio species. This instrument is based upon Raman spectroscopy, an optical technique capable of measuring vibrational signatures of most chemicals (both solids and liquids). In order to obtain this chemical signature, laser light is focused onto the sample and the resulting scattered light is collected and detected. Using this instrument for chemical and biological sample identification has several advantages over conventional analyses, including:

- No sample contact by the user necessary
- Rapid analysis, in most cases 11 seconds or less
- Embedded computer system for automated sample identification
- Touchscreen interface for user interfacing
- Battery operated with a single charge lifetime of 3 hours
- Water tight and capable of being decontaminated after exposure to toxic agents

Development Approach

The RAMiTS instrument is based totally on solid state technology, with no moving parts, therefore making it much more rugged. Initial testing of the instrument and its automated identification of chemical and biological warfare agent simulants and explosive simulants has been performed, for both



pure compounds and mixtures. In these analyses, the instrument was capable of identifying the various chemicals present whether in a pure form or in a mixture. Using this instrument in conjunction with sample vials specially developed at ORNL, it is even possible to detect trace amounts of chemical species with minimal sample handling.

The RAMiTS answers a critical demand for a rapid, simple, compact and cost-effective device for screening a wide variety of chemical species and biological agents for homeland defense. Rapid screening analyses allow detection of environmental pollutants or illicit drugs under field conditions without the need for laboratory analyses. The RAMiTS also provides an important tool for medical diagnostics based on Raman spectroscopy.

Photograph of the RAMiTS

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