

ACCURATE MEASUREMENTS OF EXPLOSIVES PROPERTIES

The Transportation Security Laboratory (TSL) conducts applied research to examine the interaction of materials with electromagnetic radiation. This work is critically important to the success of emerging technologies for passenger screening operations. Research covers direct current to ultraviolet electromagnetic energy, with emphasis on microwaves in the gigahertz (GHz) region, terahertz (THz) radiation, infrared, and visible wavelength spectroscopy. TSL is equipped with an array of systems that provide broad coverage of the electromagnetic frequency range for analysis, modeling, and development.

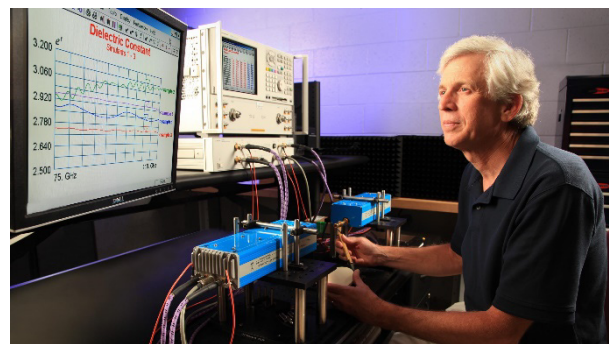
MILLIMETER WAVE SIGNATURES OF EXPLOSIVES

A core area of focus for the Electronic Signatures of Explosives Laboratory (EMXLAB) is the test and evaluation of millimeter wave (MMW) imaging systems. Activities include the measurement of the optical properties of explosives and inert materials in the GHz – THz frequency range. By measuring the complex dielectric constant of explosives, it is possible to create inert simulants of explosives for the safe testing of MMW imaging systems. EMXLAB has engaged in efforts to directly identify explosives via wide-band MMW imaging.

As MMW imaging systems are deployed at security checkpoints in a number of venues, each with its own specific requirements, knowledge of individual systems' threat detection capabilities is crucial. Additionally, while commercial systems may have internal calibration and fault check methodologies, it is desirable to have a tool (or tools) that can be used to independently test the system from development through daily commissioning at the checkpoint. EMXLAB has been developing image quality tools (IQTs) for the testing of active MMW imaging systems to supplement the methodologies that currently exist. The IQT project is a component in the development of a new standard for active MMW imaging systems.

IMPACT THROUGH INNOVATION

EMXLAB provides the applied research to support the testing and evaluation arm of TSL. Through subject matter support to the development of simulants for critical testing, the laboratory provides the foundational basis for testing and certification. EMXLAB also develops new technology to improve the state of the art in explosive detection. These efforts ensure that promising technologies support the mission of the DHS.



CURRENT PROJECTS

- MMW Identification of Explosives
- Raman Spectroscopy of Home Made Explosives

RECENT ACCOMPLISHMENTS

- Patent Awarded for MMW IDX
- Raman Database for use by the Warfighter in Handheld Systems

PARTNERS

- Transportation Security Working Group
- Transportation Security Administration
- Department of Defense
- Department of State
- Defense Advanced Research Projects Agency