

Dielectric measurements in support of security screening of personnel

For the past 20 years, the Electromagnetic Signatures of Explosives Laboratory (EMXLAB) at the US Department of Homeland Security's Transportation Security Laboratory has supported the maturation, evaluation, and certification of explosives detection technologies deployed at security checkpoints such as those operated by the Transportation Security Administration (TSA). TSA currently uses millimeter wave (MMW)-based Advanced Imaging Technology (AIT) systems for the purposes of screening passengers for weapons and explosives. The EMXLAB performs dielectric measurements of explosives for the purposes of designing simulants - inert materials that are designed to (ideally) match the complex permittivity (dielectric constant) of a threat material - to support test and evaluation of MMW AIT systems. This presentation will highlight dielectric measurements performed in the MHz – THz range with a variety of techniques (e.g. loaded waveguide, resonant cavity and free space). Efforts to support the development of the recently-completed IEEE Standard for Measuring the Imaging Performance of Active Millimeter-Wave Systems for Security Screening of Humans, IEEE N42.59, will also be highlighted.