

New THz technologies and applications in support of safety and security

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Recent incidents have affected changes to the methods employed for security screening at airports and border security check-points. At cargo screening facilities and major border check-points, where thousands of containers need to be screened rapidly, it is a challenging task to effectively screen each container. As a result, there is an increasing focus on new technologies that can be applied for security screening in a stand-off mode, either to simplify or speed up the screening process, or to provide additional functionality. Terahertz (THz) technology is a promising and emerging technology and has been in use in various forms for safety and security applications. Additionally in battlefield, one of the major threat vectors is improvised explosive devices (IEDs) used in different forms such as vehicle borne IEDs (VBIEDs) or strapped to humans at inconspicuous locations. THz pulsed imaging systems can be used to image such threat vectors, since such materials have characteristic THz spectra. The use THz illumination of sufficient power levels and fast image detection and processing, has shown that non-metallic weaponry can be imaged when concealed beneath clothing. Some of the barrier and potential confusing materials have smooth spectra with relatively low attenuation. However, use of the THz frequencies, initially aimed at narrow-band at 830 GHz along with optical mixing can be used to identify metal and dielectric objects. The ultimate possibility to identify the chemical compositions of explosive materials and mixed chemical compositions needs the wide-band antennas. The lecture will introduce some of the applications of THz for stand-off detection, use of nanomaterials such as carbon nanotubes (CNTs) to generate THz frequencies, and demonstrate that the THz spectra of several common chemicals and medicines are distinct for ease of identification.

Biography

Vaseashta received a Ph.D. from the Virginia Tech, VA in 1990. Currently, he serves as Director of Research at the CISTeCK/ICWI with NUARI. Concurrently, he serves as visiting Professor in Romania and Chaired Professor at the Academy of Sciences of Moldova. He also served as a visiting scientist at the Weizmann Institute of Science, Israel. Since 2007, he had several fellowships at the U.S Department of State serving in the offices of WMDT and Foreign Consequence Management and as S&T advisor in the office of Verification and Transparency Technologies. He is fellow of the American Physical Society, Institute of Nanotechnology, and New York Academy of Sciences. He was awarded Gold medal by the University of Armenia for his contribution to Nanotechnology. He has earned several other fellowships/awards for his meritorious services. His research interests include counter-terrorism; chemical-bio sensors; water safety and security; environmental pollution monitoring and remediation; and green nanotechnology. He authored over 230 research publications and edited/authored six books. He is an active member of several national and international professional organizations.

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