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Neil A. Salmon
Frank Gumbmann
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Neil A. Salmon, MMW Sensors Ltd. (United Kingdom)

Introduction

This year's conference on Millilmetre Wave and Terahertz Sensors and Technology XII featured a range of technology and techniques for passive and active sensing in the field of security and defence and related fields. A model and results which illustrate the performance of sensors over the band 10 GHz to 1000 GHz in adverse weather conditions kicked off the presentations. Also presented was a system that screens packages and parcels over the band 100 GHz to 500 GHz. The use of tracking algorithms to process passive millimetre wave imagers for the purpose of tracking drones was discussed.

A presentation was given on the concepts and measurements from near-field scanning microscopes with flexible sapphire fibers for imaging human tissue in the range 200 GHz to 600 GHz. Measurements at 80 GHz, which indicate how the radiometric emissivity of the human body increases due to physical exercise and a new angle on signatures for sensing that impacts the medical field was featured. Also, discussed, were measurements and models from full polarimetric radar for extraction of the Huynen target parameters for a range of targets including the human body. A novel method for measuring dielectric properties of materials was also presented.

A range of novel sources, detectors, and mixers for the THz range was explored, and the use of gold nanobars as a means for generating THz photons by accessing energy imparted to phonons was investigated. The structure as a means to up-conversion of THz radiation to the infrared band was then presented. Glow discharge sources were explored for their mixer up-conversion capabilities as well as how an infrared CMOS camera can be used to form the millimetre wave image. This approach can offer cost-efficient detection of THz signals. Investigations into how millimetre wave radiation can modulate the intensity of visible light from the glow discharge were featured. The case for high temperature superconductors acting as antenna coupled terahertz mixers and detectors was discussed. Finally, a novel large area thermal source using liquid nitrogen was featured and cited as a means to increase the contrast of indoor passive millimetre wave imagers for security screening of personnel.

Neil A. Salmon
Frank Gumbmann