HIDDEN OBJECT DETECTOR

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Abstract

Recent developments have resulted in dramatic changes in security screening methods. For example, it is now common for shoes to be removed and X-rayed at airport checkpoints after the failed shoe bombing. Terahertz (THz) technology is one of a suitable choice that is emerging. It is intriguing to note that how THz pulsed imaging systems can be used to picture threatening objects and have shown that explosive materials have distinctive THz spectra. In this paper, the characteristics of barrier and prospective confusion materials are examined more carefully.

Key words: security, X-ray, THz technology.

Introduction

There are already a broad range of methods available to detect a range of threats, such as guns or explosives or illegal products, ranging from drugs to undocumented immigrants. Latest and existing bag screening methods in different countries typically use X-ray inspection[1], [2] techniques with some use of additional image analysis, manual search and detection of chemical trace. Usually, the passenger screening[3], [4] is strongly dependent on entryway and handheld metal detectors being employed at most airports. These methods are not foolproof, however, and there could be useful improvements to detect the following:

1. Explosives;
2. Weapons or materials consisting of tiny metal pieces;
3. Biological and chemical threats; and
4. Weapons made of Ceramics.

Methodology

A laboratory version of TPITM spectra 1000 tool was used to measure all terahertz pulsed spectra in transmission. The primary distinction between the laboratory system and commercial spectrometer is the use of electro-optic detection[5] instead of photoconductive receivers in the latter, leading in reduced signal-to-noise bandwidth. Fig.1 illustrates a schematic diagram of the terahertz pulsed spectrometer in an experimental set-up. When ultra-short laser pulses are focused on a GaAs photoconductive, Terahertz pulses are generated switch from a limited titanium (Ti) bandwidth[6]: sapphire mode-locked ultrafast laser. The laser generates sub-100 fs pulses with a persistence rate of 80 MHz and an average power of 300 mW; nevertheless, the generation and detection processes require only a few tens of mW. A massive voltage of DC is applied across the switch's electrodes. The ultra-short laser pulse generates charging carriers in the semiconductor with suitably designed semiconductor devices. A transient current is then made to flow through the closed switch, and using an appropriate constructed antenna framework, terahertz radiation is combined to free space. The terahertz pulse's electrical field E(t) is proportional to the rate of current change over time (i.e., where J(t) is the transient current).

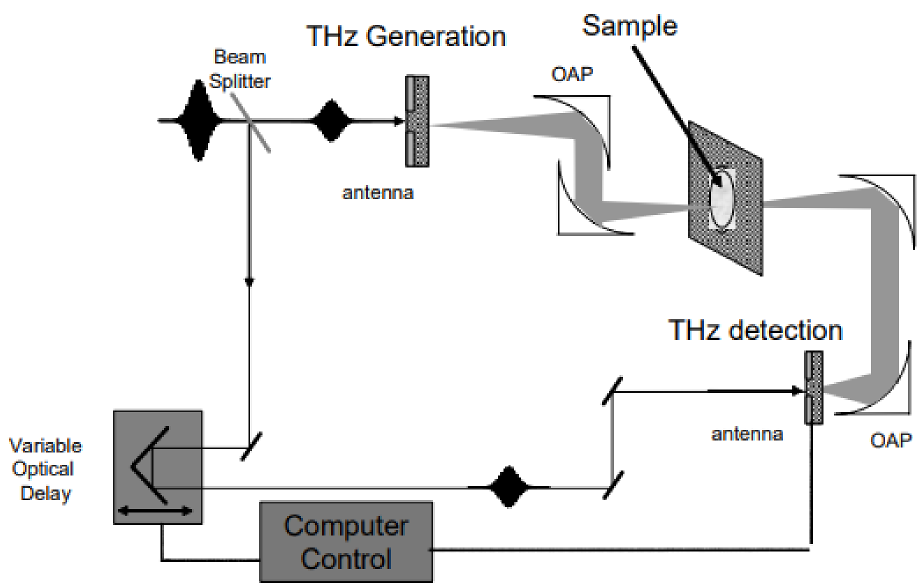

Fig. 1

Conclusion

The terahertz spectra of a diverse variety of safety screening materials was made to be measured in threat and potential confusion substances, clothing, and luggage or packaging categories. It is, therefore, possible to use terahertz to create practical spectroscopic and imaging technologies to detect and locate hidden explosives or to detect hidden weapons such as ceramics which may get undetected by the various metal detectors.

References

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