



# THz Identification for Defense and Security Purposes: Identifying Materials, Substances, and Items

*Andre U Sokolnikov*

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# THz Identification for Defense and Security

## Purposes: Identifying Materials, Substances, and Items

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The principal aim of this book is to provide the reader with the understanding of the possibilities and features of THz identification as opposed to more traditional techniques such as X-rays, microwaves, etc. by elucidating and illustrating the principles of THz identification and its applications in a systematic way. Its scope includes a description of the physical principles of THz generation, transmission and detection, as well as of the applications of THz identification.

The inherent advantages and potential benefits of the terahertz (THz) phenomenon, potential that encompasses various aspects such as THz sensing, imaging and material properties investigation with THz radiation for Defense (military) and security applications serve as an important stimulus for the interest in emerging THz science and technology, in particular, the very rapid growth of this new field.

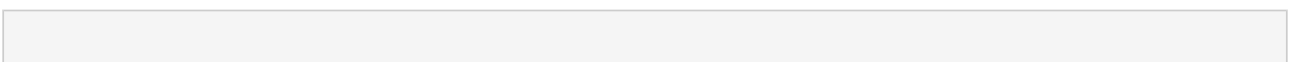
This text presents some of the leading fundamental research efforts towards the realization of practical THz devices applications for military and security applications. Relevant chapters contain fundamentals and/or measurements of THz radiation in solid-state materials such as high explosives (e.g. HMX, PETN, RDX, etc.), biological tissues and organic-semiconductor nanostructures. Individual chapters also address the present capabilities of THz equipment for the effective utilization of screening packages and personnel.

This book contains descriptions and analyses of the most innovative research in the field; the presented material introduces novel devices and/or concepts that enhance THz source and detector performance — enabling completely new types of sensor performance at THz frequency (e.g. detection at molecular and nanoscale levels), and defining innovative sensing modalities (e.g. remote object and personnel identification) for defense and security.

#### **Contents:**

- Introduction
- Basics of Electromagnetism
- Mathematical Methods of Identification
- Physics of Producing and Detecting THz Waves
- Methods and Technology for THz Sources, Detectors and Processing Electronics
- Electronics for Portable THz Devices
- THz Applications
- Medical and Other Applications of THz Radiation

**Readership:** Professionals in the field of defense and security and researchers (with college-level understanding of, or an advanced degree in physics or engineering).



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