

Terahertz Spectroscopy

Searching for new Fingerprints

Recent advances in Terahertz (THz) technology make it an attractive tool for a growing number of applications. In particular, THz spectroscopy allows to uniquely characterize many large-scale structures such as biomolecules and crystals. THz radiation has a high penetration depth while being non-hazardous. Therefore, it can identify substances even when they are packaged. Furthermore, THz spectroscopy is capable of measuring the conductivity of semiconductors. It is also well suited for time-resolved measurements.

Spectroscopy is a well-known method that exploits the interaction between light and matter. It became a standard technology for visible and infrared range. At these wavelengths, spectroscopic techniques yield valuable information about small structures such as covalent bonds, allowing to detect and classify many materials.

However, bigger structures such as molecules, in particular biomolecules, or crystals, have their characteristic spectral lines in the THz region. This makes the study of such structures a perfect application for THz spectroscopy. Due to their specific low-frequency absorption bands, THz spectroscopy offers the possibility to identify molecules. Even substances differing by their degree of crystallinity, e.g. in pharmaceutical components, or phase transitions can be discrimi-

nated. Moreover, THz radiation can penetrate into many dielectric materials such as plastics, paper or textile, which allows identifying hidden or packaged substances.

A special variant of THz spectroscopy, called THz time-domain spectroscopy, is capable of measuring conductivity (e.g. for semiconductor components and materials) or determining the time-evolution of a state of a molecule, e.g. of molecular hydration.

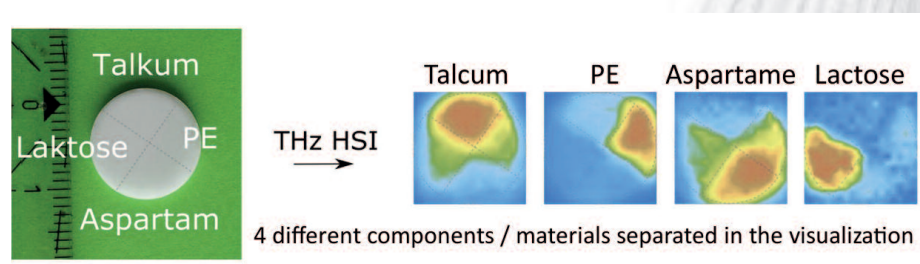


Figure 1: Identification of known substances distributed in a pressed tablet (HSI - Hyper Spectral Imaging).

Facts/Key-Values/ Features & Benefits

- Contactless, non-destructive and safe measurement method
- Offers unique spectroscopic information for large molecules
- Penetrates through packaging
- Spatially resolved information

Potential Users Fields of Application

- Chemistry, biochemistry, pharmacy
- Biomedical
- Plastic production and recycling
- Forensic applications (e.g. explosives)
- Semiconductor industry
- Food production

Status – what do we offer?

- Transmission and reflection spectroscopy measurements
- THz time-domain and frequency-domain spectroscopy
- Customer specific THz spectroscopy solutions
- Multivariate data analysis

Contact data

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