ADVANTEST

3D Imaging Analysis System

TAS7000

3D Non-Destructive Analysis System Utilizing Terahertz Wave Technology

New 2D/3D non-destructive analysis system utilizes terahertz wave technology

The TAS7000* 3D imaging analysis system exploits the unique properties of terahertz waves. TAS7000 enables 3D non-destructive analysis of the internal structure and chemical composition of a target object; the results are shown on a 3D display. In addition, this system enables high-speed and accurate measurement of spectral characteristics and 2D mapping. It provides an entirely new analytic solution for evaluating, among other things, the industrial materials within plastics and ceramic components, and offers a level of analysis and testing of pharmaceutical products, not previously possible with conventional imaging and analysis systems.

**: This system was developed by ADVANTEST in collaboration with Prof. Dr. Kodo Kawase of Nagoya University.*

Non-destructive 2D and 3D analysis utilizing terahertz wave technology

TAS7000 enables non-destructive, 2D and 3D analysis of the internal composition and structure of measurement targets by utilizing computed tomography (CT) and exploiting the unique properties of terahertz waves. In addition to the analysis of the structural homogeneity of internal substance, TAS7000 can also easily identify the property and quantitative distribution of its constituents. Moreover, in contrast with other regions of the electromagnetic spectrum, terahertz waves can penetrate various types of materials with moderate transmittance, allowing for analysis.

High-speed measurement utilizing terahertz optical sampling technology

TAS7000 relies on ADVANTEST's newly developed ultra-short pulse femtosecond optical fiber laser technology for terahertz wave generation and detection, and it utilizes the company's original terahertz wave high-speed optical sampling technique. Thus, it delivers a measurement throughput that is approximately 1000 times greater than that provided by the previous system.

Broadband terahertz wave spectroscopic analysis up to 3 THz

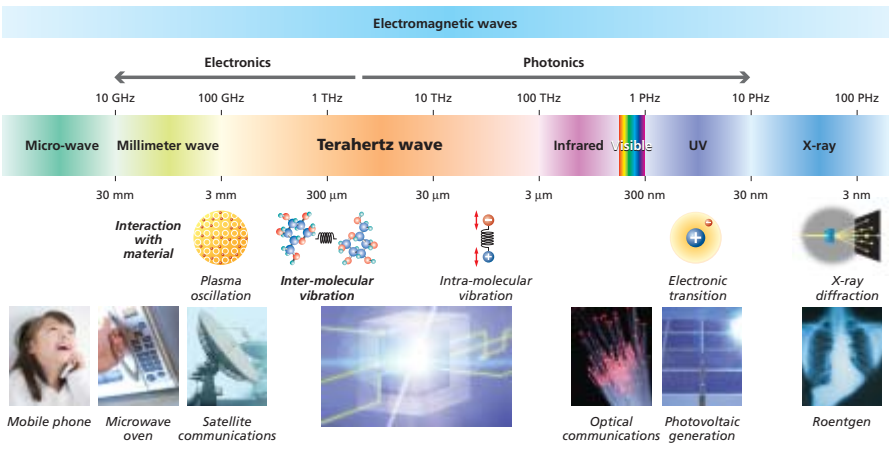
TAS7000 enables broadband, high-resolution spectroscopic analysis up to a maximum analytical frequency of 3 THz. The system is ideally suited to acquiring fingerprint spectra of a comprehensive range of chemical, industrial, and biological materials. For high precision, the system has the option to dehumidify the sample chamber by filling the chamber with dry air during the measurement.

Versatile system specifications support production lines

TAS7000's robust and versatile design permits multiple channels to be installed in its generator and detector modules, making it suitable for production line inspection and other applications requiring parallel measurement functionality. The system can be configured to meet the needs of customers.

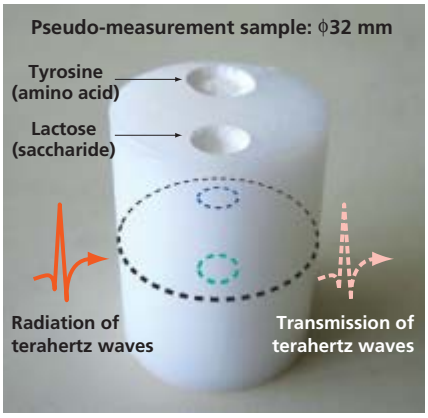
About terahertz waves:

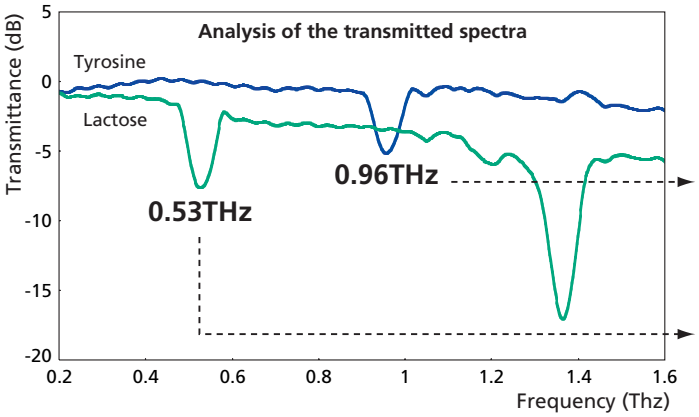
Terahertz waves are electromagnetic waves with frequencies between those of radio waves and light waves. Terahertz waves, which have both the transmissivity of radio waves and directivity of light waves, are applicable to the evaluation of industrial products such as plastic and ceramic, as well as to applications in bio-medical, food, agriculture and security fields among others.



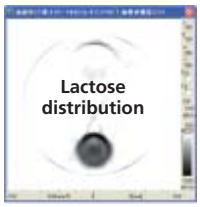
Examples of new non-destructive analysis utilizing TAS7000:

1 ·····Analysis of specific constituents and 3D imaging analysis



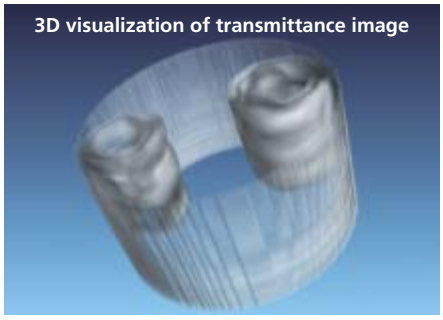


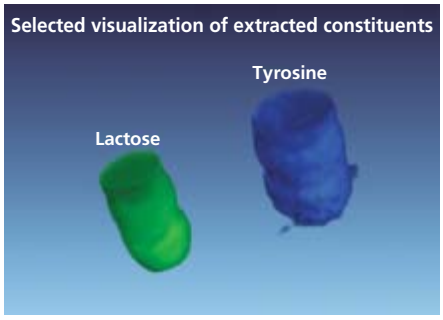
2D cross section visualization



Specific substances are identified from the results of spectroscopic analysis and 3D images are created for further analysis.

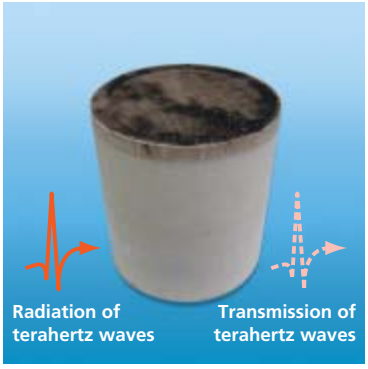
3D computed tomography (CT) spectroscopic image analysis





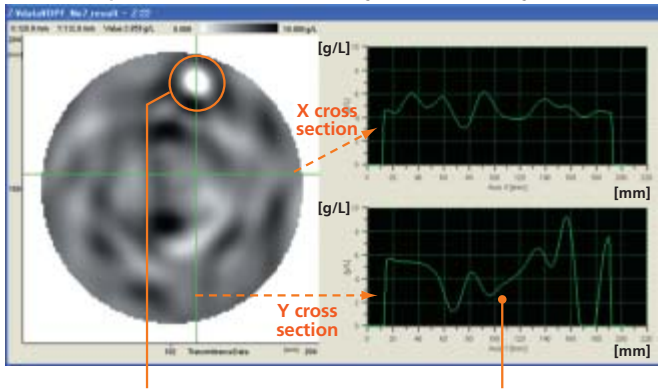
2 ·····Density distribution analysis of particulate matter (PM) accumulated in a Diesel Particulate Filter (DPF, ceramic filter) used in the emission system of a diesel engine

Analytical sample: DPF ϕ190 mm (7.5 in.)



3D computed tomography (CT) PM density distribution analysis

2D CT PM quantitative distribution analysis at an arbitrary cross-section

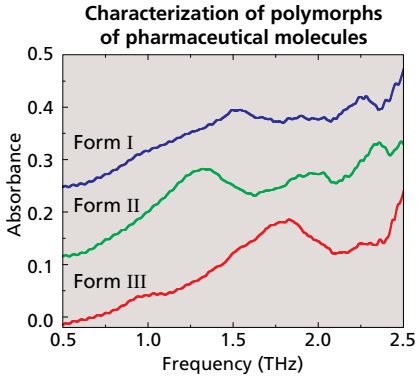


- Density distribution analysis [g/L] in arbitrary areas within samples
- Analysis of internal structure changes
- Identify accumulated PM condition by the 3D density distribution analysis

3 ·····Spectroscopy of tablets of crystalline polymorphic forms and tablets of pseudo-crystalline polymorphic forms

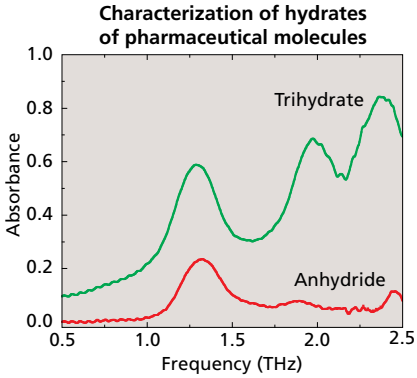
The changes in molecular arrangement during the crystallization process or in the hydrated state cause the same compounds to interact differently, producing dramatically different absorption spectra.

Characterization of polymorphs of pharmaceutical molecules



Absorption spectra of three polymorphic forms of tolbutamide (Forms I to III)

Characterization of hydrates of pharmaceutical molecules



Absorption spectra of pipemidic acid anhydride and pipemidic acid trihydrate

TAS7000 Key Specifications

Applications:	**Non-destructive analysis, 3D constituent density distribution analysis, 3D spectroscopic measurement**
Analytical functions:	**2D/3D computed tomography (CT) density distribution analysis Terahertz spectroscopic transmission analysis: 2D/3D CT spectroscopic measurement mode 2D spectroscopic measurement mode (mapping measurement) Spectroscopic measurement mode**
Analytical frequency range [1]:	**High dynamic range module: 0.02 to 0.6 THz Broadband module [2]: 0.05 to 3 THz**
Maximum sample size:	**≤ ϕ 310 mm (12.2 in.) x 310 mm (H; 12.2 in.)**
Maximum sample weight:	**≤ 20 kg**
Power requirements:	**AC 100 V (100 to 120)/200 V (220 to 240)/850 VA**
External dimensions:	**Approx. 1500 (W) x 1570 (D) x 1600 (H) mm**
Weight [3]:	**≤ 550 kg**

1): At temperatures of 23°C ± 5°C
2): With dry air option
3): Including analysis unit and CT test bench carrier and excluding hardware options and PC

Please refer to product manual for complete system specifications.
Specifications may change without notification.

ADVANTEST

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