Applied Research & Photonics, Inc.
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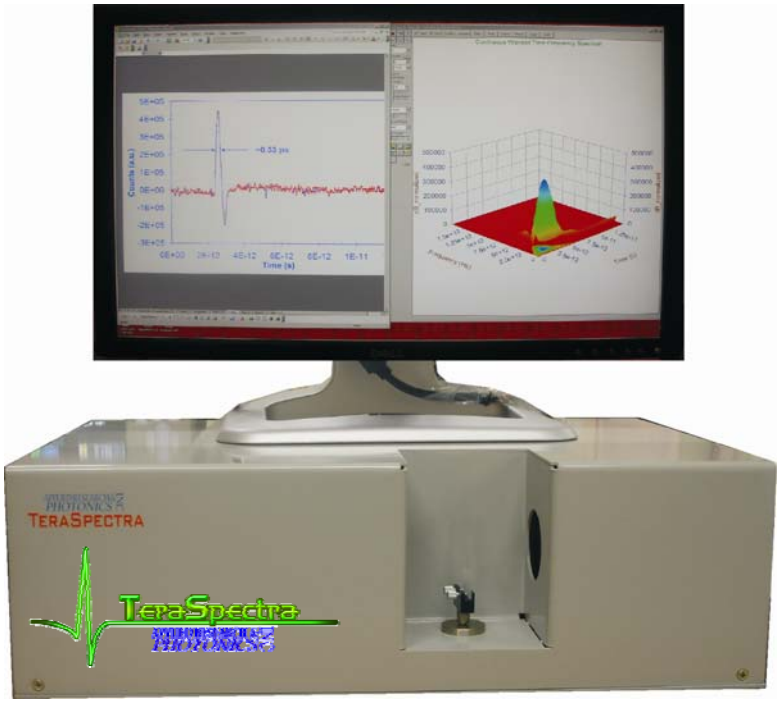
Introducing

TeraSpectra...



a terahertz spectrometer having applications in analytical, biological, biomedical, pharmaceutical, and other life sciences and physical sciences areas.

Terahertz technology provides the next generation capabilities, overcoming the so-called terahertz gap, with new applications in this spectrum range.

ARP technology won the prestigious NASA TechBrief's nano-50 award.

Product Details

ARP's TERASPECTRA is a turn key spectrometer. TERASPECTRA can solve a number of problems in the analytical, biochemical, biological and other industrial and research areas. As a high sensitivity device it can be used to identify and monitor the effect of binding of one molecule to another, or their dissociation, for example. Unlike Raman or IR spectroscopy, terahertz can penetrate to probe at a deeper level. Trace analysis may be conducted at concentrations as low as **femtomolar** or parts per trillions. Other analyses such as conjugation and catalysis can also be done on a molecular level. Alternatively, effects of temperature and environmental changes can also be monitored with high precision. Molecular signature recognition is another important application in life sciences area. Practical demonstration on specimens of interest is available. Please contact at above address or by email: info@arphotonics.net.

Specification Summary

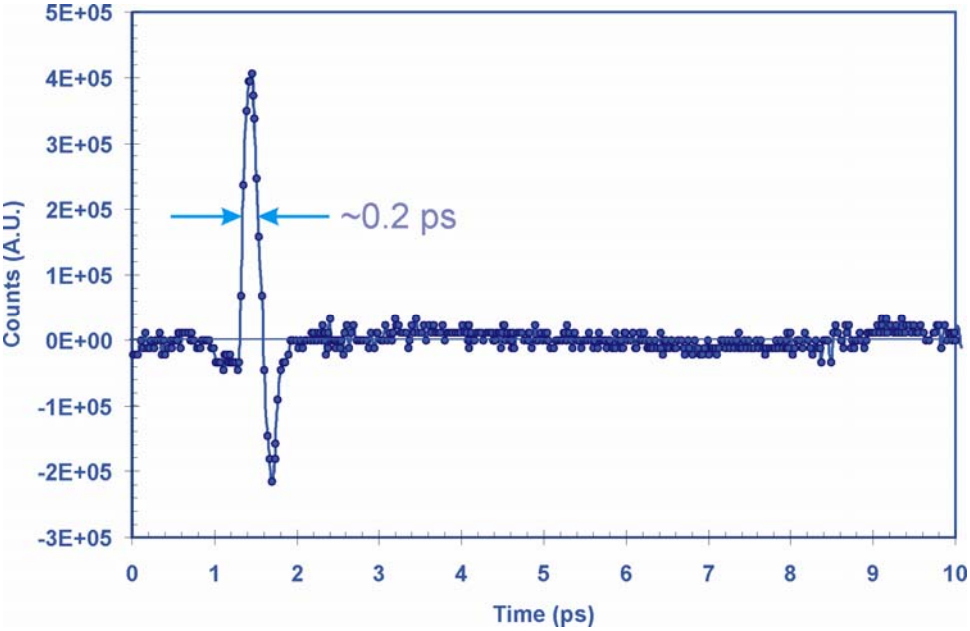
Parameter	TeraSpectra[1]
Time resolution	<100 Femto-seconds
Time span	Up to 60 Pico-seconds
Eqt. Frequency Range	0.1 to ~10 terahertz
Technology	Next gen. EO dendrimer
Source power	~ milliwatts
Sensitivity	~ 10 FemtoMol
Operation condition	Ambient

[1] Specifications may change

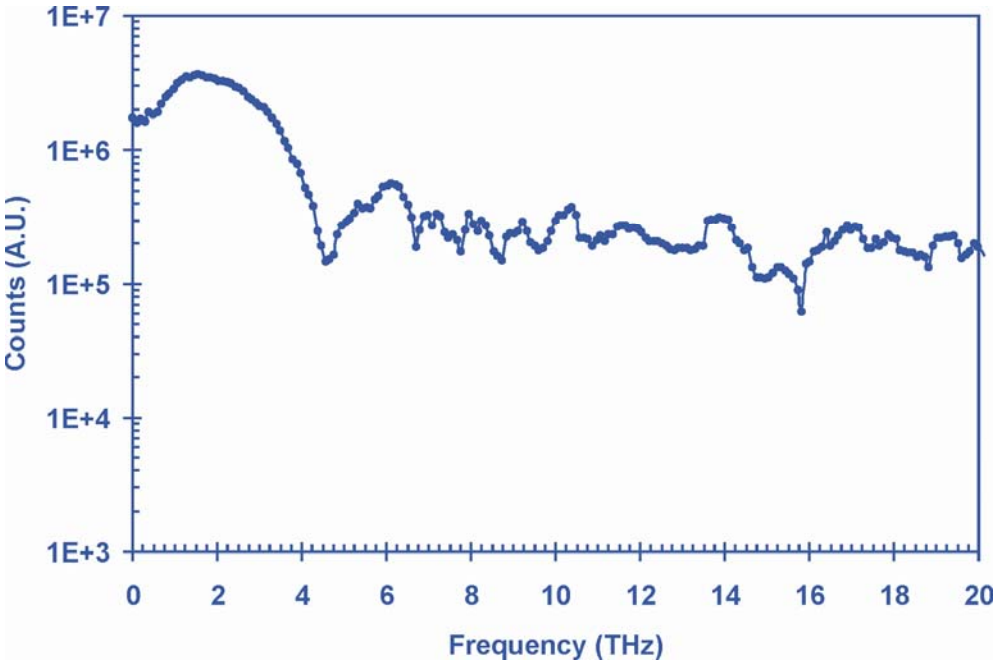
Main Features

- TeraSpectra is cost-effective with higher performance because of its next generation dendrimer technology.
- A high power source enables probing of a wide variety of specimens thus expanding the scope of the spectrometer.
- High Signal to Noise Ratio.
- Label-free characterization.
- Room temperature operation.
- Stabilized, ~1” beam diameter for uniform exposure.
- Temperature and Environment control chamber option.
- Collaborative investigations available. Contact: info@arphotonics.net

Performance Highlight



A typical time-domain pulse exhibits sub-pico second full width at half maximum (FWHM).

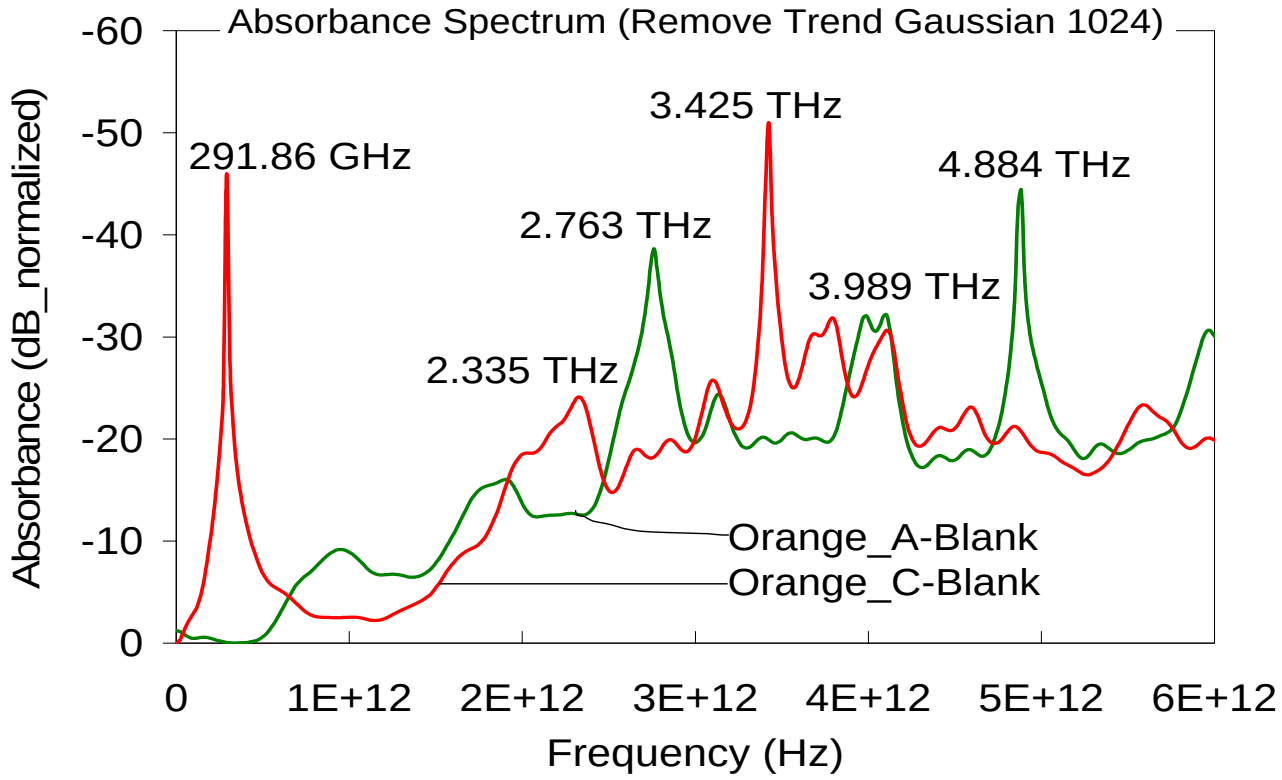


Frequency-domain spectrum spans over a wide frequency range.

Application Examples

1.Label-free DNA Hybridization Analysis

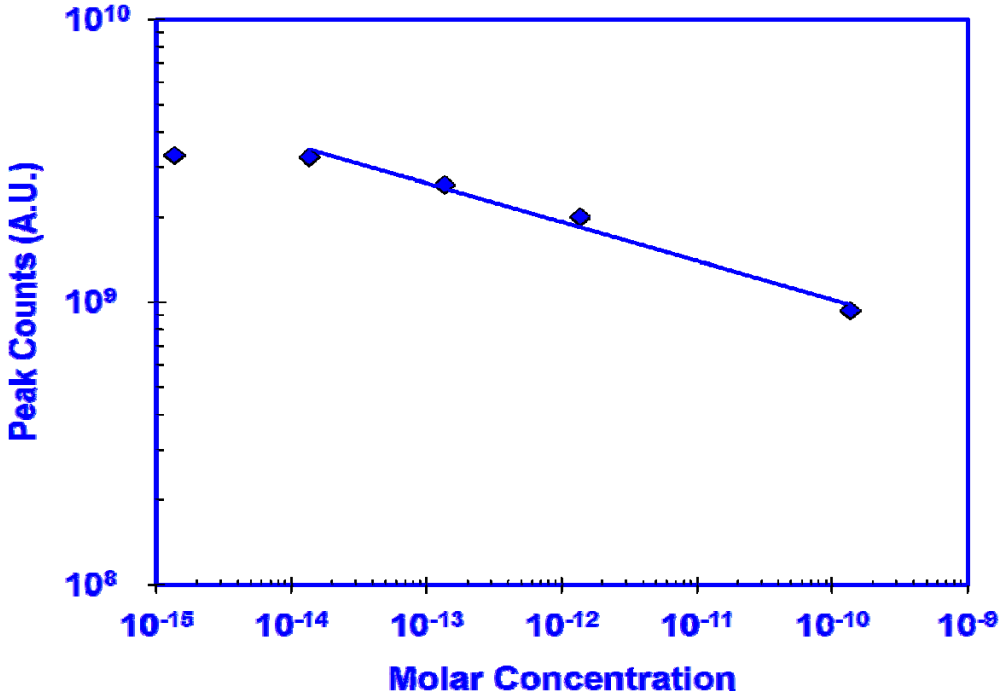
Terahertz technology allows straightforward detection of DNA binding state (i.e., discriminating between single stranded and double stranded DNA fragments) without labeling.



1. Absorbance spectra of single-stranded (Green) and double-stranded (Red) (hybridized) DNA. Characteristic peaks allow distinguishing between the hybridization states. Samples complement of Dr. Bruce Stanley of Penn State University College of Medicine, Hershey, PA.

2. DNA Quantitation

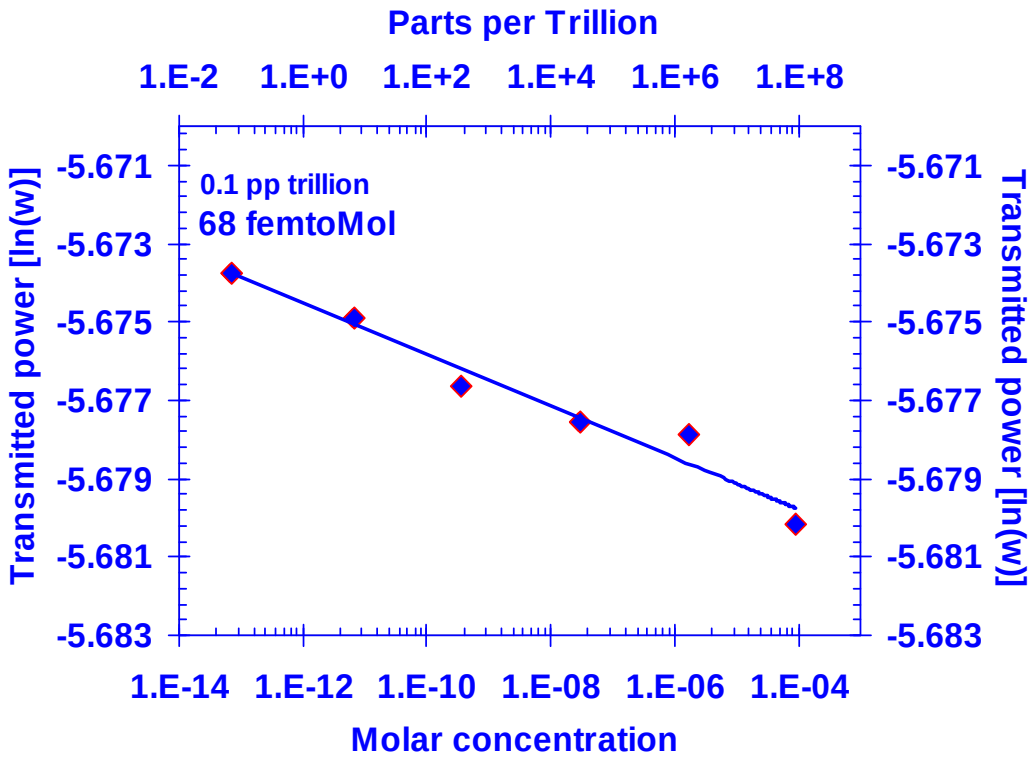
TeraSpectra's high sensitivity can be used for quantitation of biologically available quantity of material.



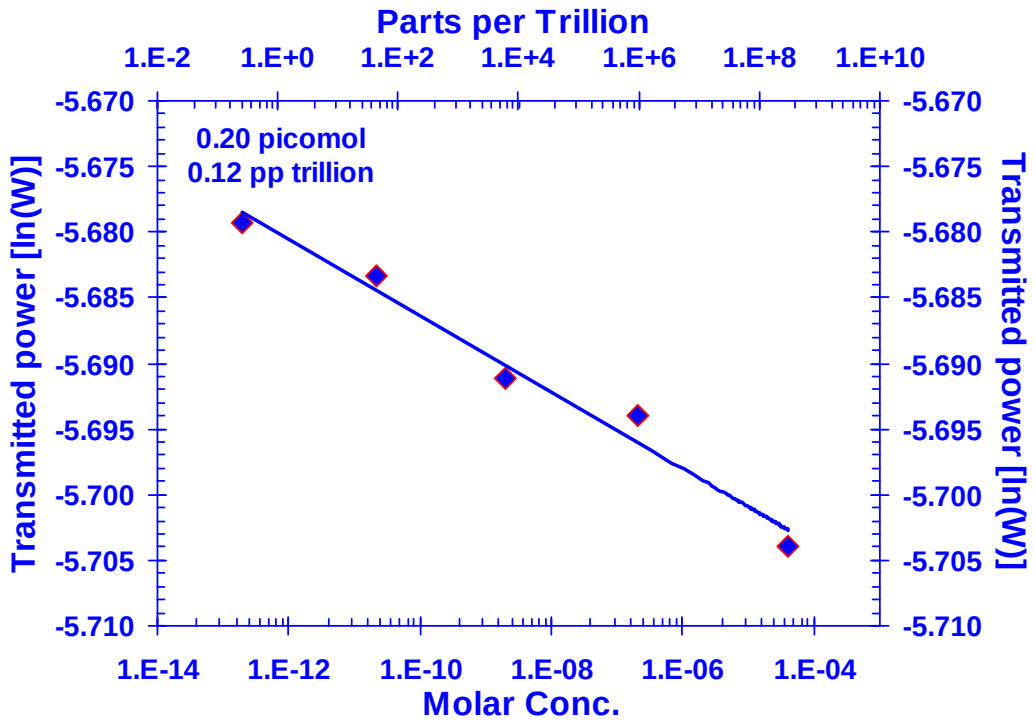
2. Data obtained from hybridized 25-mer oligonucleotide exhibits femtomolar detection ability. Above Figure shows concentration dependence of peak transmission. The trend exhibits a power-law dependence on the concentration over several decades.

3. Parts per trillion sensing

Another application is in trace analysis. Parts per trillion levels can be sensed in a variety of environment.



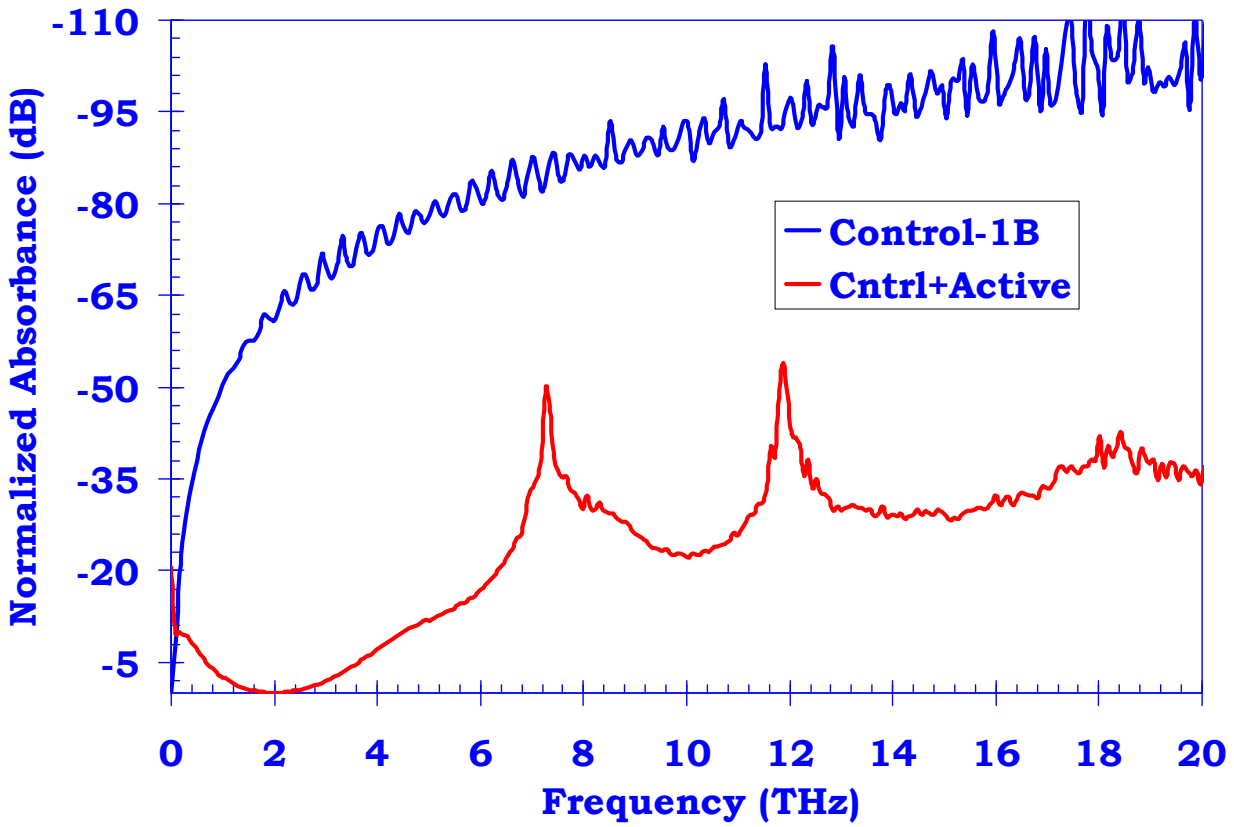
3A. Sensing an organic compound (Ceraphyl) at parts per trillion (or femtomolar) concentration from an organic solution (methanol).



3B. Detecting parts per trillion of an inorganic salt (Cr^3 Acetate Hydroxide) from aqueous solution.

4. Molecular Identification

Terahertz interaction with a given molecule results in different spectral signature. This difference can be identified by the sensitive detection mechanism of TeraSpectra.



4. Spectral signature of stratum corneum (control, blue line) and the control treated with an active ingredient (red). Terahertz can clearly detect the presence of an active as evidenced from the spectra. Samples complement of Professor Bozena Michniak-Kohn of Rutgers University, NJ.