

Fast and flexible: TOPTICA presents advanced terahertz imaging platform

Reacting to the growing demand in non-destructive testing applications, TOPTICA has further extended its terahertz instrumentation portfolio. This year at Photonics West, the company will be presenting a new **Terahertz Imaging Extension** for its successful time-domain spectroscopy platform TeraFlash. Owing to the unique spectral bandwidth of the TeraFlash (0.1 – 5 THz), researchers can exploit the full potential that the combination of imaging and spectroscopic methods has to offer.

The Imaging Extension uses two precise linear stages to scan a sample through the focus of the terahertz beam. The translational movement is synchronized with the delay-stage within the TeraFlash, speeding up the measurements significantly, allowing the system to acquire complete waveforms for up to 16 pixels per second. The positioning accuracy is better than 200 μm over a 15 x 15 cm field of view.

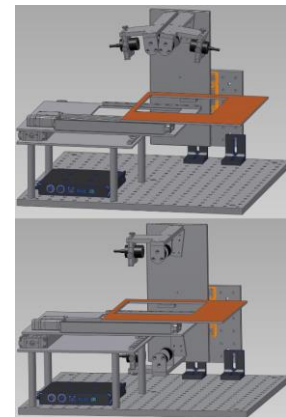
Co-developed with experts from Fraunhofer Heinrich Hertz Institute (Berlin, Germany), the Imaging Extension comes in two versions – a “basic” setup for researchers who wish to use their own optical components, and a “complete” version that includes parabolic mirrors for beam shaping and focusing.

The Complete Imaging Extension offers a unique flexibility: With the help of alignment pins, users can quickly reconfigure the optics from a transmission setup to a reflection geometry and vice versa.

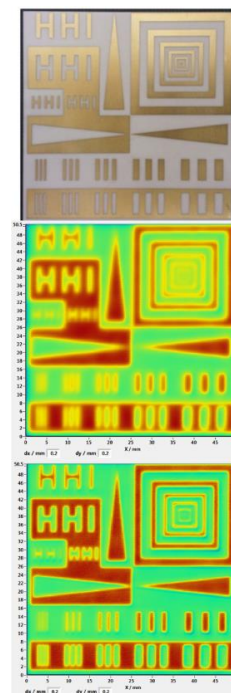
Both versions feature a powerful software package that offers a choice of contrast parameters including amplitude, phase and layer thickness. In addition, users can filter the raw data both in the time-domain and frequency-domain, and generate amplitude and height profiles along arbitrary cross sections of the sample.

Terahertz imaging can visualize sub-surface cracks, voids and delaminations in polymer structures. In plant leaves, water-contrast imaging helps to optimize irrigation strategies and avoid drought stress. In paper envelopes, terahertz screening can reveal the presence of concealed objects and identify the material in question by spectroscopic techniques.

The Imaging Extension is the latest addition to TOPTICA’s broad portfolio of terahertz products which includes state-of-the-art time-domain and frequency-domain solutions.



Complete version of the Terahertz Imaging Extension, configured in reflection (top) and transmission (bottom).



Images of a resolution test chart. Top: Photograph. Center: Terahertz reflection image at full bandwidth. Bottom: Same image after spectral filtering (range 2.5 – 4.0 THz). The field of view is 5 x 5 cm and the smallest structures are less than 500 μm wide.

TOPTICA Photonics AG

Lochhamer Schlag 19

82166 Graefelfing

Germany

www.toptica.com

<http://www.toptica.com/company-profile/news/>

Contact

Dr. Tim Paasch-Colberg

Phone + 49 89 85837-123

Fax + 49 89 85837-200

tim.paasch-colberg@toptica.com

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