

new products

The descriptions of the new products

listed in this section are based on information supplied to us by the manufacturers. PHYSICS TODAY can assume no responsibility for their accuracy. For more information about a particular product, visit the website at the end of the product description.

Andreas Mandelis

Focus on photonics and biomedical optics

Continuously variable apodizing filters

Edmund Optics presents continuously variable apodizing filters that eliminate undesirable intensity variations and create an even illumination profile in an optical system; both the Bullseye and Reverse Bullseye filters come in 25- and 50-mm diameters with end densities of 1.0 and 2.0. Bullseye filters, which have a high optical density in the center that decreases continuously to an uncoated edge, are commonly used to flatten the intensity profile of Gaussian beams. Reverse Bullseye filters improve dynamic range in imaging systems. Their high optical density coating on the edge of the filter increases continuously to an uncoated center. Both types of filters are suited for a design wavelength range of 400–700 nm. A wide variety of custom substrates, sizes, and intensity profiles are available. *Edmund Optics Inc, 101 East Gloucester Pike, Barrington, NJ 08007-1380, <http://www.edmundoptics.com>*

Streak camera for fluorescence measurements

The new Streakscope C10627 captures weak, short-lived fluorescence of semiconductor, photophysics, and biology samples. Able to resolve fluorescence lifetimes down to the sub-picosecond domain, the Streakscope is suitable for time-resolved fluorescence spectroscopy and picosecond fluorescence. Unlike techniques such as time-correlated single-photon counting and gated spec-



troscopy that capture only one set of spectral or temporal information at a time, the Streakscope simultaneously captures a full spectral emission with high temporal resolution and high sensitivity. The C10627 incorporates a newly designed streak tube with a traveling wave deflector. Sweep rates can be up to 20 MHz and significantly shorten measurement time. Other features include a dynamic range of more than five orders of magnitude. *Hamamatsu Corporation, 360 Foothill Road, Bridgewater, NJ 08807, <http://www.hamamatsu.com>*

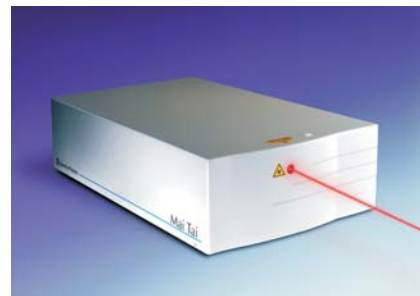
Vacuum UV analytical spectrophotometer

McPherson has introduced a vacuum UV analytical spectrophotometer for wavelength dispersive spectral measurements from 120 to 350 nm (3.5 to 10 eV). The VUVAS provides results as percentages of transmission or reflection with a precision of 0.05%. It works with solid samples and can be equipped with gas or liquid sample cells. Cryogenic or heated sample mounts and raster-mapping attachments are available options. The company states that it is easy to adjust the angle of incidence to the sample surface in reflectance mode. The VUVAS, which delivers absolute measurements, has a single detector that collects reference data and the final transmission or reflectance measurement. The system features efficient pumping to the 10^{-5} torr vacuum range for stable, reproducible measurements. The VUVAS is also suitable for inert gas purge requiring ppm levels of O_2 or H_2O . *McPherson Inc, 7A Stuart Road, Chelmsford, MA 01824, <http://www.mcphersoninc.com>*

Ultrafast oscillator for amplifier seeding

The Spectra-Physics Mai Tai SP ultrafast laser is an automated short-pulse oscillator with long-term environmental stability. Designed for seeding ultra-

fast amplifiers, the laser can produce a broad range of output bandwidths: >60 to <12 nm, corresponding to near transform-limited pulse widths from <25 to 100 fs. The bandwidth is user-adjustable via the graphical user interface, which allows for seeding sub-35-fs, 120-fs, and 2-ps amplifier systems using the same seed laser without manual realignment. The center wavelength from 780 to 820 nm can also be adjusted using



the GUI. In order to ensure long-term stability under widely varying environmental conditions, the Mai Tai SP features StabiLock technology, Etern-Align optics mounts, a temperature-stabilized housing, and active cavity purging. The laser uses ProLite diodes that produce uninterrupted output for $>10\,000$ hours. *Newport Corporation, 1791 Deere Avenue, Irvine, CA 92606, <http://www.newport.com>*

Optical component controllers

Physik Instrumente has extended its E-616 multichannel controller line for piezo-based steering and stabilization mirror platforms. Four open- and closed-loop models are now available in benchtop and OEM module versions. Features include three integrated amplifiers that provide up to 10 W of peak



power and internal coordinate transformation that simplifies control of both tripod and differential-drive parallel-kinematics designs. The differential evaluation of two sensors per axis improves linearity, stability, and resolution. A vertical movement can be obtained with the tripod design, such as for optical path length tuning. *Physik Instrumente LP, 16 Albert Street, Auburn, MA 01501, <http://www.physikinstrumente.com>*

Laser control and frequency stabilization

DigiLock 110, a digital feedback controller from Toptica, consists of hardware based on a field-programmable gate array (FPGA) and includes numerous analog and digital inputs and outputs. The system can be used as a multi-channel oscilloscope to display a laser scan across an atomic resonance. Software can control the scan to zoom into the absorption features, thus reducing the scan width. The laser can be locked to any slope or peak in the absorption spectrum. Network and spectrum functions allow for instrumental analysis, such as measuring transfer functions of actuators and analyzing the spectrum of the error signal. The unit features up to a 100-MHz sampling rate and up to 21-bit precision. Its digital locking bandwidth of several megahertz achieves a total delay time of <200 ns. An FPGA-controlled analog bypass allows for even higher bandwidths, such as for laser linewidth reduction. *Toptica Photonics Inc, 1286 Blossom Drive, Victor, NY 14564, <http://www.toptica.com>*

Laser timing stabilization unit

Gigaoptics offers the timing stabilization unit TL-1000 as an integral accessory to the Gigajet high-speed femtosecond oscillator series. The TL-1000 allows the user to tightly phase-lock the oscillator repetition rate to an external reference such as a synthesizer or another mode-locked laser. The unit's free-running oscillator suppresses repetition rate fluctuations to a few millihertz through a residual timing jitter of below 100 fs in a frequency range from 0.1 Hz to 100 kHz. The optional high-speed asynchronous optical sampling feature enables a repetition rate offset-lock and stabilization between two 1-GHz fs oscillators at a repetition rate difference between 2 and 20 kHz. The TL-1000 is designed for such

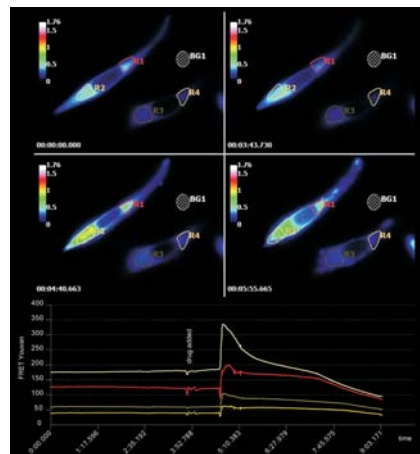
applications as two-color pump-probe spectroscopy that uses two synchronized mode-locked lasers and optical experiments synchronized to a pulsed electron source. *Gigaoptics GmbH, Blarerstrasse 56, 78462 Konstanz, Germany, <http://www.gigaoptics.de>*

Optical parametric oscillator

The new compact Chameleon optical parametric oscillator from Angewandte Physik und Elektronik allows any wavelength combinations to be used. In conjunction with the Chameleon pump laser by Coherent, the OPO has a wavelength range of 680–1200 nm and a second and third harmonic generation module down to UV (<230 nm) without a single gap, which make it a suitable excitation source for multiphoton excitation microscopy. The OPO and laser combination offers a higher penetration depth and lower sample damage for excitation wavelengths of >1 μm ; the possibility of simultaneous excitation of different fluorophores—for instance, green fluorescent protein with the laser and red fluorescent protein with the OPO; and multimodality of the system gaining access to alternative imaging methods such as coherent anti-Stokes and surface Raman spectroscopy. *Angewandte Physik und Elektronik GmbH, Plauener Strasse 163-165, Haus N, 13053 Berlin, Germany, http://www.ape-berlin.de/index_engl.html*

Camera for intracellular process capture

Carl Zeiss has launched a dual camera module for its AxioVision image analysis software to improve the imaging of



Terahertz Spectroscopy & Imaging

Time-domain terahertz

- **New:** FemtoFiber pro laser – up to 350 mW output
- Pulse width < 100 fs
- 780 nm and 1550 nm from a single source

Frequency-domain terahertz

- **New:** Spectroscopy Kit – up to 2 THz bandwidth
- Fiber-pigtailed photomixers
- Up to 90 dB SNR & MHz frequency resolution

Imaging

- **New:** All-electronic transceiver – 100 GHz or 300 GHz
- Dynamic range > 50 dB
- 3D image generated within minutes



Diode Laser Systems
(205 – 3000 nm)

Ultrafast Fiber Lasers
(480 – 2100 nm)

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fast intracellular processes. The new software allows for the simultaneous acquisition of images from two cameras and their synchronization within nanoseconds. Camera parameters such as exposure time or contrast can be set independently. The capture of two different wavelengths in two channels will be especially valuable for emission ratio imaging measurement; fast Förster resonance energy transfer examinations; and cellular transport process imaging in cell cultures, tissues, or organisms. It will also be an asset for simultaneously imaging tissue and cell structures using IR transmitted-light techniques. *Carl Zeiss Ltd, 15-20 Woodfield Road, Welwyn Garden City, Hertfordshire, AL7 1JQ, UK, <http://www.zeiss.com>*

Trigger for laser-beam-profiling cameras

Ophir-Spiricon has added a built-in photodiode trigger to its SP503U and SP620U USB 2.0 silicon CCD cameras, which are designed for laser-beam measurement applications. The cameras capture and analyze both CW and

pulsed-mode wavelengths from 190 to 1550 nm. The trigger includes new firmware that analyzes background lighting and provides offsets. Reliable triggering can occur with various energy levels, including as low as 10 μ J. The internal device includes a pretrigger function that predicts when the next pulse will arrive and opens the shutter in time to see short, nanosecond pulses. The trigger for the SP cameras can be activated from as low a contrast as reflected light around a laboratory. *Ophir-Spiricon Inc, 60 West 1000 North, Logan, UT 84321, <http://www.ophir-spiricon.com>*

Optics for coaters

Meller Optics offers a range of high-precision lenses, windows, and substrates in a wide variety of optical materials designed for optical coaters. Meller optical substrates feature one-tenth per wave flatness per inch, parallelism to 2 arc-sec, and surface finishes to 10-5 scratch-dig that meet the MIL-PRF-13830 specification. Lenses are available as plano-convex and concave, biconvex and concave, or meniscus; windows and substrates are plane, wedged, or tapered. Meller optical substrates for coaters range in size from ½ to 5 inches; have an o.d. with ± 0.00025 -inch tolerance; and come in numerous materials, including sapphire, ruby, YAG, and fused silica. *Meller Optics Inc, 120 Corliss Street, Providence, RI 02904, <http://www.melloptics.com>*

Mini laser bars for fiber-coupled laser diodes

New mini laser bars from Osram Opto Semiconductors feature high brilliance in the wavelength range from 910 to 1020 nm. Their output and beam parameters have been closely matched so that the light beam which leaves the small laser aperture at a defined angle can be perfectly coupled into a small fiber core with a diameter of 200 μ m and a numerical aperture of 0.22 to achieve outputs from the fiber in excess of 200 W. The high brilliance of the mini laser bars is exemplified by Osram's SPL BF series, which has a fill factor of 10% and provides an output of 8 W per emitter at a width of 100 μ m, with a slow-axis divergence of $<7^\circ$; the value applies to 95% output. The maximum output compatible with long life is around 12 W per 100- μ m emitter. With five emitters, the beam parameter

product is 15 mm·mrad. *Osram Opto Semiconductors, 21800 Haggerty Road, Suite 115, Northville, MI 48167, <http://www.osram-os.com>*

Biomedical multimodal imaging

Caliper Life Sciences's IVIS Lumina XR offers multimodal x-ray, fluorescence, and bioluminescence imaging. Precise optical and x-ray overlay allows researchers to bring optical signals into anatomical context. The company's Living Image software automates all the controls and settings required for image acquisition and processing. Typical x-ray image acquisitions take only 10 s and can be overlaid with both optical and photographic images. The IVIS Lumina XR is capable of imaging all common fluorescent and bioluminescent reporters or dyes. The system is equipped with up to 21 filter sets to image reporters that emit from green to near-IR. The system also accommodates Petri dishes or micro-titer plates for in vitro imaging. It can incorporate animal handling features such as a heated stage, gas anesthesia connections, and a syringe injection system for simultaneous compound administration. *Caliper Life Sciences, 68 Elm Street, Hopkinton, MA 01748, <http://www.caliperls.com>*

Fluorescence filters

Newport's high signal-to-noise ratio fluorescence filters provide a custom-defined narrow bandpass that has been designed to be narrower than the absorption and emission spectra of the targeted fluorophore in order to accommodate nontraditional pairing. With a typical SNR of 100 000:1, the nonpaired filters can be combined with any other filter in the series with substantial crosstalk suppression. The filters are important for numerous fluorescence-based research and clinical instruments. Applications include instrumentation for flow cytometry, drug discovery, and genetic analysis. The multicavity film design and multiple blocking components achieve typical spectral rejection of 1.0×10^{-8} from UV to 925 nm. *Newport Corporation, 8 East Forge Parkway, Franklin, MA 02038, <http://www.newportfranklin.com>* ■

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New catalog of specialty optical liquids features high-transmission, safe-handling, laser liquids, plus fused silica matching liquids, and specific refractive index liquids (1.300-2.11 n_D). Now includes comparative diagrams of glasses and optical liquids.



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