new products

Focus on lasers and imaging

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.

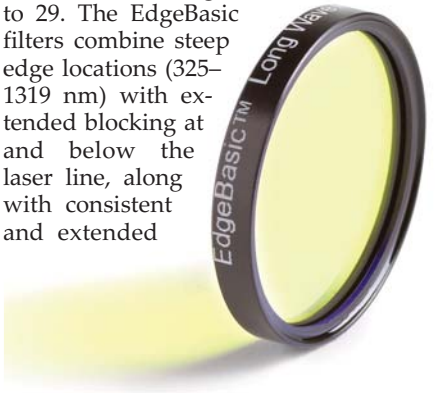
Andreas Mandelis

High-definition thermography camera

Jenoptik has applied optomechanical resolution enhancement technology to its IR-TCM HD cameras to produce thermograms and image sequences with a spatial resolution of up to 3.1 megapixels and a temperature resolution of up to 50 mK in real time. According to the company, the high-quality performance allows for precise, detailed analyses of temperature distributions. The cameras use an uncooled IR detector with 1024 × 768 pixels for thermal image acquisition. Their subframing capability allows for acquisition speed of up to 240 frames/s. Various standardized interface options—for example, GigE-Vision, DVI-D, C-Video, WLAN, and Bluetooth—are available for simple system integration, camera control, and data output. The IR-TCM HD can be used for applications in industrial and scientific research and development, automation technology, process control, and aerial photography. *ESW GmbH Sensor Systems, Prüssingstrasse 41, 07745 Jena, Germany, http://www.jenoptik.com*

New laser wavelengths

Semrock has added 10 laser wavelengths to its EdgeBasic family of long pass-edge filters, bringing the total available wavelengths to 29. The EdgeBasic filters combine steep edge locations (325–1319 nm) with extended blocking at and below the laser line, along with consistent and extended high-transmission passbands. They also have hard-coated, no-burn-out durability. Designed from the glass up to provide high performance economically, EdgeBasic filters are suitable for fluorescence imaging and metrology applications. They are appropriate to use in Raman spectroscopy when strong laser-line blocking is required and the Raman shift measurement is not too small. *Semrock Inc, 3625 Buffalo Road, Suite 6, Rochester, NY 14624, http://www.semrock.com*



Microscope for metrology and imaging

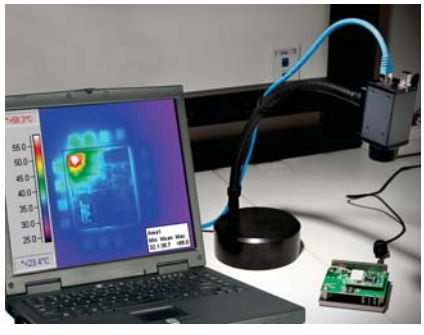
Bruker has launched the scalable ContourGT-K 3D optical microscope for benchtop metrology. It delivers high Z-axis resolution across all fields of view and reliable 2D and 3D imaging capability for noncontact profile, roughness, and thickness measurements on a wide range of surfaces. The system's gage-capable, streamlined design includes integrated air isolation for robust vibration tolerance even in challenging production environments. With the latest Bruker Vision64 software and an extensive library of preprogrammed filters and analyses, the ContourGT-K gives users easy access to advanced measurements for LED, solar-cell, thick-film, semiconductor, MEMS, and tribology applications. Factory and field-upgradable add-ons include application-specific productivity software, automated turret, stages and tilt functions, color and high-resolution camera options, and the company's NanoLens atomic force microscopy module. *Bruker Nano Surfaces Division, 3400 East Britannia Drive, Suite 150, Tucson, AZ 85706, http://www.bruker.com*

Freestanding bandpass filters

Lake Shore's BPF series bandpass filters are designed for applications for which precision and dependability are paramount, especially in extreme environments. More than 100 standard models, which include four common aperture sizes and more than 25 center wavelengths from 10 to 590 μm (about 500 GHz to 30THz), make delays and charges for custom engineering unnecessary. Originally developed for NASA and qualified for the Stratospheric Observatory for Infrared Astronomy telescope program, the BPF series filters are claimed to perform well under such harsh conditions as extreme cryogenic temperatures, thermal cycling, high gamma radiation, vacuum or pressure cycles, and vibration. Applications include terahertz and Fourier-transform IR spectroscopy, materials characterization, terahertz and millimeter-wave imaging and security, ground and space-based astronomy and astrophysics, and general electro-optics research. *Lake Shore Cryotronics Inc, 575 McCorkle Boulevard, Westerville, OH 43082, http://www.lakeshore.com*

Thermal imaging camera kit

Omega's latest series of lightweight, rugged thermal imaging cameras features plug-and-play compatibility, fast data transfer, a wide temperature range, and a high sensitivity of less than 50 mK. The camera kit is designed



specifically for thermal benchtop testing applications. According to the company, its economical OSXL-A35SC, OSXL-A15SC, and OSXL-A5SC systems bring the advantages of thermal imaging to researchers; they will be able to visualize and measure temperatures in a noncontact mode. The OSXL-A35SC produces crisp thermal images of 320 × 256 pixels; the OSXL-A15SC, 160 × 128 pixels; and the OSXL-A5SC, 80 × 64 pixels. Because of its compact packaging, the OSXL-A5SC can be used in locations where size constraints are critical. *Omega Engineering Inc, One Omega Drive, P. O. Box 4047, Stamford, CT 06907-0047, http://www.omega.com*

Extreme low-light CMOS camera

Photonis USA has designed Nocturn, its new digital extreme low-light CMOS camera, for high performance under both daylight and low-light-level conditions. Its small size, weight, and power make the camera module suitable for integration into aerial, mobile, and handheld surveillance systems. It

can also be used for machine vision and scientific imaging applications. Nocturn provides monochrome real-time imaging capabilities—from daylight to bright starlight—in the visible and near-IR spectrum. It is powered by the Photonis Lynx CMOS sensor, which enables the camera to provide a consistent read noise below $4e^-$ at rates up to its full 100 frames/s, with superior signal-to-noise performance due to its large pixels and high fill factor. The camera is capable of a broad range of spectral responses, from 400 nm to near-IR (1100 nm), with a power consumption under 200 mW. *Photonis USA, 660 Main Street, Sturbridge Business Park, P. O. Box 1159, Sturbridge, MA 01518, http://www.photonis.com*

Ultrafast fiber lasers

Toptica's latest development in ultrafast fiber lasers for science and industry is the compact FemtoFErb 780, which is a suitable source for pulsed terahertz and nonlinear microscopy. The company's ultrafast fiber lasers are based on polarization-maintaining erbium-doped fibers and saturable absorber mirror technology for reliable mode locking. The FemtoFErb 780 delivers sub-100-fs pulses with 50 mW of average power at 780 nm. It combines optics and electronics in one box and is a good match for time-domain terahertz. It can also serve as a cost-effective replacement for bulky solid-state lasers used in biophotonics applications ranging from second-harmonic-generation microscopy to multiphoton excitation. *Toptica Photonics Inc, 1286 Blossom Drive, Victor, NY 14564, http://www.toptica.com*

Time-correlated single-photon measurements

StrobeLock technology, recently launched by WITec, combines a pulsed excitation laser system with a time-correlated single-photon counting detector. The imaging modes, which include fluorescence lifetime imaging and time-resolved luminescence microscopy, can be integrated with the WITec alpha300 and alpha500 microscope series. The modular design of the WITec microscopes facilitates their being combined with the StrobeLock module. StrobeLock enhances the contrast of additional material hidden in the time function of a fluorescence or luminescence signal; the contrast is then allowed to be perfectly linked with Raman, scanning near-field optical microscopy, or atomic force microscopy imaging. Specifically suited for materials science, the technology enables users to make various measurements so they can better understand a sample's properties. *WITec Instruments Corporation, 130G Market Place Boulevard, Knoxville, TN 37922, http://www.witec.de*

Deep UV excimer laser mirrors

Newport Corp's long-lived deep UV excimer laser mirrors have projected lifetimes greater than 30 billion pulses when used in the proper photocontamination-controlled environment. The mirrors feature all-dielectric high-reflector coatings to minimize absorption and maximize reflected energy at 193 nm. The high-energy laser mirrors are designed with excimer-grade UV fused silica substrates polished to better than $\lambda/10$ flatness and 10-5 surface quality to preserve wavefront quality and maintain excellent stability. Coating and testing are done in a photocontamination-controlled deep UV clean room qualified to 193-nm standards. Newport's new laser mirrors are highly resistant to laser damage. Pet-G and metal foil packaging ensure that parts are delivered clean and protected from any environmental photocontamination. *Newport Corporation, 1791 Deere Avenue, Irvine, CA 92606, http://www.newport.com*

High-speed camera

Photron has released the Fastcam SA8 high-speed camera with 1280 × 1024 pixel image resolution up to 3500 frames/s. Increased frame rates are also available at reduced resolution, including 1280 × 720 pixels at 5000 fps. The digital sensor provides sensitivity of ISO 5000 for monochrome and ISO 2500 for color and is fully compliant with the ISO 12232 S_{sat} standard. The 12.8- by 10.2-mm sensor

size is compatible with 1-inch C-mount and Nikon G-type lenses. The camera has 4- and 8-GB memory options and a high-performance gigabit Ethernet interface to quickly download images to a PC. The compact SA8 is housed in a rugged, sealed camera body to protect it from dust and other contaminants

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in harsh environments. Applications include automotive safety testing; engineering research; materials science; fluid dynamics; military, defense, and aerospace research; and ballistic imaging. *Photron USA Inc, 9520 Padgett Street, Suite 110, San Diego, CA 92126-4446, http://www.photron.com*

Ball lenses

Precision glass ball lenses, a new manufacturing technology from Applied Image, are suited for applications such as fiber-optic couplers, laser focus lens devices, collectors in LED lighting, microscopy, endoscopy, and sensors.

Ball lenses can focus or collimate light and are mechanically simple to incorporate into complex optical systems such as endoscopes and barcode scanners or to use as a condenser lens. They can also be employed as preforms for sphere and asphere compression molding applications and to create small plano-convex lenses through conventional machining. The ball lenses are custom manufactured to high tolerances using the specific glass material required for each application. Sizes can range from 1 to 35 mm in diameter. The company's process allows for the high-quality production of both small and large quantities at low cost. *Applied Image Inc, 1653 East Main Street, Rochester, NY 14609, http://www.aig-imaging.com*

CCD camera for low-light imaging

Artemis CCD has added to its range of scientific cooled CCD cameras. The new 11-megapixel camera, the LF110 plus, builds on the current LF110 and features the 35-mm KAI-11002 CCD sensor. The camera includes both low- and high-speed analog-to-digital converters that provide a wide range of image acquisition speeds while maintaining maximum image integrity. A full-frame image of 4008 × 2672 pixels can be acquired at speeds of 2 megapixels/s for the highest quality images and up to 12 megapixels/s in preview mode. The LF110 plus achieves low image noise by matching the 11e^- noise performance of the original LF110, while images are transferred to the PC significantly faster. The cooling efficiency has been improved by combining a new thermoelectric cooler with better air-flow management, so a temperature in excess of −40 °C can be achieved without the assistance of liquid cooling. *Artemis CCD Limited, 8 Lodge Farm Barns, New Road, Bawburgh, Norwich, NR9 3LZ, UK, http://www.artemisccd.com*

MRI system for *in vivo* imaging

Aspect Imaging has made available its M2 3D magnetic resonance–based histology system for toxicological imaging. It is a compact, high-performance instrument for high-throughput *in vivo* and *ex vivo* imaging of preclinical samples. The system provides the benefits of magnetic resonance imaging (MRI), including high-resolution 3D images of anatomical morphology and quantitative information of disease progression and regression. Its operation is based on a novel permanent magnet design that does not require costly cryogens to cool and maintain the magnetic field. It is also "self-shielded," so there is virtually no external fringe magnetic field. As a result, the compact MRI system can be placed in most locations in research laboratories with no special infrastructure required. Labs that use the M2 can leverage the power of 3D morphological imaging to complement and guide traditional histology. The system is economical, easy to install, and easily operated by a technician who has no imaging experience. *Aspect Imaging, 522 University Avenue, 10th Floor, Suite 1003, Toronto, Ontario M5G 1W7, Canada, http://www.aspectimaging.com*

Laser system for *in vivo* imaging

Carmel, the all-fiber-based femtosecond laser from Calmar Laser, has 500 mW of power, 10 nJ of pulse energy, and less than 100 fs of pulse width. The 780-nm device is suitable for multiphoton microscopy, biophotonics applications, materials characterization, optical metrology, and terahertz radiation. The Carmel CFL-05RFF0's ultracompact head is much smaller than (~100 times) a traditional titanium-doped sapphire laser. Its pushbutton start, air-cooled operation, and fiber delivery allow it to be easily integrated into existing microscopes and optical

setups, with the entire assembly easily wheeled into a laboratory or operating room. The Carmel has a Gaussian beam profile, typically with an M2 of less than 1.1. Excellent pulse-to-pulse stability (less than 1% rms) combined with a clean spectrum and clean pulses over the wide operating temperature range of 17–32 °C provide reliable results for both microscopy imaging and tissue ablation in biomedical applications. *Calmar Laser, 575 North Pastoria Avenue, Sunnyvale, CA 94085, http://www.calmarlaser.com*

Ultrafast laser for materials processing

Coherent has expanded its family of ultrafast lasers with the new Talisker 1000 series of high-power picosecond lasers. They are designed for high-throughput, precision materials processing in the semiconductor, photovoltaics, medical devices, consumer electronics, and automotive industries. Three single-wavelength versions of the Talisker 1000 are available, all at 1000 kHz: near-IR, at 1064 nm; green, at 532 nm; and UV, at 355 nm. The near-IR is suitable for scribing and engraving stainless steel and

other metals. The green wavelength delivers higher precision, suitable for several exotic metals. The UV is designed for processing glass and other transparent or brittle materials. Specific applications include processing plastic electronics such as organic LEDs, engraving steel for printing fabrics and currency, and patterning metals on ceramic substrates for high-power RF electronics. The Talisker 1000 offers pulse repetition rates as high as 1 MHz, which helps enable higher throughput in many applications. *Coherent Inc, 5100 Patrick Henry Drive, Santa Clara, CA 95054, http://www.coherent.com* ■