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

Imaging software

By expanding its Zen software for confocal laser scanning microscopes so that it drives all Zeiss light microscope systems, Carl Zeiss can now offer users one identical software interface for all their microscopy experiments. The Zen pro, Zen lite, and Zen desk module packages meet the software requirements of various user groups. The heart of Zen is Smart Setup. Users select their sample fluorophores, and Smart Setup's intelligent functions suggest configurations appropriate for the fluorophores. Users can then decide which parameters, such as image acquisition or maximum resolution, to optimize for their experiments. Smart Setup automatically configures the system based on that input. Zen 2011 can record several gigabytes of large image data sets. The software can store high-speed dual-camera time-lapse series synchronously and reliably on the interlocked hard disk drives. Image stacks, time-lapse series, or tile images are saved together with the recording date of the system in .czi format. Image processing modules generate 3D projections and export them as a rendering or a film sequence. *Carl Zeiss Microscopy LLC, One Zeiss Drive, Thornwood, NY 10594, http://www.zeiss.com*

Laser-diode temperature controller

ILX Lightwave, a Newport Corp company, has added the LDT-5940C to its portfolio of thermoelectric temperature controllers designed for testing laser diodes and other optoelectronic devices. The instrument features 60 W of temperature control, an intuitive front panel, and a standard, general-purpose interface bus and USB 2.0 remote interface. The LDT-5940C is designed for users who want high power and stability. The controller's digital proportional-integral-derivative control loop achieves temperature stability of less than ±0.003 °C with output current noise and ripple of less than

2 mA rms. It is compatible with a wide range of sensors, including thermistors, resistance temperature detectors, and AD590 integrated circuit sensors. A new linearized thermistor sensor mode allows the LDT-5940C to achieve ±0.2 °C accuracy over a wide temperature range from −30 to 85 °C using a standard 10K thermistor. LabVIEW drivers for the device may be downloaded from the ILX Lightwave website. *ILX Lightwave, 31950 Frontage Road, Bozeman, MT 59715, http://www.ilxlightwave.com*

Compact fiber lasers

Toptica's new series of ultrafast fiber lasers, the FemtoFiber smart family, is dedicated to applications ranging from biophotonics to terahertz generation and two-photon polymerization. According to the company, the robust, all-fiber lasers are suitable for flexible OEM integration. The optics and control electronics are included in one box, making FemtoFiber smart lasers compact. Based on polarization-maintaining fibers and saturable absorber mode-locking technology, the lasers are claimed to offer reliable performance and hands-off operation. All models with a wavelength above 1000 nm have fiber-coupled outputs and offer either

fixed connection/angled physical contact receptacles or fiber pigtails. With pulses below 100 fs, the FemtoFErb 1560 is suitable for terahertz generation with indium gallium arsenide antennae. The ytterbium-based PicoFYb and FemtoFYb lasers operating at 1030 nm are reliable for seeding high-power picosecond and femtosecond amplifiers. *Toptica Photonics Inc, 1286 Blossom Drive, Victor, NY 14564, http://www.toptica.com*

Multichannel confocal microscopes

Attocube has introduced the AttoCFM I, a low-temperature, modular, flexible scanning confocal microscope. The multipurpose optical head provides a platform for various measurement tasks in the field of cryogenic confocal microscopy. According to the company, it features stability; high spatial resolution of 250 nm, with red laser illumination; and ease of use, specifically flexibility and quick, reliable alignment. At the heart of the optical head are up to three identical channels that can be used for confocal excitation and detection of free-beam optical signals. Each channel can be connected to a laser source or an appropriate detector, such as a silicon detector for photoluminescence or a spectrometer for Raman measurements. Broadband LED illumination and a CCD camera allow for optical inspection of the sample. Like all Attocube scanning probe microscopes, the AttoCFM I is compatible with low temperatures, vacuum environments, and high magnetic fields. Complete cryogen-free systems are also available. *Attocube systems AG, Königinstrasse 11a RGB, 80539 Munich, Germany, http://www.attocube.com*

Hyperspectral imaging system

Bruker Optics's HI 90 is a remote hyperspectral imaging, chemical sensing system that combines a Michelson interferometer with a focal plane array detector. Each pixel of the array records an interferogram from the corresponding field of view. A spectrum obtained by Fourier transformation at each pixel contains the IR signature of the image at each point. The system allows fast identification, quantification, and visualization of potentially hazardous gases from long distances. Due to its array detector, the imager can measure all pixels simultaneously. The company claims the HI 90 can do that up to 1000 times faster than traditional scanning systems that record the spectra at each pixel sequentially. The system has been developed for a wide range of applications, including atmospheric and environmental research, volcanology, industrial safety and quality control, and public safety and security. *Bruker Optics Inc, 19 Fortune Drive, Manning Park, Billerica, MA 01821-3991, http://www.brukeroptics.com*

Camera for hyperspectral imaging

Horiba Scientific has designed its new Verde hyperspectral camera to measure a complete image and spectral information simultaneously. For each image, Verde captures the entire spectrum of every point in a single measurement in as little as 3 ms. Earlier hyperspectral cameras needed to collect multiple images at different wavelengths or sweep a line across the image to collect the hyperspectral hypercube of data. Because not all points or wavelengths were recorded at the same time, it was difficult to analyze transient phenomena. Verde uses a patented 2D dispersion element, developed with NASA's Jet Propulsion Laboratory, to capture all spatial and spectral information in a single image. Spatial and spectral ranges can be optimized for specific applications. Verde works without scanning or switching filters and comes standard with a c-mount adapter for microscope-based spectral imaging of fluorescence phenomena. *Horiba Scientific, 3880 Park Avenue, Edison, NJ 08820-3097, http://www.horiba.com/scientific*

Cryogenic temperature controller

Lake Shore Cryotronics has launched the model 350 ultralow cryogenic temperature controller. It is designed to provide superior measurement and control in a wide range of cryogenic physics and ultralow temperature research applications, including those conducted in high magnetic field and radiation environments. The full-featured, four-input model 350 is a refrigeration control solution capable of using very low excitation power. It is designed for the demands of pumped helium-3 refrigerators and similar advanced research platforms. The controller provides operation in any cryogenic system from 100 mK to more than 1000 K. The standard model supports ruthenium oxide and platinum resistance temperature detectors and other negative temperature coefficient sensors. Patented low-noise input circuitry enables ultralow excitation currents for minimal self-heating and high resolution measurements while eliminating errors from grounding inconsistencies. *Lake Shore Cryotronics Inc, 575 McCorkle Boulevard, Westerville, OH 43082, http://www.lakeshore.com*

Multiwavelength laser source

The Cyto-Lite laser source from Mad City Labs combines three different wavelengths—405, 532, and 640 nm—into a single fiber. It provides complete control over each laser line via a single USB interface and the supplied software. It has output power of 10 mW (405 nm and 640 nm) and 20 mW (532 nm). The controller and software streamline the user interface and allow the characteristics of each laser line, including optical power, to be controlled independently through the single interface. Each laser line can be controlled in constant current or constant optical power feedback modes. The onboard direct digital synthesis sine-wave generator and internal 16-bit digital-to-analog converter allow users to set modulation frequency and amplitude of each laser line waveform. Three independent linear regulator power supplies result in low noise operation; filtering on each laser line further minimizes electronic noise. *Mad City Labs Inc, 2524 Todd Drive, Madison, WI 53713, http://www.madcitylabs.com*

Ultrahigh-frequency lock-in amplifier

Zurich Instruments has introduced an ultrahigh-frequency lock-in amplifier (UHFLI) that performs measurements as high as 600 MHz. According to the company, that is three times faster than

other available devices. Using fully digital signal processing, the UHFLI demodulates signals of up to 600 MHz while providing 100-dB dynamic reserve over the entire frequency range. It is equipped with an integrated toolset for time and frequency domain signal analysis. The toolset consists of an oscilloscope, a frequency response analyzer, and a fast-Fourier-transform spectrum analyzer. Physicists, chemists, and biologists will potentially benefit from the device's speed and nonconventional features. The UHFLI has applications in the fields of quantum physics, nanophysics, sensing and actuating, laser spectroscopy, and bioengineering. *Zurich Instruments AG, Technoparkstrasse 1, 8005 Zurich, Switzerland, http://www.zhinst.com*

Fiber-pigtailed lasers

Coherent has expanded its OBIS family of smart laser modules with a new fiber-pigtailed (FP) option at several wavelengths, including 405, 488, and 640 nm. The FP lasers have 1 m of single-mode, polarization-preserving fiber that terminates in a standard fixed connection and angled physical contact connector and thus simplifies their integration into OEM instruments. In addition to their ease-of-use advantages, the compact, self-contained FP lasers can be directly modulated. They achieve low noise and high output stability because of two factors: an output beam with low drift to maintain efficient coupling, and the use of telecom-type architecture and methods, such as laser welding, to yield drift-free optomechanical coupling. The lasers are suitable for life sciences and photophysics applications, including fluorescence-based techniques such as flow cytometry, confocal microscopy, and the excitation of target fluorophores. *Coherent Inc, 5100 Patrick Henry Drive, Santa Clara, CA 95054, http://www.coherent.com*

Ultrafast intensified CCD

Andor Technology has launched the iStar 312T imaging platform, part of the iStar family. It provides ultrafast acquisition rates greater than 15 frames/s that are suitable for combustion and plasma studies. The "crop mode" and "fast kinetic mode" allow high acquisition rates in excess of 5500 spectrum/s (continuous) and 55 500 Hz (burst), respectively. The platform also features a –40 °C thermoelectric cooling interface, low-noise electronics, and high quantum efficiency photocathodes for high sensitivity. It offers ultraprecise timing control through low-jitter electronics, a software control interface, and ultrafast gating of less than 2 ns. The fully integrated digital delay generator allows precise synchronization of complex experiments through a comprehensive range of input and output triggering options. Solis software provides an intuitive interface to accurately set all delays, gating, and CCD parameters and offers a real-time control graphical user interface for on-the-fly acquisition and timing optimization. *Andor Technology plc, 425 Sullivan Avenue, Suite 3, South Windsor, CT 06074, http://www.andor.com*

Single- and multi-emitter pump modules

Intense has released a 10-W version of the series 8000 793-nm high-brightness laser pump modules. The new pump delivers 10 W of output power from a 105-μ core fiber and 0.22 numerical aperture; 0.15 NA fiber options are also available. The module is designed specifically for use as a pump source for thulium and holmium pulsed laser systems, which are increasingly being used in defense and medical applications. The high-power chip technology developed by Intense and introduced in the series 8000 793 nm is now available in fiber-coupled single emitters at 4.5 W and in compact, multi-emitter, high-brightness, fiber-coupled 10- and 20-W modules. The entire series 8000 793-nm family of pump lasers is based on Intense's single emitter chips that incorporate narrow-beam divergence and the company's patented quantum well intermixing technology to maximize power, brightness, and reliability. *Intense Limited, 1200A Airport Road, North Brunswick, NJ 08902, http://www.intenseco.com*

Microscopy color camera

Lumenera Corp engineered its new InfinityHD 2 megapixel microscopy color camera with a high-resolution, one-third-inch CMOS sensor. The camera was devised to stream video output over a high-definition multimedia interface connector running autonomously with-

out the need for a computer. The InfinityHD, capable of color reproduction, is suitable for color-sensitive microscopy applications, including bright-field, clinical, and industrial microscopy. It provides 1080p60 streaming video with full-color output. Built-in auto-intensity compensation automatically adjusts the video stream as the microscope objective or the light intensity changes. Real-time live video preview enables accurate focus and specimen placement and allows for quicker slide reviews. A USB 2.0 port connects to a computer or laptop to optimize auto white balance and to quickly capture images from the camera. *Lumenera Corporation, 7 Capella Court, Ottawa, Ontario K2E 8A7, Canada, http://www.lumenera.com*

Laser diode driver controller

Quantum Composers has introduced the 1550 series laser diode driver controller (LDDC) product line to reduce development time in the photonics and laser industries. Rather than having to create a controller for diode drivers from scratch, users can employ the portable, handheld device. The 1550 LDDC allows remote computer control of the laser diode driver; alternatively, it can be integrated into the laser driver system as a board level option. Users will be able to save and recall their settings for use with future projects or to control different drivers with a single instrument. The device features an LCD display, indicator lights, an eight-button keypad, and a USB port that allows it to function alone or in conjunction with a system. *Quantum Composers Inc, 212 Discovery Drive, Bozeman, MT 59718, http://www.quantumcomposers.com* ■