

NEW PRODUCTS

Focus on biotechnologies and biomedical optics

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Andreas Mandelis

Confocal imaging system

Molecular Devices has introduced the ImageXpress micro-confocal high-content imaging system, which provides increased sensitivity that yields high contrast and high uniformity of intensity and shape across a large field of view. The system incorporates the company's AgileOptix spinning disk technology with advanced optics, a powerful solid-state light engine, and a high-quantum-efficiency scientific CMOS sensor. It



enables optimal selection and configuration of components for 3D cellular assays and offers the power of confocal modality with throughput previously only available with wide-field imaging. Multiple confocal geometries, including pin-hole and slit options and wide-field imaging, allow users to select the mode best suited for both sample and assay throughput requirements. The large field of view and greater than three orders-of-magnitude dynamic range increase data reliability. *Molecular Devices LLC, 1311 Orleans Drive, Sunnyvale, CA 94089, <http://www.moleculardevices.com>*

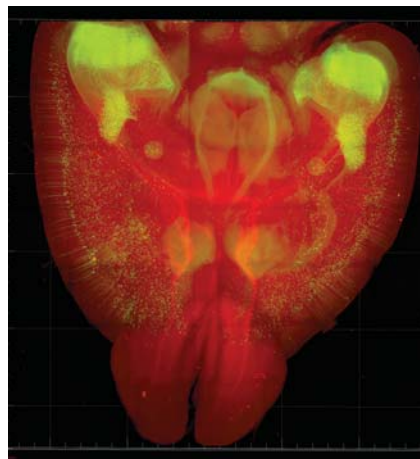
Inverted microscope for cell culture

According to Olympus, the advanced optical and ergonomic features of its CKX53 inverted microscope make inspection and documentation of cell and tissue cultures fast and comfortable. The company's UIS2 microscope objectives

offer excellent clarity and resolution, and a new integrated phase contrast system enables users to view samples at 4×, 10×, 20×, and 40× easily, without exchanging or recentering the ring slit. An energy-efficient, long-life LED light source brighter than earlier halogen bulb systems improves bright-field imaging. For cell-culture observation, the LED color temperature is optimized to enhance color reproducibility when the brightness level is changed. The microscope controls are ergonomically located: The optical axis and focusing knobs are close together for natural hand positioning when adjusting the focus. *Olympus America Inc, 3500 Corporate Parkway, P. O. Box 610, Center Valley, PA 18034-0610, <http://www.olympus-lifescience.com>*

Imaging for life sciences

Carl Zeiss and Arivis AG are collaborating on 3D imaging systems to help researchers handle, process, and analyze the multi-terabyte data sets generated by microscopy technologies such as light-sheet fluorescence. Zeiss offers a package integrating high-performance computer hardware and Arivis's Vision4D modu-



lar software to facilitate the handling of multidimensional—3D+—images of nearly unlimited size. Users can import images generated by microscope systems such as Zeiss's Lightsheet Z.1 and can stitch and align single images into large, comprehensive stacks. They can assess and analyze images from, for example, brain mapping experiments or long-term observation of developmental processes in embryos. Zeiss and Arivis also offer 3Dxl Viewer, an integrated rendering module for Zeiss's ZEN blue edition imaging software. It allows the handling of large 6D data sets acquired on the Zeiss LSM 800 with Airyscan, which allows for optimal sample acquisition. *Carl Zeiss Microscopy GmbH, Carl Zeiss Strasse 56, 73447 Oberkochen, Germany, <http://www.zeiss.com>*

Scientific CMOS camera

Applications for Andor Technology's ultrasensitive Zyla 4.2 Plus scientific CMOS camera include live-cell imaging, superresolution microscopy, and fluorescence correlation spectroscopy. According to Andor, the compact, low-vibration camera offers the highest,



broadest sCMOS quantum-efficiency profile available; it maximizes at 82% and is suitable for a wide range of common fluorophores. Through a USB 3.0 interface, it delivers a sustained 53 fps at full resolution, which the company claims is 77% faster than other sCMOS cameras. On-camera intelligence improves linearity for high quantitative measurement accuracy across the full dynamic range. The high-resolution 4.2-megapixel camera produces less than 1 e⁻ read noise and 33 000:1 dynamic range. It includes application-specific modes such as LightScan Plus, which adapts the rolling shutter scan mode to applications such as scanning light-

sheet microscopy. **Andor Technology USA**, 425 Sullivan Avenue, Suite 3, South Windsor, CT 06074, <http://www.andor.com>

Light source for life-sciences studies



The IS-LEDc optics module from Siskiyou is a flexible, dual-wavelength excitation light source for life-sciences applications that need to independently pulse two excitation wavelengths with no time lag or shift in illumination alignment. Those applications include optogenetics stimulation, wide-field microscopy, and fluorescence imaging of microwell arrays. The IS-LEDc combines and focuses the light output from two LEDs into a single subminiature A fiber-optic connector. A simple software and USB interface enables full digital, independently addressable control of each LED, including external triggering from transistor-transistor logic input. The module is available with a choice of two LEDs from a range of visible and near-IR center wavelengths, including 460 nm, 525 nm, 590 nm, 735 nm, and 850 nm. The nominal power output is 5 W at each wavelength, with other powers available on a custom basis. **Siskiyou Corporation**, 110 Southwest Booth Street, Grants Pass, OR 97526, <https://www.siskiyou.com>

Microscope for *in vivo* imaging

The streamlined design of Bruker's Ultima Investigator multiphoton microscope incorporates many of the novel features in the company's Ultima Intra-Vital and In Vitro models. According to Bruker, its multiphoton technology produces high sensitivity and flexibility for research into *in vivo* cellular activity. Up to four close-coupled detectors maximize photon collection efficiency and, when combined with a Bruker preamplifier, produce signal-to-noise levels that enable high-speed imaging at depths up to 1 μm . The microscope platform provides generous clearance for *in vivo* stud-

Luminescence lifetime imaging camera

According to PCO, its pco.flim camera is the first frequency-domain fluorescence lifetime imaging system based on a dual tap control CMOS image sensor. It is supplemented by a modulatable laser diode optimized for use with the sensor and is suitable for numerous biomedical research applications. The image sensor has a resolution of 1024×1024 pixels with a $5.6\text{-}\mu\text{m}$ pitch and can be modulated up to 50 MHz. The camera system generates all required modulation signals from 1 kHz to 50 MHz (sinusoidal and rectangular) and will accept external modulation signals within a limited range of frequencies. The pco.flim features various trigger input and output signals for easy system integration, and software provides direct measurements and lifetime analysis. The system performs pixel correction to generate linear and high-quality images, while the basic image processing is done in the computer. The modulation frequency can be freely adjusted. **PCO AG**, Donaupark 11, 93309 Kelheim, Germany, <http://www.pco.de>



ies, and a rotatable nosepiece allows for the off-axis imaging required for advanced *in vivo* neural activity research. An optional resonant galvanometer enables high-speed applications, with full-frame rates of 30 fps and region-of-interest rates of more than 500 fps. Photoactivation and photostimulation options are also available. **Bruker Nano Surfaces Division**, 3030 Laura Lane, Suite 140, Middleton, WI 53562, <http://www.bruker.com>

Ventilator for rodents

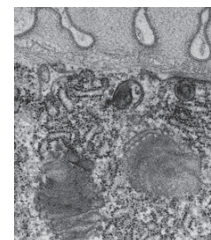
Harvard Apparatus designed its VentElite ventilator for small animal research on subjects ranging in size from mice to guinea pigs. To maintain versatility and ease of use while fostering safe and physiologically accurate mechanical ventilation conditions, the VentElite has advanced piston/cylinder and valve assemblies and microprocessor-controlled actuation mechanisms to precisely con-



trol respiration profiles. Researchers can use the settings button on the large touch screen to toggle between the two operating modes, volume control and pressure control. Features include a manual or programmable sigh, an inspiratory or expiratory hold, an adjustable inhalation:exhalation ratio, built-in positive end-expiratory pressure, audible alarms, and a real-time graphical representation of the detected pressure. **Harvard Apparatus**, 84 October Hill Road, Holliston, MA 01746, <http://www.harvardapparatus.com>

Cell freezer

Developed for electron microscope sample preparation in cell biology, cytogenetics, neurobiology, and industry, Leica's EM ICE cell freezer combines high-pressure freezing and light stimulation. High-pressure freezing can capture intricate changes in fine structure and cellular dynamics. The EM ICE allows users to control a cell's freezing and the different light wavelengths that stimulate the cell. Freezing and stimulation can be synchronized so researchers can capture the moments that most interest them. Highly dynamic processes can



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be captured and resolved at a nanometer scale and millisecond time precision, and aqueous samples can be cryo-immobilized under high pressure. The unit allows users to concentrate on sample loading; the instrument will take over and control the parameters needed for a successful freeze. **Leica Microsystems Inc.**, 1700 Leider Lane, Buffalo Grove, IL 60089, <http://www.leica-microsystems.com>

Remotely controlled chilling and heating stations

Torrey Pines Scientific has expanded its EchoTherm series of remotely controlled heating and chilling dry baths with models RHB20 and RIC20 for use in robotic systems and fume hoods or environmental chambers where remote control is necessary. They control the temperature of samples in various containers from assay plates to centrifuge tubes in a range from -20.0°C to 120.0°C , with control



and accuracy to $\pm 0.2^{\circ}\text{C}$. Either a computer or the company's compact MIC20 remote terminal can be used to configure and control the RIC20 and RHB20 remotely by means of RS-232 input/output ports. The RS-232 cable provided with the MIC20 allows users to set and display temperature and timer, collect current set point and temperature, set and clear an idle mode, and calibrate the unit. The MIC20 can be disconnected from one unit and used to set another while the first unit is carrying out its assigned tasks. **Torrey Pines Scientific Inc.**, 2713 Loker Avenue West, Carlsbad, CA 92010, <http://www.torreyпинesscientific.com>

Microscale liquid chromatography

The M3 MicroLC from Sciex is a fully integrated microscale liquid chromatogra-

phy system for biopharmaceutical applications in which sample size is limited, such as antibody drug development. The system improves the sensitivity of liquid chromatography-mass spectrometry (LC-MS) workflows, enables users to reach limits of quantitation up to 10 times lower than other systems without sacrificing throughput, and makes economical use of solvents. An optional trap-and-elute capability lets users analyze analytical-scale sample volumes on a microscale LC-MS system. According to Sciex, the M3 MicroLC provides consistently accurate results while allowing up to 200 samples to be run per day. The benchtop system can sit beside or on top of a mass spectrometer for optimal use of laboratory space. **Sciex**, 500 Old Connecticut Path, Framingham, MA 01701, <http://sciex.com>



Near-IR spectroscopy system for brain imaging

Shimadzu Scientific Instruments has developed the LABNIRS near-IR spectroscopy system for researchers who are studying functional localization of the brain. The system provides multichannel, high-sensitivity optical measurements of blood (hemoglobin)-oxygen-level-dependent signals that originate in the cerebral cortex. The inside of the brain is irradiated from the head surface by near-IR light via an optical fiber. The light is scattered by various types of tissue; some of it reaches an optical-fiber bundle in a set of light-receiving probes. The collected light is guided to a photomultiplier and converted to electrical signals. Up to 40 sets of probe fibers are accommodated by flexible holders that provide 142 channels, and images can be acquired at a rate of 6 ms/image. The adjustable holders that accommodate the optical fibers can be arranged to measure any brain region and to seamlessly map the entire brain. **Shimadzu Scientific Instruments Inc.**, 7102 Riverwood Drive, Columbia, MD 21046, <http://www.shimadzu.com>

Programmable measurement transmitter

Boekel Scientific's Open Source Bio (OSB) transmitter enables conductivity, pH, dissolved oxygen, and temperature to be measured and controlled from one programmable device. Conventional benchtop probes and transmitters typically do not allow user programming or integration of additional equipment, but the OSB is built around an Arduino-compatible, open-source printed circuit board that permits both. Users can perform custom calculations and display custom values, graphs, and graphics on the LCD screen. They can control external equipment and accept readings or inputs from it. OSB features include data logging to a USB drive and easy-to-follow calibration sequences. The economical, flexible OSB probes and transmitter are suitable for use in the classroom and the laboratory. **Boekel Scientific**, 855 Pennsylvania Boulevard, Feasterville, PA 19053, <http://www.boekelsci.com>

UV-visible spectrophotometers

Designed for accurate quantitation and purity measurements, the NanoDrop One and NanoDrop One^c UV-visible microvolume spectrophotometers from Thermo Fisher Scientific can help life scientists conducting experiments with DNA, RNA, and proteins quantify and qualify nucleic acid and protein samples and make decisions about sample suitability. The compact, ergonomic NanoDrop One instrument has auto-range path-length technology that allows for accurate measurement of concentrated samples without dilutions. The patented NanoDrop sample-retention system measures 1–2 μl of sample in seconds with no need for cuvettes. The NanoDrop One^c instrument offers both pedestal and cuvette measuring positions, which increase dynamic range and assay flexibility. The company's Acclaro Sample Intelligence technology enables users to identify sample contaminants and measure samples with embedded sensor and digital image analysis. **Thermo Fisher Scientific Inc.**, 81 Wyman Street, Waltham, MA 02451, <https://www.thermofisher.com>

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