

New Products

Andreas Mandelis

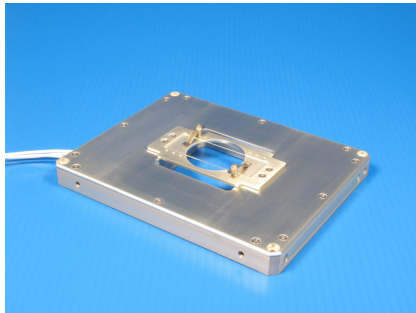
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In order to supplement manufacturers' information this Department will welcome the submission by our readers of brief communications reporting measurements on the physical properties of materials which supersede earlier data or suggest new research applications.

NEW INSTRUMENTS AND COMPONENTS

High speed nanopositioner

Mad City Labs has added the nano-LPQ piezoelectric nanopositioner to its line of low profile microscopy systems. According to the company, it is the lowest-profile high speed XYZ nanopositioner available and is suitable for three-dimensional particle tracking and super resolution microscopy applications. It offers $75 \times 75 \times 50 \mu\text{m}^3$ travel with picometer position resolution under closed loop control and features equal millisecond response times in XYZ, an integrated sample holder, analog and digital control with added scan synchronization features, and compatibility with major image and automation software. The nano-LPQ is compatible with LABVIEW and C++. For ease of use, it is supplied with Mad City Labs' NANO-ROUTE 3D software.—*Mad City Labs Inc., 2524 Todd Drive, Madison, Wisconsin 53713. (608-298-0855) www.madcitylabs.com*

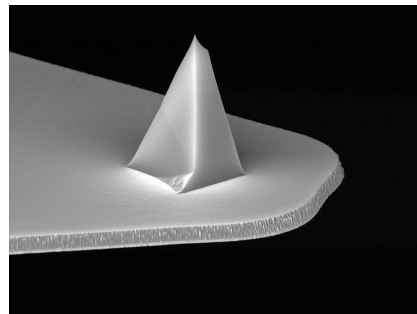


X-ray microanalysis

EDAX has introduced a new series of Apollo silicon drift detectors (SDDs) for x-ray microanalysis. For the past several years SDDs have been able to process a very high volume of x rays, making high-speed mapping possible. At times, the resolution was sacrificed to achieve increased throughput. EDAX states that with the new Apollo series, mapping resolution no longer suffers. The company defines high-resolution, high-speed mapping as better than 135 eV resolution at 100 000 counts/s and dead time of 30% throughput. The Apollo series complements EDAX's GENESIS software, offering the materials characterization scientist advanced features for qualitative and quantitative analysis, mapping, and particle analysis.—*EDAX, 91 McKee Drive, Mahwah, New Jersey 07430. (201-529-4880) www.edax.com*

Sharp nitride lever probes

Veeco Instruments now manufactures sharp nitride lever (SNL) probes that provide high atomic force microscope (AFM) imaging resolution and long probe lifetimes at economical cost. In order to provide a silicon nitride lever with a sharper tip for imaging in fluids, Veeco's hybrid SiN/Si manufacturing process combines the low spring constant softness of a silicon nitride cantilever with the sharpness of a silicon tip. This process has improved the traditional probe radii limits of 10–20 nm to a radius of curvature as low as 2 nm. The company states that these probes have delivered high-resolution imaging in both air and fluid with contact mode and tapping mode operation. The new SNL probes can be used on any AFM instrument. Two lever configurations are available: NP/DNP and MLCT/MSCT. The silicon tips can be fabricated specifically for molecular recognition and other advanced applications.—*Veeco Instruments, Inc., Metrology and Instrumentation Group, 112 Robin Hill Road, Santa Barbara, California 93117. (805-967-1400) www.veeco.com*

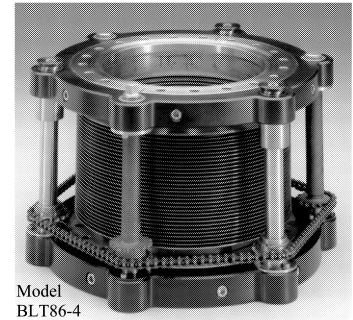


NEW DETECTORS, MEASUREMENTS, AND MATERIALS

Dual wavelength and multiple-focal-plane imaging

The new ORCA-D2 from Hamamatsu Photonics, a dual charge-coupled device (CCD) camera designed around two ER-150 CCD devices, can capture simultaneous dual wavelength or multiple focal plane images. Each CCD captures a $1280(\text{H}) \times 960(\text{V})$ pixels field of view, but each has independent exposure and gain settings to accommodate significantly different intensity levels between the two images, as is often seen in fluorescence resonance energy transfer (FRET)

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and ratio imaging applications. Image separation is accomplished with interchangeable optical blocks that incorporate beam splitters and emission filters. Either dichroic splitter optical blocks or a 50/50 optical block may be selected to provide a tool described as easy to use for a wide range of applications. Dual images of wavelengths between 400 and 950 nm at frame rates up to 11 frames/s at full resolution and full 12-bit output can be made by combining the optical blocks with the two high quantum efficiency ER-150 CCDs. Image registration in dual imaging applications is simplified in the ORCA-D2. One of the CCDs is software adjustable to compensate for vertical, horizontal, and Z-axis registration. Each optical block contains a memory and can be adjusted for multiple objective choices. When the optical block is inserted into the camera, the position of the moveable CCD is automatically adjusted for the optical setup. Other features of the ORCA-D2 include wide dynamic range; high sensitivity and low noise, by virtue of Hamamatsu's CCD cooling technology; and the company's vacuum-sealed chamber technology, which is claimed to promote long term, maintenance-free operation even in demanding applications. The camera also has an IEEE1394b interface, a 12-bit analog/digital converter, and various external trigger modes. This camera is suitable for various microscopy applications, including ratio imaging, single and dual wavelength fluorescence microscopy, FRET, blue to near infrared (NIR) fluorescence applications, colocalization, FISH applications, dual wavelength total internal reflection fluorescence microscopy, real-time confocal microscopy, combined transmission and fluorescence imaging, and multifocal plane imaging.—*Hamamatsu Corporation, 360 Foothill Road, Box 6910, Bridgewater, New Jersey 08807-0910. (908-231-0960) www.hamamatsu.com*

Large format CCD cameras

With the introduction of the new PIXIS: 1300 series CCD cameras, Princeton Instruments (PI) adds three configurations to its PIXIS line: front illuminated, back-illuminated, and back-illuminated deep depletion CCD cameras. These cameras are based on PI's 1340×1300 format sensors with a large 26.8×26.0 mm² imaging area. According to the company, PIXIS: 1300 is the only camera of its kind to offer deep cooling better than -70 °C, with guaranteed vacuum for

the life of the camera. PI states that with their ultralow noise electronics and 20 μm pixels, the cameras achieve a true 16-bit performance. Previously, users interested in low-light, large format imaging had to use smaller pixel sizes of 13.5 μm in 2K×2K. To increase photon capture efficiency, it was necessary to use pixel binning that reduced resolution. The large 20 μm pixels of PIXIS: 1300 afford better light collection efficiency while achieving low noise, with or without binning. These new cameras offer many features of the PIXIS line, including dual 100 kHz/2 MHz digitizers, multiple gains, multiple output amplifiers, ultralow read noise of 2e⁻ rms, all-metal hermetic seals, a USB2.0 interface, and a single optical window design for optimal optical throughput. The cameras also incorporate other features of the PIXIS line, including flexible binning and region of interest capabilities and support by the WINVIEW

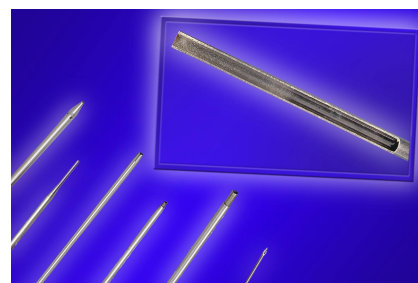


software package. For integration into complex experiments, a toolkit with LABVIEW examples and PI's PVCAM software development kit are available. The compact PIXIS: 1300B back-illuminated CCD camera is specifically designed for large format astronomical imaging and chemiluminescence applications. For example, astronomers are particularly sensitive to smearing caused by the convective air currents around telescope optics. For this special requirement the PIXIS: 1300 is available with water-only cooling, eliminating the internal fan. The available CoolCUBE liquid circulator allows users to capture crisp images by removing heat from the camera. For operation from remote control rooms, the camera may be equipped with a fiber optic data interface. The back-illuminated, deep depletion version offers high NIR sensitivity while virtually eliminating etaloning. With very low dark current and read noise, the camera can detect ultralow light levels typical in chemiluminescence and bioluminescence applications. The large imaging area is also suitable for high throughput screening.—*Princeton Instruments, 3660 Quakerbridge Road, Trenton, New Jersey 08619. (609-587-9797) www.princetoninstruments.com*

Probe polishing process

A new service from Diba Industries delivers a highly polished inside diameter for stainless steel and other metallic probes used in IVD and scientific instruments. According to the company, the DP3 technology leaves a highly passivated inside

surface that ensures consistent fluid handling with no degradation over time. The process can polish the inside surface of a probe down to a 6 μm in. roughness. The resulting mirrorlike surface reduces the microscopic pits where process fluids can build up in unpolished probes, minimizing the possibility of unwanted chemical interaction with potentially reactive materials. Applying DP3 to a probe is said to reduce carryover by up to 75%, increasing throughput while retaining the flow characteristics necessary for efficient system performance. Highly polished probes save cycle time and reduce washing fluid costs. They can also expand testing capabilities by facilitating more sensitive testing and the ability to work with a wider range of chemicals. Because the DP3 process smooths the existing metal surface, rather than adding a coating (such as fluoropolymer) which can flake over time, it is more durable. DP3 can be applied to Diba's complete line of aspirate/dispense, piercing, level sensing, and vented reagent and sample transfer probes. DP3 is available for probes with inside diameters as small as 0.016 in., in flush or angle cut tip designs. Stainless steel or other metals can be selected to custom fit to an instrument manufacturer's specification and Diba's technical staff is available to assist in specifying configurations for given applications.—*Diba Industries, 4 Precision Road, Danbury, Connecticut 06810. (203-744-0773) www.dibaind.com*

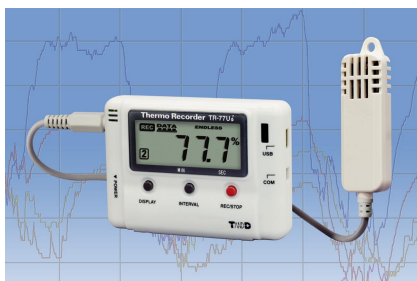


100 μm high power fiber

IRphotonics has made available a new small core, high power multimode mid-IR fiber (H100) for medical, industrial, and research and development applications. The H100 mid-IR fiber offers a spectral transmission from 0.3 to 4.5 μm with low attenuation and no significant spectral absorption peaks up to 4.5 μm. IRphotonics' H100 small core enables high power to be transmitted over a small bend radius from a range of lasers such as Er:YAG (2.94 μm), semiconductor, quantum cascade, solid state, or tunable midwavelength infrared lasers (OPOs). The H100 mid-IR fiber has a fiber core diameter of 100 μm and a numerical aperture of 0.2 (0.3 or other numerical aperture is possible upon request). It is dual clad for higher power handling, bend insensitive down to 1 in., and has a high laser damage threshold. The H100 mid-IR fiber is available bare or in a patchcord with high power connectors.—*IRphotonics, 7 Cobblestone Drive, Hamden, Connecticut 06518. (877-340-6982) www.irphotonics.com*

Wide range temperature and humidity logger

The new TR-77Ui data logger from TandD Corporation features a wide range from 0 to 99% relative humidity (RH) and an expanded temperature range from -30 to 80 °C. This lightweight, versatile unit measures approximately 2×3 in. and operates on one AA battery. The RH accuracy is $\pm 2.5\%$, uncalibrated. The instrument exhibits a humidity measurement response with a 20 s time constant. The sturdy probe has a 1 m cable which can be increased up to 10 m from the logger with optional extensions. The TR-77Ui can store up to 8000 readings on each of two channels for a total of 16 000 readings in “one time” or “endless” recording mode. By connecting the unit to a computer via a USB port, the recorded data can be downloaded quickly with software described as easy to use. The TR-77Ui also features an IrDA port for wireless downloading of data. A built-in adjustment function allows the user to enter calibration factors directly into the logger, eliminating the need to adjust readings after they are downloaded.—*TandD Corporation, P.O. Box 321, Saratoga Springs, New York 12866. (518-669-9227) www.tandd.com*



High throughput crystal imaging in protein crystallography

Rigaku Automation has announced that the new Minstrel HT UV is the first fully automated high-throughput ultraviolet (UV) and visible crystal imaging and protein crystal monitoring system. Engineered and optimized for use in protein crystallization experiments, this new robotic instrument is described as a major advancement over previous visible light microscopy technology because its UV technology can find crystals in complex drops and distinguish protein crystals from nonprotein crystals (such as salt or detergents). The Minstrel HT UV employs the company's “Clean Light Technology,” providing illumination with the wavelength optimized for the absorption of the fluorescing amino acids, while greatly reducing the light that can result in photodamage to proteins. The fluorescent light resulting from the protein is then digitally recorded by a specialized 5.1 Mpixel CCD sensor. This camera, attached to a single microscope optical train, also allows for UV imaging to be combined with either monochromatic, color, or polarized color imaging in the visible spectrum. All currently installed

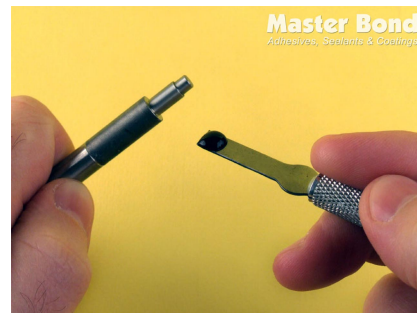
Minstrel HT systems may be upgraded to the Minstrel HT UV specification. Traditional UV illumination sources such as mercury or deuterium can cause irreparable damage to protein crystals, making it nearly impossible to use the original crystal hits for structure solution. However, with Clean Light Technology, original crystal hits may also be used for structure solution since the illumination does not affect the diffraction quality of the crystals, as the company states has been seen in its research laboratories. Experiments using the Clean Light Technology have shown that crystals screened with Rigaku's UV can be used for x-ray diffraction data collection, saving time and expense. Clean Light Technology can be focused only into the well of interest and is “strobed” to further minimize UV exposure time. The result is an average exposure time of 1–2 s per imaging session. Additional experiments indicate that exposure times as high as 50 h of Clean Light Technology have no effect on the diffraction quality of the crystals, and exposure times of 25 min or less have no effect on the electron density maps. The Minstrel HT UV system comes with CRYSTALTRAK software for automatic imaging of crystallization experiments. It links those images with crystallization conditions in a relational database, providing a complete virtual crystallization laboratory. CRYSTALTRAK provides a chemical and crystallization database, data analysis tools, methods for designing optimization and initial crystallization screens, and an interface described as simple yet powerful for viewing images and conditions to evaluate and score crystals. CRYSTALTRAK Web uses web browser technologies to provide remote viewing over the Web or across other platforms such as MAC/OS or LINUX.—*Rigaku Automation, 5999 Avenida Encinas #150, Carlsbad, California 92008. (760-438-5282, ext. 129) www.rigaku.com*



Single component snap cure epoxy

Master Bond EP17HT-3 is a one part epoxy that sets up in 20–30 s and snap cures in 2–3 min at 250–300 °F. It is a one part system; no mixing is required and the epoxy can be cured in sections up to $\frac{1}{4}$ in. thick. Its working life is indefinite as it will not gel until heated above 200 °F. With a volume resistivity of $>1 \times 10^{14}$ Ω cm, EP17HT-3 has excellent electrical insulation and chemical resistance characteristics. It is resistant to a wide

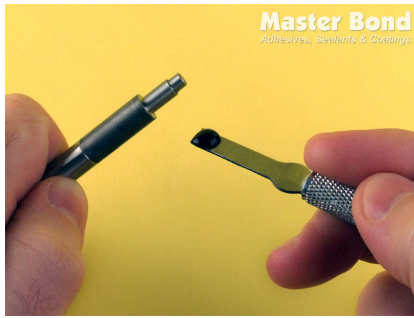
range of chemicals, including water, oil, and most organic solvents. Other features include a Shore D hardness that exceeds 85 and a tensile lap shear of 2100 psi. According to Master Bond, the EP17HT-3 adhesive has superior temperature resistance with a service operating temperature ranging from -60 to 400 °F. It is 100% reactive and contains no solvents or diluents. It is also available in a paste version called EP17HT-3ND and a slightly toughened variant called Supreme 17HT-3 that is suitable for bonding dissimilar substrates and for applications subject to thermal cycling. Each product comes in half pints, pints, quarts, gallons, and 5 gal container sizes.—*Master Bond Inc., 154 Hobart Street, Hackensack, New Jersey 07601-3922. (201-343-8983) www.masterbond.com*



BIOINSTRUMENTATION AND BIOTECHNOLOGIES

Clinical and research microscopes

Olympus has announced that its new BX3 line of upright clinical and research microscopes incorporates ergonomic and imaging features to provide comfort, ease of use, and accuracy while delivering reliable optical performance, value, and eco-friendly operation. The line includes the BX43 system microscope for clinical laboratory applications, the BX46 clinical microscope with ergonomic design and fast observation, and the BX53 system microscope for research and clinical applications. The three systems, which succeed the company's BX2 microscopes, employ Olympus' UIS2 optics manufactured from lead-free glass and claimed to deliver sharp, bright images. Advancements in the design of the BX3 series allow users to record and share microscope magnification and setting information automatically to compare, measure, and scale images. An exposure button allows users to capture digital images without taking their hands off the microscope. An optional tilting trinocular observation tube provides comfortable, efficient operation when capturing photomicrographs. Environmentally conscious features enhancing the performance and value of the BX43 and BX46 in clinical applications include a bright light-emitting diode lamp that offers halogenlike color fidelity, is energy



efficient, and lasts approximately 20 000 h. A "light intensity manager" eliminates the need to make manual adjustments when changing magnifications. Users can select either left- or right-handed microscope operation. New to both instruments is an optional tilting, telescoping, and lifting observation tube. It allows users to adjust the height, front-to-back position, and tilt angle of the eyepieces independently for comfortable observation. The BX46 features the lowest stage height available—just 3 in. above the tabletop—for stress-free operation with reduced fatigue. The fixed stage design of the BX46 provides stability and accuracy in specimen positioning. The BX53 research/clinical system offers new fluorescence optics and filters, including improved hard-coating technology and a unique fly's eye array that delivers higher-quality images by providing more even illumination. For longer lamp life and energy savings, it offers a motion sensor that detects when the user steps away from the instrument and automatically turns off the lamp after approximately 30 min. Both the BX43 and BX53 offer an optional new condenser that accommodates magnifications from 2× to 100× without requiring a swing-top lens.—*Olympus America Inc., 3500 Corporate Parkway, Center Valley, Pennsylvania 18034. (484-896-5107) www.olympusamerica.com*

Solenoid operated micropumps

Bio-Chem Fluidics' (BCF) line of micropumps delivers precise fluid volumes for analytical and chromatography equipment manufacturers, medical and IVD instrumentation, biotechnology, and research scientists. BCF solenoid-operated micropumps dispense volumes described as precise from 4–250 μl to make certain that downstream instruments receive a desired volume of liquid. Pumps with dispense volumes of 20 μl and larger are self-priming and do not require a separate priming cycle. The pumps' wetted parts are constructed from nonmetallic, inert materials for zero metallic contamination to the fluid stream



passing through the pump. According to the company, BCF micropumps are capable of continuous duty operation with a high degree of repeatability. Users can customize their pump order, specifying the construction materials, operating voltages, and dispense volumes that fit their applications. BCF micropumps' activation mechanism is rated up to 20×10^6 cycles to ensure each pump has a long service life.—*Bio-Chem Fluidics, 85 Fulton Street, Boonton, New Jersey 07005. (973-263-3001) www.biochemfluidics.com*

NEW LITERATURE AND SOFTWARE

A Guide to Understanding Electrical Test and Measurement on CD

Keithley Instruments, Inc. has released a tutorial CD offering helpful and practical techniques for obtaining the most accurate and precise measurements possible. *A Guide to Understanding Electrical Test and Measurement* covers all aspects of measurement performance, including how to troubleshoot, connect, select instruments, and more. The CD contains application notes, white papers, and webcasts on various test and measurement topics. Instrument options cover digital multimeters, source and measure instruments, and



function/pulse/arbitrary/pattern generators. Application examples range from accelerated stress testing to wireless device testing, with many topics covered by multiple articles. According to Keithley, the CD will be useful to those looking for specific information on instrument selection and setup or on applications in multiple areas and in multiple industries, and to anyone who wants a ready reference on the use of instrumentation in a multitude of areas.—*Keithley Instruments, Inc., 28775 Aurora Road, Cleveland, Ohio 44139-1891. (800-688-9951 or 440-248-0400) www.keithley.com*