

new products

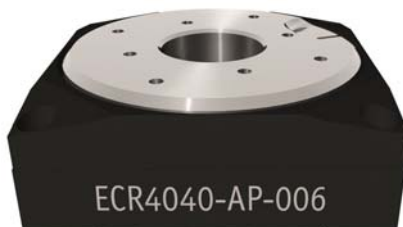
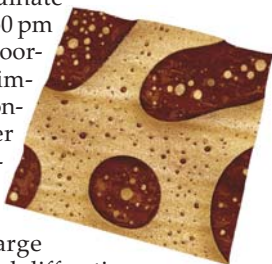
Focus on lasers and imaging

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

Atomic force microscope

Asylum Research, an Oxford Instruments company, offers a new version of its MFP-3D atomic force microscope. The MFP-3D Infinity features a large 90- μm stage and new control electronics located close to the microscope for fast, low-noise performance. Flexible signal switching and programmable logic permit future expansion of instrumental capabilities. The new head and scanner offer high bandwidth and reduced sensor noise of less than 35 pm in the z-coordinate and less than 150 pm in the x- and y-coordinates for improved force control and faster imaging. Top- and bottom-view optics allow for a large field of view and diffraction-limited resolution to pinpoint features on samples. Operating at up to a 300-Hz pixel rate, the instrument captures every force curve in an image without missing curves or manipulating hidden data. User-accessible real-time and off-line analysis models calculate modulus, adhesion, and other properties. Asylum Research, 6310 Hollister Avenue, Santa Barbara, CA 93117, <http://www.asylumresearch.com>



optical equipment and components such as breadboards and cage plates. The device is available with an integrated optoelectronic position encoder that has a sensor resolution of 10^{-5} degrees and a repeatability of 10^{-3} degrees. The company's ECC100 controller drives the positioner in open- and closed-loop modes. Among the interfaces that allow the positioning units to be implemented in almost any experiment are USB, TCP/IP, and EPICS via Ethernet; transistor-transistor logic and AquadB triggers; and dynamic-link library and LabVIEW software. attocube systems AG, Königinstrasse 11a RGB, 80539 Munich, Germany, <http://www.attocube.com>

Multiscale x-ray nanotomograph

According to Bruker, its new SkyScan 2211 high-resolution x-ray nanocomputed tomography system has the widest range of object sizes and spatial resolutions currently available and is the first single instrument that can perform both nondestructive scanning and 3D reconstruction of internal microstructures of large objects. It also provides submicron resolution for small samples. The multiscale device may make possible new approaches in 3D imaging and exact modeling of ma-



terials in applications such as oil and gas exploration, composite materials, fuel cells, and electronic assemblies. It combines a 600-nm x-ray source with two x-ray detectors—a 3-Mp flat-panel and an 11-Mp cooled CCD detector, so that $8000 \times 8000 \times 2300$ pixels can be reconstructed after a single scan. The smallest pixel size is 100 nm. Bruker AXS Inc, 5465 East Cheryl Parkway, Madison, WI 53711-5373, <http://www.bruker.com>

Polarization imager

Hinds Instruments has made available the Exicor MicroImager birefringence polarization imaging microscope to allow researchers to evaluate birefringence of biological and industrial materials. It has a digital resolution of 0.01 nm; a detection limit, or noise floor, of 0.3 nm; and a measurement range of beyond 300 nm when using red light. The instrument integrates a camera, optics, electronics, sample stage hardware, and software. The standard system offers evaluations at three wavelengths—red, green, and blue—and two levels of magnification: a 2 $\times$ objective with 5- μm resolution and a 5 $\times$ objective with 2- μm resolution. Because the microscope measures at different wavelengths, it provides flexibility for sample color discrimination and improved order determination for high birefringence structures. A multiorder birefringence “unwrapping” option is available with the system. Hinds Instruments Inc, 7245 Northwest Evergreen Parkway, Hillsboro, OR 97124, <http://www.hindsinstruments.com>



Piezoelectric positioner

The ECR4040AP rotator positioner from attocube enables rotations both clockwise and counterclockwise with torques up to 2 Ncm. Its bearing-based design offers high-precision piezo technology and high stability. Specifically conceived for optical experiments, the ECR4040AP features a half-inch aperture at the rotator center. With a total footprint of 40 mm $\times$ 40 mm and a standardized mounting pattern, the rotator dimensions match those of standard

Monolithic light engine

The OEM monolithic light engine from Melles Griot has a novel hermetically sealed mechanical design and patented beam combiner that make it stable even when subjected to mechanical shock, vibration, and temperature changes; realignment is not needed after shipping. The light engine is available in three or more output wavelengths from 405 nm to 785 nm and powers up to 200 mW. The internal laser components, combining elements, and beam-shaping optics are held at a constant temperature in a



compact package that delivers pointing and power stability and ultralow optical noise. Customized beam profiles, focal distances, and modulation parameters are available according to OEM requirements. Among its OEM applications are flow cytometry, confocal microscopy, microarray scanning, and laser-induced fluorescence. *Melles Griot, 2031 Palomar Airport Road, 200, Carlsbad, CA 92011, <http://mellesgriot.com>*

Piezo-driven nanopositioning stage

Physik Instrumente's P-763.22C multi-layer piezo-driven nanopositioning stage provides subnanometer resolution and rapid response for fast step and settle or high-speed scanning applications. Because of the capacitive feedback, the linearity of motion has



only 0.02% deviation from a perfect straight line when tested on a laser interferometer. With a footprint of less than

70 mm × 70 mm, the compact flexure-guided stage provides an aperture of 30 mm × 30 mm and a large travel range of 200 μm × 200 μm. The piezo positioning system is suitable for applications such as image stabilization, microlithography, nanoalignment, surface metrology, superresolution microscopy, and bionanotechnology. A number of OEM and benchtop controllers are available; each piezo controller comes with suitable software tools and programming examples. *Physik Instrumente LP, 16 Albert Street, Auburn, MA 01501, <http://www.pi-usa.us>*

Microscope for Raman-SEM imaging

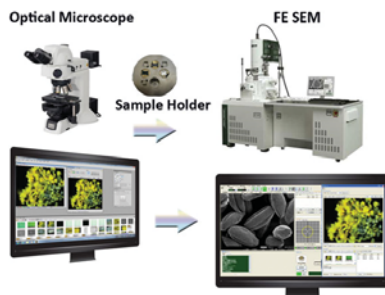
Tescan Orsay Holding and WITec have jointly launched RISE, a correlative technique for confocal Raman and scanning electron microscope (SEM) imag-

ing within one integrated microscope system. Electron microscopy can visualize sample surface structures in the nanometer range, and confocal Raman imaging can detect chemical and molecular components, so the novel combination can make sample characterization more comprehensive. The RISE system can generate 2D and 3D images and depth profiles to visualize the distribution of the molecular compounds within a sample. Between the Raman and SEM measurements, a precise scan stage automatically transfers the sample inside the microscope's vacuum chamber and repositions it. The integrated software carries out the required parameter adjustments and instrument alignments. The results can then be correlated and the Raman and SEM images overlaid. Applications for RISE include nanotechnology, materials science, and life sciences. *WITec Instruments Corporation, 130G Market Place Boulevard, Knoxville, TN 37922, <http://www.witec-instruments.com>*



Optical and SEM correlative imager

Nikon and JEOL have integrated optical microscopy and field emission scanning electron microscopy in a way that enables seamless observation of the same region of interest on a sample. The technique, MiXcroscopy, employs the same specimen holder for both the optical microscope (OM) and the scanning electron microscope (SEM). The specimen stage registration is controlled by dedicated software that allows the OM and SEM to share, recall, and observe exact locations of a specimen's specific areas. The Nikon Eclipse LV-N series OM and any JEOL JSM-7000 series field emission SEM work concurrently: The optical image taken on the OM and the specimen stage coordinates are transferred to the SEM for fast, accurate



Hannah Coney, Accounting

Precision, Speed, Both!

High speed wavelength measurement with MHz-accuracy over a large spectral range is a great challenge. HighFinesse wavelength meters with their solid state Fizeau Interferometers are perfectly apt for this task. They are also an ideal match for the active stabilization of TOPTICA's tunable diode lasers in complex experiments.

HighFinesse wavelength meters offer both: **highest precision** and unmatched **speed!**

Wavelength Meter @ TOPTICA

- ▶ Absolute accuracy down to 2 MHz
- ▶ From UV to IR (192 nm .. 11 μm)
- ▶ For pulsed and cw lasers
- ▶ Measurement speed up to 600 Hz



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navigation and correlation via Nikon's Elements software. When the sample holder is moved to the SEM, users can observe detailed structures at higher magnifications and easily make comparisons to the optical image on screen. *JEOL USA Inc, 11 Dearborn Road, Peabody, MA 01960, <http://www.jeolusa.com>*

Near-IR imaging camera

Princeton Instruments has added the NIRvana 640ST imaging camera to its scientific-grade NIRvana series of cameras that use a deep-cooled indium gallium arsenide focal plane array. Designed for scientific imaging applications in the shortwave-IR (SWIR), it offers high resolution and sensitivity from 900 nm to 1700 nm. According to the company, it is a suitable tool for astronomy; standard SWIR fluorescence, small animal, and deep tissue imaging; and applications for which short integration times in the SWIR region are required. The NIRvana 640ST features built-in air cooling or liquid cooling, or a combination of the two, for use in thermally and vibration-sensitive environments. It also has a gigabit Ethernet data interface that allows remote operation from up to 50 m and delivers a maximum frame rate of 110 frames/s at full resolution. *Princeton Instruments, 3660 Quakerbridge Road, Trenton, NJ 08619, <http://www.princetoninstruments.com>*



delivers 33% more power and pulse energies; an increase in the maximum repetition rate, up to 3.5 MHz; and an increase in minimum pulse widths, from less than 2 ns to greater than 100 ns. The Quasar combines an advanced hybrid fiber laser, power amplifier, and patented harmonics technologies. With its long-lasting components and state-of-the-art UV manufacturing processes, the laser has passed extensive environmental qualification testing. Each instrument is subjected to rigorous tests during production to ensure high reliability. *Spectra-Physics, 3635 Peterson Way, Santa Clara, CA 95054, <http://www.spectra-physics.com>*

Laser crystal coatings

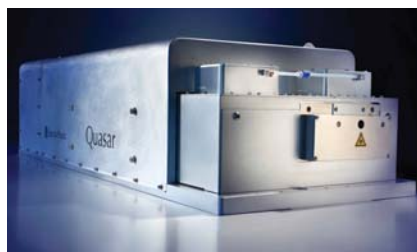
Coating services for customer-furnished nonlinear crystals and laser gain materials used in a wide range of laser applications are now offered by Research Electro-Optics. Gain crystals, nonlinear crystals, Q-switches, and more are included. The coatings, which use the company's proprietary ion-beam-sputtering (IBS) process, produce fully densified films for ultralow loss, low absorption, high laser damage threshold, and superior environmental stability. The IBS technology enables precision and repeatability during deposition and permits the production of consistent coatings, including films with complex, multi-wavelength spectral performance. Advanced tooling techniques precisely control the clear aperture and minimize overspray. Proprietary cleaning technology, crystal pretreatment processes, and handling protocols are used to maintain high yields for customer-furnished materials. *Research Electro-Optics Inc, 5505 Airport Boulevard, Boulder, CO 80301, <http://www.reoinc.com>*



With the release of its Quasar 355-60 UV laser, Spectra-Physics improves on its earlier 355-45 model. The new instrument offers more than 60 W and greater than 300-μJ pulse energies, and it features TimeShift technology for programmable pulse parameters. Compared with the earlier version, it

High-power UV laser

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Ultrahigh-speed imaging camera

Vision Research has introduced the Phantom v2010, a flexible, high-performance ultrahigh-speed camera that captures more than 22 000 frames/s at full resolution and features high-definition, widescreen 1280 × 800 CMOS sensors. Its 12-bit pixel depth, which is

standard, provides high image quality and dynamic range. The camera can be configured with 24 GB, 48 GB, or 96 GB of memory, which can be segmented into 63 partitions to allow for nonstop shooting with no need for continuous downloading. When shooting in low light, the v2010 offers sensitivity as high as ISO 5000 (daylight illumination) for color images and ISO 25 000 for monochrome images. With built-in on-camera controls, most settings can be managed with a turn of a knob, thus eliminating the need for a PC or laptop connection. The Phantom v2010 includes time code, dual power inputs, high-definition serial digital interface, GPS input, camera synchronization, and trigger connections. *Vision Research Inc, 100 Dey Road, Wayne, NJ 07470, <http://www.visionresearch.com>*



new literature

Optics catalog

Semrock has released its 2014 *Master Catalog*, which provides a concise layout of product information to streamline product selection. Among the new items it features are assorted single-band bandpass optics, edge filters, and dichroics. The catalog also includes a BrightLine full multiband laser filter set optimized for 405 nm, 488 nm, 532 nm, and 635 nm and new standard sizes for many products. The standard product offering now features a BrightLine 11-band filter optimized for imaging formaldehyde; it has extremely high transmission, steep and well-defined edges, and effective blocking between the passbands. New to the 2014 edition are Semrock's StopLine notch dichroic beamsplitters at 405 nm, 488 nm, and 632.8 nm for coherent anti-Stokes Raman scattering spectroscopy applications. Each beamsplitter reflects a standard laser line incident at 45° while efficiently passing the shorter and longer wavelengths. *Semrock Inc, 3625 Buffalo Road, Suite 6, Rochester, NY 14624, <http://www.semrock.com>*

