new products

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Lawrence G. Rubin

Focus on analytical equipment

Scanning transmission electron microscope

JEOL Ltd has announced the JEM-ARM200F, a scanning transmission electron microscope (STEM) that includes a spherical aberration corrector for its electron optics system. The instrument has produced an image resolution of 0.08 nm, claimed to be the highest among commercial TEMs. The electron probe, after aberration correction, features a current-density level an order of magnitude higher than conventional TEMs. To achieve atomic-level resolution, the power supply that controls the electron optics system has had to reduce fluctuations of high voltage and objective current by 50% to enhance its electrical stability. The ARM200F incorporates an enlarged column size to improve rigidity and enhance mechanical stability and provides a set of thermal and magnetic shields to reduce the effects of changes in temperature and in stray magnetic fields. *JEOL USA Inc, 11 Dearborn Road, Peabody, MA 01960, http://www.jeolusa.com*

CARS light source

APE GmbH, in conjunction with High Q Laser (Austria), has developed the picoEmerald, a remote-controlled coherent anti-Stokes Raman scattering (CARS) light source that provides pump and Stokes pulses perfectly overlapped in space and time. The new light source contains in a single housing a high-power, picosecond, 1064-nm oscillator; a frequency doubler; and a synchronously pumped optical parametric oscillator (OPO). The optical modules were optimized by finite element-analysis and mechanical-stability algorithms. An active resonator control continuously maximizes the efficiency of the picosecond oscillator and OPO. The picoEmerald delivers 7-ps pulses at 1064 nm and 5–6 ps from the OPO; the pulses show no timing jitter and have a very low noise level. The specified 750 mW for both the 1064-nm and OPO signal outputs and the 600 mW for the OPO idler furnish more than enough power for CARS and coherent Raman microscopy. *APE GmbH, Plauener Strasse 163–165, Haus N, 13053 Berlin, Germany, http://www.ape-berlin.com*

Forensic microspectrometer

The QD 2010 from CRAIC Technologies is a microspectrometer configured to rapidly, accurately, and nondestructively analyze many types of crime-scene trace evidence, such as textile fibers, hair, and paint chips. The system can image and acquire spectra of documents in question from the deep UV to the near-IR. The microspectrometer integrates an advanced spectrophotometer with a custom-built microscope and

powerful software for a forensics laboratory instrument that features high sensitivity and the measurement of variable sample areas from the submicrometer range to more than 100 μm across. It utilizes multiple analytical techniques, including absorbance, reflectance, and fluorescence microspectroscopy. The QD 2010 can also be used in combinatorial chemistry, process impurity detection, and surface plasmon resonance. *CRAIC Technologies Inc, 948 North Amelia Avenue, San Dimas, CA 91773, http://www.microspectra.com*

Micro XRF spectrometer

Spectro Analytical Instruments has introduced the third generation of the Spectro Midex, a micro x-ray fluorescence spectrometer. It is equipped with an air-cooled, low-power, x-ray tube with micro focus and uses software-controlled collimated point excitation; the size of the measuring spot can be set in steps between 200 μm and 4 mm. The new model incorporates the latest generation of silicon drift detector, which can process up to 250 000 pulses/s and delivers exact results even with a working distance of 20 mm, a distance ideal for the nondestructive analysis of the lower-lying components on a sample. The Midex has a sample chamber that may be optionally equipped with a motor-driven *xyz* table for which the travel path can be programmed along a surface of 240 × 178 mm; the chamber includes an integrated video system for point measurements. *Spectro Analytical Instruments Inc, 91 McKee Drive, Mahwah, NJ 07430, http://www.spectro.com*

Atomic force and light microscopy

Veeco Instruments has released the BioScope Catalyst Life Science microscope that integrates atomic force and light microscopy. The system features hardware and software innovations that enable the two complementary techniques to be used together more effectively and with greater ease for a wide variety of life science applications. The Catalyst employs a top-down laser path that permits use of phase contrast, differential interference contrast, and bright-field optical microscopy while offering optical and physical access from the top of the AFM head. The instrument includes flexible mounting options, heating and fluid-handling capabilities, and a microvolume perfusion accessory for working with precious reagents and proteins. The company's microscope image registration and overlay software corrects and registers light microscopy images and AFM data in real time. *Veeco Instruments Inc, Terminal Drive, Plainview, NY 11803, http://www.veeco.com*

Fiber imaging microscope

FEI Company is offering the Fibermetric system, powered by the Phenom

personal electron microscope. The system is designed to discover and quantify the properties of woven and nonwoven fiber samples in minutes and to make direct observation and measurement of micro- and nano-fibers faster and more accurate. The system automatically collects hundreds of measurements per image and generates fiber- and pore-size distribution plots for quality control and for predicting application properties such as filtration efficiency. A special feature will automatically determine whether the selected image elements are fibers or pores. For fibers, it will measure diameters; for pores, enclosed surface areas. The Fibermetric instrument uses magnifications up to 24 000 times, a 4.9 nm/pixel resolution, and a Gaussian fit function to measure 100-nm-diameter fibers with greater than 97% accuracy. *FEI Company, 5350 NE Dawson Creek Drive, Hillsboro, OR 97124, http://www.fei.com*

Particle size analyzer

Shimadzu Scientific Instruments has developed the IG-1000 particle size analyzer, which is based on the induced-grating method. This new method uses dielectrophoresis and diffracted light for excellent reproducibility and stable data, particularly for particles smaller than 10 nm. The IG-1000 uses optical signals emitted by the diffraction grating that is formed by the particles. Even for single nanoparticles, a good signal-to-noise ratio can be obtained. The method resists contamination; accurate measurement information is still reliably captured if the sample is mixed with small amounts of foreign particles. Users can evaluate mixed samples because the signal size does not depend on particle size. The new analyzer can measure particles in the 0.5-nm to 200-nm range in about 30 s, from measurement start to displayed results. *Shimadzu Scientific Instruments Inc, 7102 Riverwood Drive, Columbia, MD 21046, http://www.shimadzu.com*

Atomic force microscope

Agilent Technologies has added new capabilities to its 5600LS, a high-resolution atomic force microscope that uses an addressable 200 mm × 200 mm stage and a low-noise design to image either a single large sample or multiple small samples. A special Agilent stage adapter permits the AFM to be used with a sample plate that facilitates in-fluid imaging of small samples. Heating and cooling control is also offered for imaging biological and polymer samples in liquid. The 5600LS supports all major AFM modes, including the company's scanning microwave microscopy mode. The instrument's MAC Mode III provides three user-configurable lock-in amplifiers and allows single-pass imaging concurrent with Kelvin force and electrical force microscopes, facilitates vertical and lateral modulation studies, and supports the use of higher-cantilever-resonance modes. *Agilent Technologies Inc, 5301 Stevens Creek Boulevard, Santa Clara, CA 95051, http://www.agilent.com*

FIB-SEM workstation

Carl Zeiss SMT's Auriga is a focused-ion-beam scanning electron microscope operating through the company's CrossBeam workstation. Its redesigned vacuum chamber has 15 ports for different detectors. A charge compensation system enables the local application of an inert gas flush so that electrostatic charging of nonconductive samples is neutralized, which allows for detection of secondary and backscattered electrons. The heart of the workstation is the company's Gemini FE-SEM column. Its design allows the analysis of magnetic samples, and the special in-lens detector offers images with excellent material contrast. Simultaneous milling and high-resolution SEM imaging is a feature

unique to CrossBeam workstations. The Auriga incorporates a new focused ion beam with a resolution of better than 2.5 nm and advanced gas processing technology for ion- and electron-beam-assisted etching and deposition. *Carl Zeiss SMT Inc, One Corporation Way, Peabody, MA 01960, http://www.zeiss.com*

AFM accessory

Asylum Research has announced the CoolerHeater stage for the company's MFP-3D atomic force microscope. The accessory uses a Peltier element to heat and cool small samples within the range of –35 °C to +120 °C, suitable for studying phase transitions, chemical reactions, and other temperature-dependent phenomena. The heating and cooling temperature and heating rate are set using the AFM software. The stage is based on the company's closed-fluid-cell design and seals out the environment with a rubber membrane and O-rings. The temperature-controlled surface is 15 mm × 15 mm but can hold slightly larger samples. The CoolerHeater requires a separately purchased environmental controller, in which the built-in microprocessor maintains closed-loop performance independently of the AFM controller. Temperature information is stored with each image. *Asylum Research, 6310 Hollister Avenue, Santa Barbara, CA 93117, http://www.asylumresearch.com*

Detector for GPC system

Malvern Instruments has released a new photodiode array (PDA) detector for the TDAmax gel-permeation (or size-exclusion) chromatography (GPC) system from Viscotek, a Malvern company. The TDAmax incorporates a triple or quadruple detector array. By capturing absorption spectra across the UV-visible wavelength range, the PDA detector makes a fingerprint of each time slice of the sample as it is extracted from the column; measurement times are just 30 to 40 minutes. Since unique electrical, thermal, and photochromic properties often correlate with UV absorption characteristics, the PDA has particular application in smart-material research. When GPC is coupled with advanced detectors, a range of additional parameters, including intrinsic viscosity, molecular size, and long-chain branching, can be determined. *Malvern Instruments Inc, 117 Flanders Road, Westborough, MA 01581-1042, http://www.malvern.com*

Spectroscopic ellipsometer

Horiba Scientific's MM-16 NIR spectroscopic ellipsometer, operating in the 515-nm to 1000-nm wavelength range, is dedicated to thin film characterization and determining thicknesses, optical constants, and the optical bandgap of materials. The instrument features a CCD detection system for rapid and accurate measurement down to 1 second per determination, and a 200-μm microspot that allows characterization of patterned samples. The MM-16 NIR can be configured with a 200 mm × 200 mm (or optional 300 mm × 300 mm) mapping stage for bench-top thin-film measurements or with a compact, integrated goniometer to provide a cost-effective metrology tool. The ellipsometer can be mounted in situ on process chambers to control the thickness of deposited or etched layers or integrated into production lines for quality control. *Horiba Scientific Inc, 3880 Park Avenue, Edison, NJ 08820-3097, http://www.horiba.com*

Liquid chromatography–mass spectrometry system

Thermo Fisher Scientific has introduced its Exactive bench-top liquid chromatography–mass spectrometry system, which utilizes the company's Orbitrap mass analyzer technology. The instrument improves laboratory efficiency and throughput by streaming many of the technical steps that normally require specialized set-up and operation. The Exactive Pathfinder software interface provides the right workflow for the right analysis and ensures precise mass identification of target compounds over a wide concentration range. The software makes the system easy to use in both expert and walk-up modes. Exactive provides resolutions up to 100 000 and, when combined with high single-scan accuracy in positive and negative modes, offers excellent high-throughput scanning. *Thermo Fisher Scientific Inc, 81 Wyman Street, Waltham, MA 02454, http://www.thermofisher.com*

IR spectrometer system

Syrris is offering the Atlas FT-IR spectrometer system for in situ reaction monitoring over the wavenumber range 3500 cm^{-1} to 560 cm^{-1}. Incorporating a mid-IR spectrometer, the combination of the Syrris Atlas and Bruker Optics Matrix-MF makes it ideal for real-time analysis of chemical reactions and processes. The software for the two systems is integrated to make it easy to control and view results. Data such as integrated peak size over a defined wavelength range can be plotted on the same graph as other Atlas data, including reaction power, enthalpy, pH, and temperature. The system covers the wide temperature range of –80 °C to +180 °C and vacuum down to 300 bar, and offers a range of vessel sizes from 5 ml to 5 l. The Atlas spectrometer can be upgraded to handle calorimetry, pH control, gravimetric or volumetric reagent addition, and parallel reactions. *Syrris Inc, 29 Albion Place, Charlestown, MA 02129, http://www.syrris.com*

X-ray source

Spellman High Voltage Electronics has expanded the Monoblock series of x-ray sources with the addition of the XRB100. The new model, providing 100 kV at 100 W, continues the practice of integrating the high-voltage power supply, filament power supply, x-ray tube, and control electronics into a single package. It features power-factor-corrected universal input and analog or RS 232 interfacing. Emission control circuitry enables excellent tube current regulation and high-stability performance. The XRB100 has a stationary tungsten anode x-ray source and delivers a fan-shaped beam geometry; the nominal tube voltage is adjustable between 40 kV and 100 kV, and the current is 100 μA to 1 mA over that voltage range. The Monoblock series can be customized for beam shape, focal spot size, and other application-specific parameters. *Spellman High Voltage Electronics Corporation, 475 Wireless Boulevard, Hauppauge, NY 11788, http://www.spellmanhv.com* ■