Focus on bioinstrumentation and biotechnologies

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

Quadrupole time-of-flight mass spectrometer

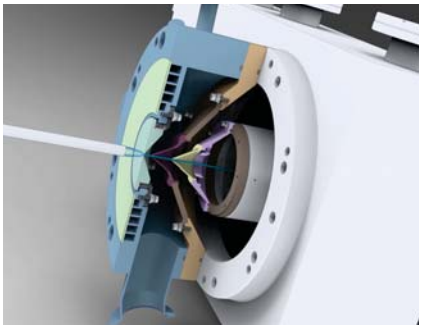
The maXis II is the latest addition to Bruker's line of ultrahigh-resolution quadrupole time-of-flight mass spectrometers. The system is designed to deliver high resolution and mass accuracy for unambiguous identification of the monoisotopic mass peak of both the light and heavy chains of, for example, monoclonal antibodies. Users can also identify modifications hard to detect at the protein level, such as deamidation. The maXis II allows small molecules and megadalton proteins to be analyzed simultaneously. A high mass option yielding native spray mass spectrometry (MS) capabilities makes it possible to analyze megadalton protein complexes and determine antibody drug conjugates. The electron transfer dissociation option provides an MS/MS fragmentation technique for the sequence analysis of intact proteins, including monoclonal antibody subunits. *Bruker Daltonics Inc, 40 Manning Road, Manning Park, Billerica, MA 01821, http://www.bruker.com*

TEM sample preparation system

Denton Vacuum's Vitua is an automated transmission electron microscopy (TEM) sample preparation system designed and characterized for high-resolution rotary shadow casting of large organic molecules. Among the challenges of TEM organic molecule imaging is that small samples, such as DNA or complex proteins, are difficult to resolve using traditional staining techniques. Because TEM processing also degrades stained samples, follow-up characterization is impossible. To use high-resolution rotary shadow casting on organic molecules, it is necessary to deposit thin, consistent metal layers on the specimen. Users have had to modify their deposition equipment and expend considerable time and effort developing the expertise to ensure good results. Vitua includes processes that automate high-resolution rotary shadow casting. It streamlines TEM sample preparation and thereby allows for wider use of the technique in organic molecule imaging. *Denton Vacuum LLC, 1259 North Church Street, Building 3, Moorestown, NJ 08057, http://www.dentonvacuum.com*

Mass spectrometer for therapeutic medicine

Medical and biological researchers are increasingly using cold plasma sources in areas such as dentistry, surgery, wound sterilization, and general surface decontamination. Successful optimization of gas-phase cold plasmas requires detailed characterization and quantification of the plasma beam to establish the actual abundances of the reactive species within the feed-gas and feed-gas-composition variances. In the Hiden HPR-60 research mass spectrometer, the plasma is sampled through three separate sequential stages of high-pumping-speed pressure reduction. The extracted sample is formed into a molecular beam to transfer undisturbed the reactive gas-phase species to the integrated mass spectrometer. The system directly measures the mass and energy of positive and negative ions, radicals, and neutral species. Data are presented in real time. *Hiden Analytical Inc, 37699 Schoolcraft Road, Livonia, MI 48150, http://www.hidenanalytical.com*



Thermally conductive epoxy

With biocompatibility and cytotoxicity certifications, Master Bond EP21AOLV-2Med is suitable for bonding, sealing, coating, and encapsulation applications in the medical device industry. The two-component epoxy system withstands various sterilization methods, including ethylene oxide, radiation, and many cold sterilants. Thermally conductive and electrically isolating, it has a smooth consistency and good flow properties. It bonds well to metals, composites, glass, ceramics, plastics, and many rubber materials. The system offers a high tensile modulus of 450 000–500 000 psi, a compressive strength exceeding 18 000 psi, and very low shrinkage upon curing. The viscosity and low thermal expansion coefficient of EP21AOLV-2Med allow it to be used for potting and encapsulation applications. The epoxy is resistant to many chemicals, including water, oils, and fuels, and it is serviceable over the temperature range of −60 °F to 250 °F. *Master Bond Inc, 154 Hobart Street, Hackensack, NJ 07601, http://www.masterbond.com*

Real-time PCR system

Agilent Technologies has introduced the AriaMx system for real-time polymerase chain reaction (PCR) analysis. It features easily changed optics cartridges for complex research applica-

tions such as gene-expression analysis, pathogen detection, and genotyping via high-resolution melt. The modular format with expandable cartridges makes the system suitable for laboratory personnel and principal investigators running multiple types of applications and provides them with the flexibility to match the system to current and future needs. With its ability to multiplex, the AriaMx can deliver high optical resolution for clear data capture in each of its six channels. Additionally, it features an onboard diagnostic system that can pinpoint potential problem points and software that allows users to set up, view, and analyze data from any assay. *Agilent Technologies Inc, 5301 Stevens Creek Boulevard, Santa Clara, CA 95051, http://www.agilent.com*

Magnetic bead biomolecule linkage kit

MagSi-Direct from AMS Biotechnology is a biomolecule linkage kit for magnetic separation in cell biology, protein chemistry, flow cytometry, diagnostics development, and other fields. It provides a fast, efficient way to attach nearly any biomolecule to nanoscopic magnetic beads and is particularly suitable for exploiting interactions between biomolecules and their binding partners. MagSi-Direct beads attach to the starting molecule via strong, stable coordinate bonds between the surface of the bead and any electron-donating group on the molecule being studied—for example, carboxyl, amines, hydroxyl, and phosphate. Molecular orientation is nonspecific and random, so within a population of beads, all possible orientations of the starting molecule will be available for interactions with other molecules, complexes, or cells. *AMSBio LLC, 1035 Cambridge Street, Cambridge, MA 02141, http://www.amsbio.com*

Biomedical imaging system

Bio-Rad's ChemiDoc Touch system for electrophoresis and gel and Western blot imaging has a compact design integrating an intuitive touchscreen with a high-performance computer. It uses application-specific trays for chemiluminescence and UV/visible fluorescence detection, including stain-free gel and blot imaging. According to the company, the instrument offers high sensitivity and image quality. Used as part of Bio-Rad's V3 Western Workflow, the ChemiDoc Touch imager brings reliable quality control and quantitation to Western blotting. Users can visualize, verify, and validate results at multiple points throughout the process. *Bio-Rad Laboratories Inc, 1000 Alfred Nobel Drive, Hercules, CA 94547, http://www.bio-rad.com*

Multispecimen perfusion bioreactor

The 3DCulturePro system from Bose Corp is a multispecimen perfusion bioreactor designed for biologists, biomedical researchers, and scientists who need reproducible and reliable tissue growth. It supports cell growth and 3D tissue culture in an easy-to-use, scalable configuration. Built for use with multiple experiments, the bioreactor is completely biocompatible and can be moved in and out of standard cell incubators. It can be set up as a single, stand-alone chamber with specimen fixtures or as a complete, multichamber system with a perfusion pump. The multichamber configuration can hold up to six chambers positioned vertically, horizontally, or on the side. Each chamber comes with barb fittings, porous platens, and grips that can be used for different sample sizes and types of biomaterials, including bone, blood vessels, skin, ligaments, and tendons. *Bose Corporation, ElectroForce Systems Group, 10250 Valley View Road, Suite 113, Eden Prairie, MN 55344, http://www.bose-electroforce.com*

Comprehensive liquid phase chromatograph

The Nexera-e comprehensive 2D liquid chromatograph (2D-LC) from Shimadzu Scientific Instruments offers a separation method for complex sample matrices. According to the company, it provides a good understanding of sample analytes, which is beneficial in the analysis of pharmaceutical impurities, proteins, lipids, peptides, food extracts, and natural products. To increase separation efficiency, the comprehensive 2D-LC instrument combines two independent separation modes orthogonally and a dual-loop/dual-valve alternate switching system. The combination enables the separation of peaks difficult to isolate using conventional LC. The company claims the system achieves the highest possible theoretical plates for LC separation. Ultrahigh-speed analysis of comprehensive 2D-LC requires quick data sampling. The Nexera-e incorporates Shimadzu's SPD-M30A, a photodiode array detector that has high sampling rates up to 200 Hz. *Shimadzu North America/Shimadzu Scientific Instruments Inc, 7102 Riverwood Drive, Columbia, MD 21046, http://www.ssi.shimadzu.com*

Multiphoton excitation microscopy laser

The Chameleon Discovery dual-wavelength laser from Coherent allows fluorescence detection techniques to be used in nonlinear microscopy. The new laser's primary output is continuously

tunable from 680 nm to 1300 nm, with a short 100-fs pulse width and power up to 1.4 W. It simultaneously provides 1.5 W of output at 1040 nm. The wide tuning range, high power, and short pulses of the primary output are suitable for optimum excitation of all popular fluorophores, including yellow and enhanced green fluorescent proteins and all the red-shifted proteins. The secondary 1040-nm output provides high power and short 160-fs pulses and enables simultaneous, multiwavelength excitation of multiple probes and photoactivation of opsins for optogenetics applications. The availability of phase-correlated dual wavelength pulses makes the Chameleon Discovery a suitable source for techniques such as coherent anti-Stokes Raman scattering and stimulated Raman scattering microscopy. *Coherent Inc, 5100 Patrick Henry Drive, Santa Clara, CA 95054, http://www.coherent.com*

Temperature controller for microfluidic chips

The Meros TCU-100 from Dolomite offers advanced temperature control from 1 °C to 100 °C for microfluidic chips, microscope slides, and other devices. Measuring 11 cm wide, the chemically resistant, robust, and reliable TCU-100 is economical and easy to use in biological and chemical applications such as cell analysis, thermal control of microreactors, incubation of microdroplets, protein crystallization, nanoparticle synthesis, and thermocycling of microscale samples. It enables temperature control—including cooling, heating, and thermocycling—with accuracy of 0.5 °C, target temperature resolution of 0.1 °C, and rapid ramp rates up to 1 °C/s. Operation, data logging, and graphical data display are achieved through the company's user-friendly Flow Control Centre software or third-party software such as LabVIEW. *Dolomite Microfluidics, 29 Albion Place, Charlestown, MA 02129, http://www.dolomite-microfluidics.com*

Peristaltic pump

The P-1500 peristaltic pump with weight-scale integration from Harvard Apparatus allows users to dispense fluids based on units of weight. For precise dispensing, the pump and the scale can communicate during operation. The interface in the peristaltic controller is compatible with Mettler Toledo XS and Ohaus Defender 5000 and Ranger series scales. According to the company, the P-1500's weight-scale capabilities make the pump suitable for applications such as dispensing reproductive biotechnology samples and organic solvents and automated weighing of food samples. The antidrip feature automatically runs the pump in the reverse direction for a short time after it finishes dispensing to prevent solution left in the tubing from dripping out and skewing the dispensed weight. *Harvard Apparatus, 84 October Hill Road, Holliston, MA 01746, http://www.harvardapparatus.com*

Single-molecule detector and imager

Leica Microsystems has introduced the HyD SMD universal hybrid single-molecule photodetector, which allows for the observation and precise measurement of the concentration of fast cellular processes. It combines characteristics of the classic photomultiplier tube with highly sensitive avalanche photodiodes to provide high sensitivity, a large dynamic range, rapid detection speed, and low dark noise. Because the Leica HyD SMD is fully integrated into the spectral detection system of the Leica TCS SP8 confocal microscopy platform, all available excitation sources, including UV and visible-light lasers and the highly flexible white-light laser in Leica Microsystems' portfolio, can be used for SMD experiments. *Leica Microsystems Inc, 1700 Leider Lane, Buffalo Grove, IL 60089, http://www.leica-microsystems.com* ■