Focus on analytical equipment and diagnostics

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

Mass spectrometer

Bruker has introduced the impact II system to its ultra-high-resolution Qq-time-of-flight (UHR-QqTOF) mass spectrometry product line. It offers greater than 50 000 full-sensitivity resolution and enhanced analytical performance for applications—including proteomics, biomarker research, identification of impurities, and residue screening—in which trace analysis from complex, high-background matrices is a challenge. A dynamic range of five orders of magnitude is achieved at ultra-high-performance liquid chromatography (UHPLC) speeds, with up to 50-Hz spectrum acquisition. The impact II measures isotopic patterns accurately. According to the company, that ability is a prerequisite for automated, reliable molecular formula determination of low-abundance compounds in nano- and UHPLC peaks. The novel UHR-QqTOF spectrometer includes software for intelligent self-optimizing tandem mass spectrometry acquisition to establish optimal experimental conditions independent of sample amount or complexity. *Bruker Daltonics Inc, 40 Manning Road, Manning Park, Billerica, MA 01821, http://www.bruker.com*

Biofuel research mass spectrometer

Hiden's Biostream system is a research-grade mass spectrometer for biofuel studies. Algae-based biofuels, such as biodiesel and bioethanol, can have advantages over crop-based biofuels. Algae grow significantly faster than many complex plants and, since they are grown in compact closed systems, potentially have a greater yield per unit area. The Biostream system provides real-time analysis of dissolved gases and vapors in aqueous solutions by quickly identifying and quantifying gaseous species with molecular weights up to 300 amu. It is fully programmable for both multiple- and single-species monitoring. Numerous inlet manifold and membrane separator styles allow for diverse applications by offering sequential measurement from a single point up to 80 sampling points. The system is suitable for fermentation culture analysis, monitoring of gaseous and volatile organic species in media such as sea water and soils, and evolved gas studies from microbiological systems. *Hiden Analytical, 420 Europa Boulevard, Gemini Business Park, Warrington WA5 7UN, UK, http://www.hidenanalytical.com*

Electron ionization system

The 7010 triple quadrupole gas chromatography and mass spectrometry (GC/MS) system from Agilent Technologies features what the company claims is a first for electron ionization GC/MS/MS systems: a high-efficiency EI source that enables attogram detection limits. The improved sensitivity provides increased confidence in results at all measurement levels and allows sample preparation procedures to be streamlined. Since the new EI source creates more than 20 times as many ions as other available EI sources, it is now possible to inject smaller sample volumes for decreased load on GC liners and columns, scale down sample prep volumes to save on costly reagents and standards and decrease waste, eliminate preconcentration steps, and easily add more compounds to target lists by lowering the dwell times of existing targets. The system can improve existing GC/MS/MS technologies by providing better lower limits of quantitation. *Agilent Technologies Inc, 5301 Stevens Creek Boulevard, Santa Clara, CA 95051, http://www.home.agilent.com*

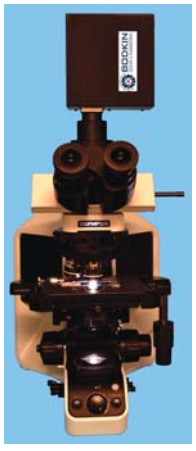
Photovoltaic measurement system

Solartron Analytical, a unit of Ametek Advanced Measurement Technologies, has introduced the ModuLab DSSC optical and electrical measurement system

for researchers who are developing dye-sensitized solar cells and other photoelectrochemical systems. Recognizing that many users may be unfamiliar with the techniques to characterize dye-sensitized solar cells, the company designed the system to provide even novices with the ability to analyze data with the click of a mouse. No prior knowledge of frequency domain techniques is required. More experienced users can develop new experiment types with a step sequencer. According to the company, the ModuLab DSSC allows all measurements to be run in sequence without user interference. It features a collimated, highly focused high-power light source and an optical bench equipped with a 10-MHz fast silicon photodetector containing a NIST-traceable sensor. *Ametek Inc, 1100 Cassatt Road, Berwyn, PA 19312, http://www.ametek.com*

Spectral microscope camera

A new hyperspectral medical imaging system from Bodkin Design & Engineering allows users to pinpoint data and analyze complex microscopic samples in real time. All materials have a spectral signature that identifies the



material and its related characteristics. Typical hyperspectral imagers capture data over time, which does not allow for accurate data capture in applications in which high-speed sampling is essential, such as research on live tissue samples. The VNIR-90 captures spectral images within fixed tissue or *in vivo* biological samples in a single video frame for immediate identification and analysis. It uses a patented hyperpixel array technology that combines spectral data with spatial information to create 3D hyperspectral "data cubes" at video rates. Users can "see" more than 90 spectral bands, with no motion artifacts and maximum signal-to-noise ratio, and observe the chemical changes associated with processes such as blood flow, mitosis, apoptosis, and endocytosis. *Bodkin Design & Engineering LLC, 77 Oak Street, Suite 201, Newton, MA 02464, http://www.bodkindesign.com*

Glass refractive index measurements

Craic Technologies and Laboratory Imaging have collaborated to develop rIQ (refractive index quantification), which combines image analysis software, advanced optical design, and standard reference materials. It enables users to measure the refractive index of multiple glass fragments simultaneously, quickly, and accurately. An automated system, rIQ uses the thermal immersion method, as defined by ASTM E1967, for measurement. Statistical analysis methods can be applied to the data. The user-friendly instrument is offered as a standalone package, an add-on to Craic Technologies' microspectrophotometers, or an upgrade for older units already in use. *Craic Technologies Inc, 948 North Amelia Avenue, San Dimas, CA 91773, http://www.microspectra.com*

Chemical species analyzer

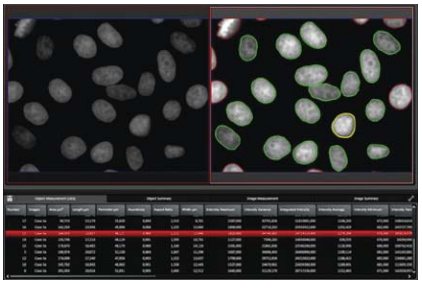
Eltra has made available the CHS-580 analyzer for determining carbon, sulfur, and hydrogen concentrations in organic sample materials such as fuels, oil, chemicals, soil, and cement. Its ability to measure the hydrogen content in fuels and chemicals gives it a unique advantage over conventional combustion analyzers, which can determine only carbon and sulfur. Equipped with a ceramic furnace with a maximum temperature of 1550 °C, the flexible, robust CHS-580 permits direct elemental analysis of solid or liquid samples without elaborate preparation. Typical analysis time is 1–3 minutes. The analyzer's standard delivery scope includes golden IR cells, so that even more aggressive reaction gases can be processed, such as for the analysis of acidulated soils. The CHS-580 provides reliable results for element concentrations from the parts-per-million range to 100%. *Eltra GmbH, Retsch-Allee 1-5, 42781 Haan, Germany, http://www.eltra.com*

ICP-OES spectrometer

Horiba Scientific's Ultima Expert spectrometer for inductively coupled plasma optical emission spectrometry (ICP-OES) features a novel plasma torch with a radial viewing mode. Its ability to measure the entire normal analytical zone makes it superior to other available systems, according to the company. With the vertical torch, a sheath gas device, and a wide injector, the Ultima Expert is robust, is suitable for difficult matrices, and requires minimal maintenance. High resolution and sensitivity enable accurate measurement of elements with high, low, and trace concentrations. The optical design, with a high-density holographic grating and 1-m focal length optics, allows the Ultima Expert to deliver resolution of less than 5 pm for the UV range and less than 10 pm for the visible range. Thermally stabilized optics provide long-term reproducibility of the measurements. Full wavelength coverage from 120 nm to 800 nm satisfies the requirements for elemental analysis, including far-UV capability for halogen analysis. *Horiba Scientific, 3880 Park Avenue, Edison, NJ 08820-3097, http://www.horiba.com/scientific*

Image analysis software

Leica Microsystems has launched the 4.0 version of the Leica Application Suite Advanced Fluorescence software platform for advanced life sciences research in wide-field and confocal microscopy. With the software, researchers can perform 2D image analysis on multichannel experiments and fully control the environmental conditions. Wide-field systems users can connect to the acquisition station remotely at any time. A workflow guides users step by step through the 2D image analysis, from filtering, thresholding,



and binary image processing to measurements and classification. Each step offers a set of tools for use according to analysis requirements. The image viewer provides immediate feedback on the applied settings. Results are obtained easily and quickly and are reproducible, even with multidimensional data sets. Analysis workflows can be saved as user-defined protocols and later applied to other data sets. *Leica Microsystems Inc, 1700 Leider Lane, Buffalo Grove, IL 60089, http://www.leica-microsystems.com*

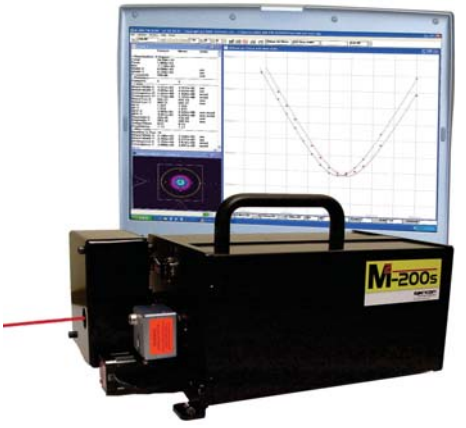
High-throughput sample delivery system

Malvern Instruments' NanoSampler is a compact, fully automated sample delivery system for the company's Zetasizer Nano, a nanoparticle and colloid characterization system. It works with all the sizing systems in the Zetasizer Nano instrument range, including both high-performance and entry-level systems that use dynamic light scattering to measure particles and molecules from less than 1 nm up to several microns in size. Samples can be selected for analysis via a simple standard operating procedure in the Zetasizer software. Each sample is delivered through solvent-resistant tubing into the quartz analysis cell in the Zetasizer Nano. Size

measurements are made automatically. The results from all selected samples are clearly displayed in the Records View. *Malvern Instruments Ltd, Enigma Business Park, Grovewood Road, Malvern WR14 1XZ, UK, http://www.malvern.com*

Laser-beam propagation analyzer

The M^2-200s is the latest version of Ophir Photonics' camera-based beam-propagation analyzer. Featuring a robust design that supports continuous operation, the M^2-200s is an ISO 11146–compliant system that automatically measures laser-beam quality in less than 2 min. A new controller decreases noise from motor movement by 30%.



The compact, portable unit incorporates a CCD camera for use with pulsed- or continuous-wave lasers that emit in the 266- to 1300-nm range. For each axis, the system automatically measures beam quality (M^2), beam waist location and width, divergence, astigmatism, asymmetry ratio, and the Rayleigh range. Input-beam sizes can range from 0.5 mm to 10 mm. Manual mode is available for beams that are outside that size range or for wavelengths outside the standard optical train. *Ophir-Spiricon LLC, 3050 North 300 West, North Logan, UT 84341, http://www.ophiropt.com/photonics*

TOF mass spectrometers

Waters Corp has introduced two new Xevo instruments: The Xevo G2-XS is a benchtop quadrupole time-of-flight (TOF) mass spectrometer, and the Xevo TQ-S micro is a compact benchtop tandem quadrupole mass spectrometer. The Xevo G2-XS combines the new XS Collision Cell with the company's TOF multiple-reaction monitoring, StepWave, and QuanTOF technologies to deliver optimum sensitivity and selectivity. According to Waters, that allows for the detection of more low-level compounds than was possible previously. The Xevo TQ-S micro offers six orders of magnitude of linear dynamic range, which helps quantify compounds in samples in which the concentrations of individual analytes differ greatly. The wider the operational dynamic range, the easier it is to transfer data processing between instruments of differing sensitivities. *Waters Corporation, 34 Maple Street, Milford, MA 01757, http://www.waters.com*

Handheld Raman material analyzer

Rigaku Raman Technologies claims that its newly released handheld analyzer, the Progeny, is adaptable, easy to use, and highly accurate. According to the company, an advanced miniature volume phase grating–based, 1064-nm optical engine at the Progeny's core offers benchtop-quality analytical performance in a rugged, ergonomic, IP68 sealed enclosure. The analyzer's fully customizable workflow software is 21 CFR Part 11 compliant and features a smartphone-inspired user interface to facilitate rapid implementation of material identification methods. A 512-pixel indium gallium arsenide detector has the resolution, analytics, and signal-to-noise ratio suitable for analyzing challenging mixtures. An ultrafast quad-core processor manages search and quantification algorithms without requiring remote desktop work. Sampling accessories and adjustable focus optimize sensitivity and deliver results from a broad range of samples. *Rigaku Raman Technologies Inc, 14 New England Executive Park, Suite 102, Burlington, MA 01803, http://www.rigaku.com* ■