

new products

Focus on nanoscience and nanotechnology

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

Raman and AFM imaging system

Bruker has released the Innova-IRIS, an integrated system for correlated atomic force microscopy (AFM) and Raman spectroscopic imaging. According to Bruker, it makes AFM easier to use while providing quantitative material property information. The combination of ultralow closed-loop noise, no-drift mechanical stability, and wide-open optical access makes the Innova AF microscope suitable for tip-enhanced Raman spectroscopy (TERS) research. With



multiple simultaneous optical views, simplified approach curves for TERS signal evaluation, and automated mapping, the integration accelerates AFM-Raman setup and data acquisition. At the same time, the integration preserves the performance and capabilities of each instrument during separate operations and has fully featured analysis packages for the AFM and Raman data. The Innova platform provides sensitive interrogation of opaque samples. It is compatible with leading Raman systems and implements the optimized off-axis Raman geometry necessary for maximum sensitivity. *Bruker Nano Surfaces Division, 3400 East Britannia Drive, Suite 150, Tucson, AZ 85706, <http://www.bruker.com>*

Micro- and nanoscale AFM

Agilent Technologies has expanded the capabilities of its 6000ILM atomic force

microscope (AFM) for life sciences research. Designed to facilitate molecular imaging, live-cell imaging, force studies, and mechanical stimulus studies, the updated instrument is a versatile single-system solution that integrates the capabilities of an AFM with those of an inverted light microscope or an inverted confocal microscope. Additions to the 6000ILM platform include advanced force-volume spectroscopy capabilities and top-view video optics. To facilitate dynamic studies in fluids, Agilent has added a new 6000ILM incubator perfusion cell sample plate that provides continuous perfusion, offers variable flow-through, and maintains liquid levels. With those solutions, researchers can maintain cell viability for up to eight hours. *Agilent Technologies Inc, 5301 Stevens Creek Boulevard, Santa Clara, CA 95051, <http://www.agilent.com>*

Protein nanoarray assay platform

The Nano BioDiscovery division of NanoInk has released a new automated platform for the analysis of its protein assays. The NanoArray assay system enables detection, identification, and quantitation of clinically relevant, low-abundance proteins from a wide variety of sample types for applications such as biomarker analysis, translational medicine, and toxicology. NanoInk assays consume much smaller sample and reagent volumes than do traditional enzyme-linked immunosorbent and bead-based assays and thus generate more proteomic data with less starting material while lowering assay costs for tests. The benefits are explained in a video, "NanoArray assays: More proteomic data from less sample," available on NanoInk's website. The ability to generate high-throughput proteomic data from very small sample volumes is especially critical when working with rare and hard-to-collect samples like spinal fluid, tissue extracts, and dried blood spots. *NanoInk Inc, Illinois Science + Technology Park, 8025 Lamon Avenue, Skokie, IL 60077, <http://www.nanoink.net>*

Nanoscale circuit-edit technology

DCG Systems has introduced the OptiFIB Viper, a system for circuit edit. Its precursor, the OptiFIB-IV, was used by semiconductor companies to edit process technologies down to the 28-nm node. The OptiFIB Viper incorporates a new coaxial photon-ion column to provide spot sizes 50% smaller than those of the OptiFIB-IV. It operates at lower beam energies, helps to prevent damage to sensitive materials, and enables endpoint capability at sub-picoampere beam currents. The OptiFIB Viper operates efficiently in the face of the dimensional and material challenges of technologies beyond 22 nm. At low beam currents, small-geometry device features are more easily resolved. The system has practical resolution at 15 kV and below, so sensitive materials are circuit edited without damage; better sample exchange pump-down efficiency; an in-chamber stage and jet movement observation camera for user reference; and improved flexibility to accommodate frequently used apertures. *DCG Systems Inc, 45900 Northport Loop East, Fremont, CA 94538, <http://www.dcgsystems.com>*



Accurate atomic force microscope

According to Park Systems, its new NX10 noncontact atomic force microscope (AFM) features long tip life and high imaging accuracy and scan speeds. Data accuracy is of paramount importance to nanotechnology researchers, since the credibility of their research depends on accurate results. The NX10 features z-servo speed, closed-loop detector noise, and minimized thermal drift. It includes xyz-scan linearity with



two independent flexure scanners for the sample and tip; out-of-plane motion of less than 1 nm over the entire xy -scan range; z -scanner linearity of less than 0.015%; and reduced xy -scanner ringing by a forward sine-scan algorithm. The z -scanner bandwidth is more than 9 kHz, which implies z -servo speed of more than 62-mm/s tip velocity. Sample topography is measured by a low-noise z detector capable of monitoring small forward and backward scan gaps of less than 0.15%. System drift and hysteresis are minimized by thermally matched components. *Park Systems Inc, 3040 Olcott Street, Santa Clara, CA 95054, <http://www.parkafm.com>*

Nanoanalytic imaging instrumentation

JPK developed quantitative imaging (QI) to make atomic force microscopy (AFM) imaging easier. With QI, a force curve-based imaging mode, users have full control over the tip-sample force at every pixel of the image. There is no need for set-point or gain adjustment



while scanning. With JPK's ForceWatch technology, QI can handle challenging samples, including soft (hydrogels, biomolecules); sticky (polymers, bacteria); loosely attached (nanotubes, virus particles in fluid); and those with steep edges (powders, microelectromechanical systems structures). The QI mode may be particularly useful in applications that demand both high resolution and force sensitivity; those include biology, polymers, and surface science. QI delivers quantitative AFM measurements. The QI-Advanced software package is an extension of the standard QI version and enables quantitative measurement of nanoscale material properties such as stiffness, adhesion, and dissipation. *JPK Instruments AG, Bouchéstrasse 12, Haus 2, Aufgang C, 12435 Berlin, Germany, <http://www.jpk.com>*

Nanoscale thermal analysis using AFM

Anasys Instruments has introduced the *afm+*, an integrated atomic force microscopy platform with three analytical capabilities. Using nano-TA, Anasys's proprietary thermal probe technology for nanoscale thermal analysis, the *afm+* allows users to obtain transition temperatures on any local feature of a sample or a transition temperature map. It simplifies measurement of glass transition temperatures and melting temperatures. This instrumentation platform also includes scanning thermal microscopy, which allows users to map relative thermal conductivity and relative temperature differences across the sample. The transition temperature microscopy mode is used to quantify and map thermal transitions in heterogeneous materials. That fully automated mode rapidly performs an array of nano-TA measurements and automatically analyzes each temperature ramp to determine the transition temperature. *Anasys Instruments Corporation, 121 Gray Avenue, Suite 100, Santa Barbara, CA 93101, <http://www.anasysinstruments.com>*

Pico- and nanoliter-handling piezo system

BioDot's BioJet Ultra piezo system has been designed for noncontact liquid handling and spotting. The new technology dispenses liquids within wide dynamic volume ranges from single drop (50 pL to 1.0 nL) to multidrop (up to 1 μ L) and with volume variances up to 2%. It allows dispensing in the low nanoliter range in a single drop. The system can easily change volume ranges while accurately aspirating and dispensing aqueous and organic solutions and living cells. High-viscosity reagents such as glycerol can also be dispensed. The BioJet Ultra allows users to change spot volumes and dispense reagents in different layers without cross-contamination. Depending on the application, the technology can be configured in "batch" or "inline system" modes. Results can be analyzed with standard technology and given immediately for optimal reaction parameters. *BioDot Inc, 2852 Alton Parkway, Irvine, CA 92606, <http://www.biodot.com>*

3D graphene products

A new line of chemical-vapor-deposited, 3D graphene products launched by CVD Equipment Corp is expected to enable new high-performance products. The CVD3^DGraphene cellular material platform is based on a 3D graphene-foam-like material made of several 2D graphene sheets, a few atomic layers thick, that are mechanically and electrically fully interconnected in three dimensions. The novel, customizable material platform enables the preservation of many of the high-performance material properties of traditional one-atom-thick 2D graphene sheets. Such 3D graphene materials can be further functionalized by chemical vapor deposition, electrodeposition, and chemical grafting to develop even more advanced materials. The new nanomaterial platform bridges the 2D nanoworld with the 3D macroscopic world of manufacturable products. *CVD Equipment Corporation, 1860 Smithtown Avenue, Ronkonkoma, NY 11779, <http://www.cvdequipment.com>*

Microfluidic system for nanoparticle synthesis

Dolomite has extended its range of system solutions to include a syringe-based nanoparticle system that generates polymeric, metal, and semiconductor nanoparticles from 1 to 100 nm in diameter. The system is suitable for a wide range of applications, including biochemistry, drug delivery, biomolecular sensing, and fiber optics. Built around Dolomite's microfluidic pumps, connectors, and chips, it enables rapid and effective mixing of up to two reagents of 25 μ L–10 mL. Using extra-smooth pumps to deliver the reagents into the mixing region, the system ensures that precipitates of uniformly sized particles are distributed consistently throughout the sample. It operates over a wide flow range from 0.1 μ L/min to 10 mL/min and features a sample injection valve that reduces reagent consumption. An additional thermal control module, which ensures that constant temperatures are maintained throughout an experiment, can be used for targeted heating in biomedical applications. *Dolomite Microfluidics, 29 Albion Place, Charlestown, MA 02129, <http://www.dolomite-microfluidics.com>* ■