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new products

Focus on materials

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

X-ray diffractometer

Agilent Technologies has launched the GV1000 x-ray diffractometer to collect high-quality diffraction data from crystalline samples of biological macromolecules. Macromolecular crystallography provides detailed information about the atomic structure of protein and nucleic acid molecules, the key components of every living organism. It also plays an important role in the discovery of new medicines in the pharmaceutical industry. The GV1000, a single-wavelength system that incorporates novel gradient vacuum technology, features a compact, high-brilliance x-ray source designed to be reliable and simple to service. Combined with Agilent's precision four-circle goniometer and high-performance CCD detectors, the diffractometer can meet the requirements of modern macromolecular crystallography laboratories. *Agilent Technologies Inc, 5301 Stevens Creek Boulevard, Santa Clara, CA 95051, <http://www.agilent.com>*

Nanoelectrical AFM mode

The PeakForce Kelvin probe force microscopy (KPFM) mode for Bruker's line of atomic force microscopes (AFMs) uses frequency-modulation detection to provide high spatial resolution Kelvin probe data. It builds on the company's PeakForce Tapping technology to provide directly correlated quantitative nanomechanical data, which improves the sensitivity of the frequency-modulation measurement and eliminates artifacts. PeakForce KPFM also provides a completely automated parameter setup with Bruker's ScanAsyst. The result is a significant improvement over existing surface potential measurement technologies in obtaining quantitative data for materials research and semiconductor applications. The PeakForce KPFM can be used as an accessory for the company's Dimension Icon and MultiMode 8 AFMs. It includes the complete set of KPFM detection mechanisms (amplitude and

frequency modulation), in conjunction with the tapping mode and PeakForce Tapping, and the ability to perform KPFM measurements over an extended voltage range. *Bruker Nano Surfaces Division, 112 Robin Hill Road, Santa Barbara, CA 93117, <http://www.bruker.com>*

Electromagnet power supply

Lake Shore Cryotronics' model 648 is a fault-tolerant, 10-kW electromagnet power supply optimized for powering large 7- or 10-inch research electromagnets. It is suitable for electromagnet characterization systems used for magneto-optical studies, magnetic hysteresis tests, susceptibility measurements, Hall effect studies, spin magnetic resonance demonstrations, and biological tests. The model 648, intended for use with large electromagnets in high-precision laboratory settings that require low electrical noise,



has a linear design that removes the undesirable higher-frequency noise typical of many other switch-mode power supplies. The low output noise means researchers can obtain greater resolution and finer detail from data taken during high-sensitivity experiments. Eliminating the need for external switching or operator intervention to reverse current polarity, the model 648 uses convenient bipolar, four-quadrant

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operation that provides clean transitions through zero without discontinuities. *Lake Shore Cryotronics Inc, 575 McCorkle Boulevard, Westerville, OH 43082, <http://www.lakeshore.com>*

High-strength epoxy

Master Bond Supreme 10HT epoxy combines high shear and peel strengths with convenient handling. The one-part system eliminates mixing and cures in 60–75 minutes at 250 °F. With a temperature range of 4 K to +400 °F, it can withstand severe cryogenic temperatures and extreme heat. Supreme 10HT offers tensile shear strength in excess of 3600 psi and T-peel strength up to 30 pounds/linear inch. Its flexibility and toughness enable it to resist thermal cycling, mechanical shock, vibration, and stress fatigue cracking. Supreme 10HT can also withstand exposure to various chemicals such as water, oils, fuels, solvents, acids, and bases. According to the company, the cured epoxy is a superior electrical insulator and offers processing advantages. For example, it is storable at room temperature, its viscosity remains constant and will not thicken with time, and its working life is unlimited at room temperature. Supreme 10HT adheres well to metals, glass, ceramics, and many plastics. *Master Bond Inc, 154 Hobart Street, Hackensack, NJ 07601, <http://www.masterbond.com>*

Plasma deposition system

Oxford Instruments has launched its latest etch and deposition tool, the PlasmaPro 100 system, for applications in the MEMS, high-brightness LED, semiconductor electronics, failure analysis, and photovoltaics fields. The system offers improved plasma-enhanced chemical vapor deposition hardware that delivers step changes in the deposition rate of high-quality silicon dioxide and silicon nitride (SiN_x)



with corresponding reductions in cleaning overhead. The latest generation of the Cobra inductively coupled plasma source improves on the etch rate and feature-control capability. A robotic handler optimizes the system's processes, and an enhanced system control infrastructure and software interface deliver improved diagnostics, reliability, and serviceability. *Oxford Instruments Plasma Technology USA, 300 Baker Avenue, Suite 150, Concord, MA 01742, <http://www.oxford-instruments.com>*

Chemical layer deposition system

The VG Scienta OFT Edge series incorporates configurable devices for depositing and analyzing organic and inorganic layers on flexible and solid substrates for system fabrication. The technology provides low-temperature deposition of transparent conductive oxide, metals, and small molecule deposition for organics. An interchangeable

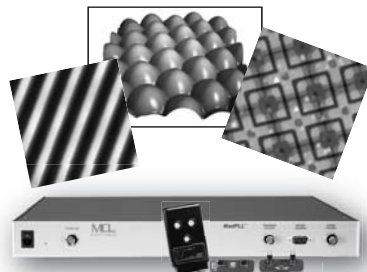


modular construction with a wide selection of deposition and analytical tools can be attached to the system to increase its flexibility. Among those tools are modules for ALD, x-ray and UV photoelectron spectroscopy, scanning tunneling microscopy, IR, and atomic force microscopy. The devices are designed so users can choose both the order and the content of the system to be constructed. Modules within the system can be used as standalone units when combined with a fast entry load lock, or they can be fully integrated into the multipurpose cluster tool in conjunction with a central handler. *VG Scienta Inc, 37A Pleasant Street, Unit 1, Newburyport, MA 01950, <http://www.vgscienta.com>*

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new products

High-resolution SEM

The Verios XHR, the second generation of FEI's XHR scanning electron microscope (SEM) family, provides subnanometer resolution and enhanced contrast for precise measurements on beam-sensitive materials in semiconductor manufacturing and materials science applications. At low kV, where the performance of conventional SEMs degrades significantly, the Verios system's advanced optics deliver excellent sensitivity to surface detail. Users can quickly switch between various operating conditions, maintain sample cleanliness, and obtain subnanometer resolution at any accelerating voltage from 1 to 30 kV. In addition to its high-resolution performance, the Verios introduces new detection technologies. Many beam-sensitive and nonconductive materials can now be accurately observed at the nanoscale, without any preparation. *FEI Company, 5350 Northeast Dawson Creek Drive, Hillsboro, OR 97124, <http://www.fei.com>*

UV-visible achromatic wave plates

Thorlabs has released a new line of achromatic wave plates for use in the 260- to 410-nm range. According to the company, it is one of the first to offer a high-performance wave plate capable of reaching into the UV wavelength range. Achromatic wave plates are constructed from at least two birefringent materials, typically quartz and magnesium fluoride. To manufacture an achromatic wave plate for use into the UV, Thorlabs used a compound plate design of quartz and sapphire. Not only is it manufacturable, but the design also leads to a much wider field of view than other materials because sapphire is a negative uniaxial crystal. In addition, since sapphire is a much harder material than MgF_2 , the new quartz-sapphire wave plates are much more durable and resistant to scratching. *Thorlabs, 56 Sparta Avenue, Newton, NJ 07860, <http://www.thorlabs.com>*

Thermally conductive epoxy

Aremco Products has developed Aremco-Bond 860, a high-temperature, aluminum nitride-filled epoxy system that is electrically insulating. The two-

component, 100% solids epoxy is suitable for bonding and small encapsulation applications to 400 °F. According to the company, Aremco-Bond 860 exhibits excellent adhesion to a variety of high-temperature plastics, such as polyimides and composites, and to ceramics, glass, and high-expansion metals. It is mixed in a ratio of one part base resin to one part activator by weight and cures in 24 hours at room temperature or in 2 hours at 200 °F. After curing, it exhibits a thermal conductivity of 8.5 Btu-in/hr-ft²-°F and a dielectric strength of 250 V/mil. The tensile shear strength is 1375 psi. The system also demonstrates good corrosion protection and thermal shock resistance. Applications include the bonding of heat sinks and fins used in heat exchangers and electrical and electronic assemblies. Aremco-Bond 860 is supplied in pre-measured pint, quart, gallon, and five-gallon kits from stock. *Aremco Products Inc, 707 Executive Boulevard, Valley Cottage, NY 10989, <http://www.aremco.com>*

Multispectral optical filter assembly

New multispectral optical filter assemblies (MOFAs) represent an expansion of Deposition Sciences' optical components line. The company's advanced technology combines individually coated multispectral filter substrates into an array assembly. The assemblies can range from two- to eight-filter stacks, but more can be added.

For more flexibility, the MOFAs can employ a variety of adhesives, including space-qualified ones. The highly durable, complex MOFAs are used in linear- and planar-array CMOS detectors, medical instrumentation, and commercial, government, and aerospace applications. The MOFAs may be customized using various substrate sizes. Numerous complex filters may be combined into one device. Once assembled, the filters provide distinct capabilities on each multispectral array. Deposition Sciences can incorporate stops and apertures on the surfaces of parts by using advanced patterned coating technology. *Deposition Sciences Inc, 3300 Coffey Lane, Santa Rosa, CA 95403, <http://www.depisci.com>* ■

