

Focus on materials, semiconductors, vacuum, and cryogenics

Andreas Mandelis



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NEW PRODUCTS

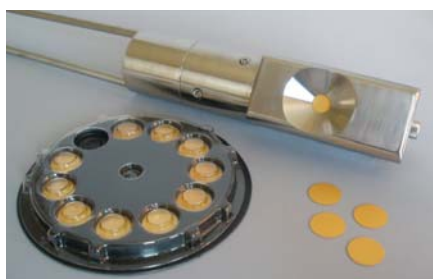
Focus on materials, semiconductors, vacuum, and cryogenics

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 its description. Please send all new product submissions to ptpub@aip.org.

Andreas Mandelis

Quiet, dry vacuum pumps

The HiScroll models from Pfeiffer Vacuum's new range of scroll pumps are oil-free, hermetically sealed vacuum pumps with high nominal pumping speeds of 6–20 m³/h. The compact devices offer quiet, low-vibration operation with less than 47 dB(A) and less than 42 dB(A) in standby mode. The two-stage gas ballast increases the pumps' water vapor tolerance and helps avoid condensation in the vacuum. Active temperature control ensures optimal cooling and the lowest noise emissions in their class, according to Pfeiffer Vacuum. The powerful motor—up to 15% more efficient than conventional drives, the company claims—ensures optimal performance while also keeping temperatures low. The pumps are suitable for many applications in R&D, analytics, biomedicine, and pharmaceuticals. They can be used in mass spectrometry, electron microscopy, surface analysis, accelerators, laboratory applications, the semiconductor industry, coating processes, and gas recovery. **Pfeiffer Vacuum Inc**, 24 Trafalgar Sq, Nashua, NH 03063, www.pfeiffer-vacuum.com



Compact sensor head

With its advanced space-saving design, the Intlvac Multi Crystal Sensor Head can fit through a ConFlat flange measuring 1–2¾ inches. The unit is compatible with existing thin-film deposition controllers from Inficon, Sigma, and Maxtech, which reduces costs. The sensor head can be programmed to operate

fully automated through the input–output port. Necessary crystal changes can be signaled via users' thin-film monitor or controllers; a load option on the sensor controller allows for manual operation. Crystal sensors can be replaced as necessary during a deposition run. The unit is suitable for use in precision organic LED and molecular-beam epitaxy applications. **Intlvac Thin Film Corporation**, 1401 Duff Dr, Unit 600, Fort Collins, CO 80524, <https://intlvac.com>

Water vapor desorption system

The VB series vacuum chamber bakeout package now available from RBD Instruments combines the company's BC-3 controller and IRB-600 shortwave IR emitter. According to RBD, it effectively reduces water vapor in vacuum chambers. Users are able to set the heating power and bakeout time. Additional features include thermocouple feedback to regulate temperature and vacuum interlock feedback to maintain vacuum chamber pressure. The IRB-600 emitter provides 600 W of IR power in a small form factor. The BC-3 controller can drive up to two IRB-600 emitters or heating tapes. The VB series is easy to operate and a safe alternative to the Variac controllers, which are no longer allowed in many government laboratories. **RBD Instruments Inc**, 2437 NE Twin Knolls Dr, Ste 2, Bend, OR 97701, www.rbdinstruments.com



Superconducting magnet system with diamond windows

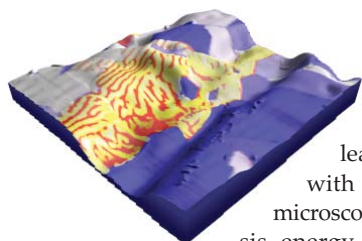
Cryomagnetics' C-Mag Vari-7S-Optical, a 7-tesla split-pair superconducting magnet system, is cryogen-free: A Sumitomo 1.0 W single-pulse tube cryocooler conductively cools the magnet, the cryostat, and a secondary closed-loop helium circuit used to control the sample temperature. Optical access—both axial and perpendicular to the magnetic axis—features diamond windows for measuring over a wide spectral range. A bottom-mounted window allows for access to the z-axis. The system features an f2.4 axial and an f3.1 perpendicular optical path, a 38 mm i.d. sample space less than 1.6–300 K, and ±0.3% homogeneity over 1 cm diameter of spherical volume. The cryostat cradle is designed for precision alignment on optical tables. **Cryomagnetics Inc**, 1006 Alvin Weinberg Dr, Oak Ridge, TN 37830, www.cryomagnetics.com



12 December 2024 11:11:18

Turbomolecular pumps

Edwards has launched two larger variants of its nEXT mechanical turbomolecular pump range: the nEXT730 and nEXT930, with pumping speeds over 700 l/s and 900 l/s for nitrogen. They are designed to make the range suitable for new applications, including specialty coating, heat treatment, furnaces, electron-beam welding, ion implantation, degassing, and cylinder evacuation. The pumps are rated IP54 as standard to further support those applications. According to the company, the nEXT730 and nEXT930 pumps offer improved performance and cycle times and reduced operational pressures. They function in any orientation and are easy to install because of their compact design and integrated controller. Their compatibility with Edwards TIC and TAG controllers and Support PC software for monitoring, configuration, and control facilitates their integration into new or existing vacuum systems. *Edwards Ltd, Innovation Dr, Burgess Hill, West Sussex, RH15 9TW, UK, www.edwardsvacuum.com*

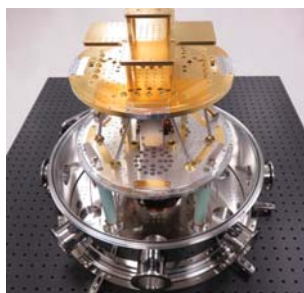


Software for correlative imaging

Oxford Instruments Asylum Research has released its Relate software for correlative imaging with Asylum Research's electron and atomic force microscopes (AFMs) and Oxford Instruments' NanoAnalysis energy-dispersive-spectroscopy (EDS) and electron-backscatter-diffraction (EBSD) detectors. According to the company, the software simplifies the correlation, visualization, and analysis of the numerous image data types generated by those techniques. It uses the combined information they provide for applications in semiconductors, metallurgy, energy storage, and generation materials. The Relate software works by importing data files in the native formats used by the AFMs and the EDS and EBSD detectors. It lets users correlate data from the same region of interest and prepare composite 2D and 3D images. Unlike simplistic image overlays, Relate maintains the underlying data structure of each layer, which enables not just visualization but true quantitative analysis of the combined data sets. *Oxford Instruments America Inc, 300 Baker Ave, Ste 150, Concord, MA 01742, www.oxinst.com*

Low-vibration cryogenic probe station

According to High Precision Devices, its cryogen-free model 125 probe station can test silicon chips at 4 K. It does so by combining the benefits of low-vibration, liquid-helium dip probes and cryogen-free systems that rarely achieve such low temperatures when used alone. When using electrical probes to test chip samples, it is important to reduce vibration levels between the probe and the device under test. The model 125 does that by mechanically isolating the experimental space and insulating it from the cryocooler's impulses. The probe station can be configured to host either individual chips or whole wafers. Other options include translations up to the full diameter of the wafer, window shutters, coaxial cables, and sample magnets. Its low vibration level makes the model 125 suitable for scanning probe microscopy research, including SQUID studies and atomic force and scanning tunneling microscopy, and for superconducting logic functions, metrology, and quantum sensing and communication. *High Precision Devices Inc, 4601 Nautilus Ct S, Ste 100, Boulder, CO 80301, <https://hpd-online.com>*



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Recirculating Cryocooler Eliminates the use of LHe for 'Wet' Systems



Existing LHe-cooled cryostats and probe stations can be converted to cryogen-free operation with the addition of an external cryocooler, the Janis recirculating gas cryocooler (RGC4). Instead of using LHe from a storage vessel, the RGC4 delivers a stream of 4 K helium to the cryostat or probe station.

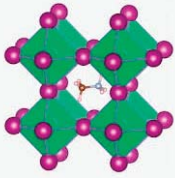
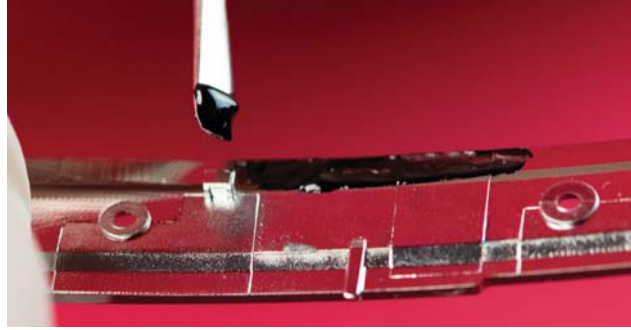
Contact Janis today for more information.

Contact us today:
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NEW PRODUCTS

Medical-grade epoxy

Master Bond's EP42HT-4AOMed Black two-part epoxy offers thermal conductivity and electrical insulation. Created for medical-device manufacturing, it is biocompatible and noncytotoxic, passes USP class VI and ISO 10993-5 certifications, and withstands aggressive chemical sterilants, radiation, and repeated cycles of autoclaving. EP42HT-4AOMed Black offers cryogenic serviceability and heat resistance. It has a service temperature range of 4–477.6 K, thermal conductivity of 1.30–1.44 W/m·K, and volume resistivity greater than 10^{14} Ω -cm. A filler in the epoxy system contributes to its high strength profile and dimensional stability. Once mixed, it has good flow properties and is suitable for bonding, sealing, and coating applications. It bonds well to metals, composites, glass, ceramics, rubbers, and plastics. The epoxy can cure at room temperature, but the process can be sped up through the application of heat. **Master Bond Inc**, 154 Hobart St, Hackensack, NJ 07601-3922, www.masterbond.com



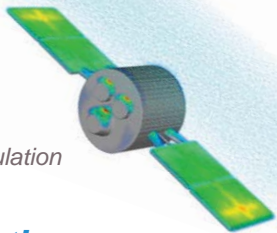
Perovskites for optoelectronic applications

Goodfellow now offers a new range of perovskites, a group of materials that, according to the company, demonstrate excellent potential for optoelectronic applications. Many perovskites occur as oxides (ABO_3), where A and B are typically metal cations. Due to their lattice structures, those materials are characterized by properties such as superconductivity, magnetoresistance, piezoelectricity, and dielectric and pyroelectric behavior. They are therefore good candidates for multilayer capacitors, including fuel cells, solar cells, sensors, and electric batteries. They may also be suitable for use in next-generation display screens, LEDs, memory devices such as RAM, and high-temperature superconductors. Goodfellow's perovskite range includes powder and solid forms of barium titanate, bismuth aluminate, bismuth titanium oxide, calcium titanate, copper tungsten oxide, lithium titanate, lead titanium oxide, lanthanum titanate, and samarium ferrite. **Goodfellow Corporation**, 125 Hookstown Grade Rd, Coraopolis, PA 15108, www.goodfellow.com

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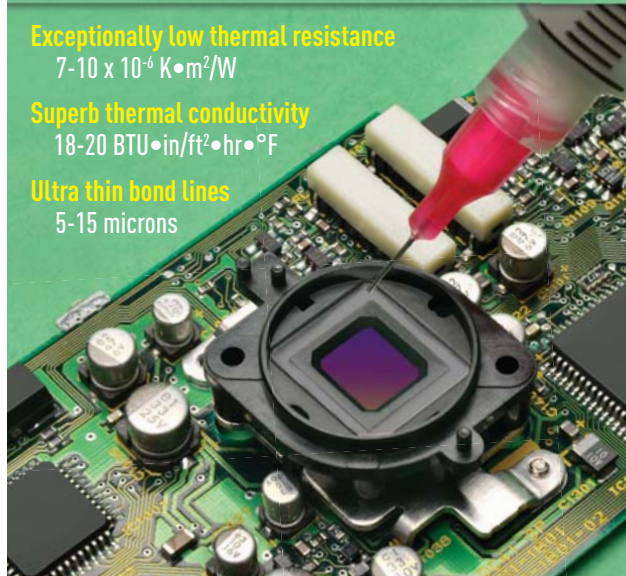
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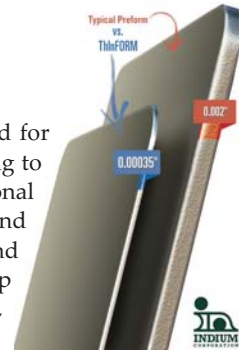
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Ultrathin gold-tin preform

Indium has expanded its portfolio of precision preforms with an ultrathin gold-tin layer designed for semiconductor-laser manufacturing where thermal management has become a challenge. According to the company, the AuLTRA ThInFORMS, which are just 8.89 μm thick, improve the overall operational efficiency of high-output lasers by helping to combat common issues such as poor thermal transfer and shorting. The ultrathin preform reduces bond-line thickness and thus improves thermal transfer and increases the longevity and performance of the device. Reduced solder volume inhibits wicking up the die and minimizes the risk of shorting. **Indium Corporation**, 34 Robinson Rd, Clinton, NY 13323, www.indium.com



Cost-effective EBSD detector

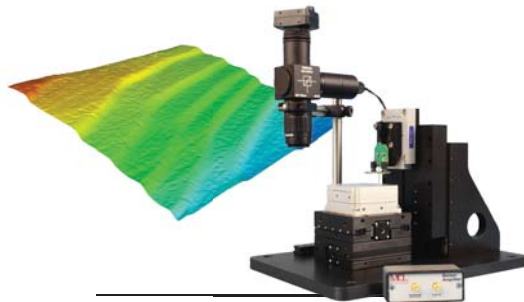
Bruker claims that its new e-Flash XS is the first electron backscatter diffraction (EBSD) detector to enable the characterization of the microstructure of crystalline materials in tabletop and other small, entry-level scanning electron microscopes (SEMs) in research and industry. The e-Flash XS is the smallest and lightest EBSD detector currently available, but it offers excellent performance, according to the company. That makes the instrument suitable for routine EBSD analysis in applications that do not require the use of high-end field-emission SEMs. The e-Flash XS is powered by a state-of-the-art CMOS camera with 720 \times 540 pixels of native resolution. Coupled with an innovative optical system

for maximum light transmission and a high-performance, user-replaceable phosphor screen, the camera can acquire patterns at a speed of up to 525 fps even at moderate electron probe currents. **Bruker Nano Inc**, 5465 East Cheryl Pkwy, Madison, WI 53711, www.bruker.com

MCL

MAD CITY LABS INC.

High Resolution AFM and NSOM

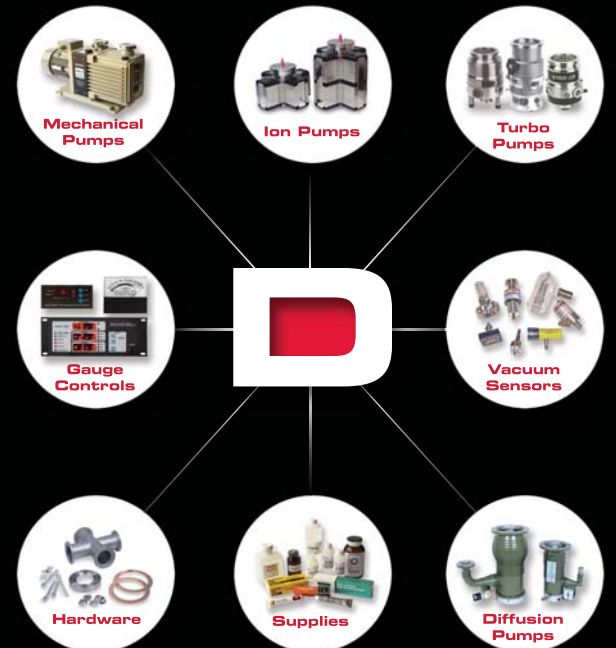


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Laser particle sizer



With an extra-wide measuring range of 0.01–3800 μm , the Analysette 22 NeXT Nano from Fritsch performs automatic particle size analysis down to the nanoscale. According to the company, it offers high precision and sensitivity for the smallest particles. It is compact and solid, has few moving parts, and is low maintenance. The Analysette 22 NeXT Nano operates with only one laser and does not need an additional light source, even for backward scattering. The entire measuring range is recorded with one scan; most measurements take less than a minute, including a reliably residue-free cleaning. The analyzer is suitable for measuring particle size distribution of sus-

pensions in R&D, production and quality control, and controlling manufacturing processes. *Fritsch GmbH—Milling and Sizing, Industriestrasse 8, 55743 Idar-Oberstein, Germany, www.fritsch-international.com*



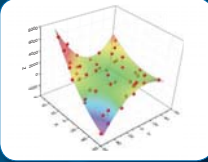
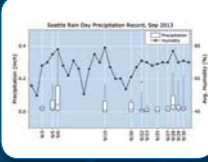
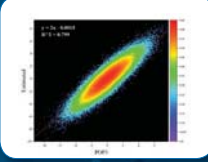
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Semiconductor leak testing

Inficon has unveiled the latest generation of its leak detectors for checking complex, ultraclean vacuum units. With the UL3000 Fab Ultra, the company has refined the detector to adhere to the special requirements of equipment used to manufacture semiconductor chips, solar cells, and flat-panel displays; of glass and plastic foil coating; and of vacuum process equipment. The UL3000 Fab Ultra is slim, mobile, robust, and intuitive to operate. It uses the vacuum method with helium as the tracer gas in order to safely detect the smallest leaks. A high-performance, low-maintenance roots pump replaces the scroll pump used in previous models. The efficient roughing pump allows the UL3000 Fab Ultra to more quickly evacuate production equipment being tested—especially when it is very large—and thereby reduce downtime in facilities. The detector can identify leak rates of down to 5×10^{-12} mbar·l/s when testing the vacuum in wafer chambers. *Inficon, 2 Technology Pl, East Syracuse, NY 13057, www.inficon.com* PT

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