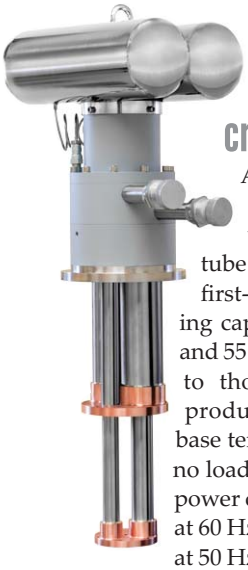
NEW PRODUCTS

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 the product description. For all new products submissions, please send to Rnanna@aip.org.

Andreas Mandelis



Pulse tube cryorefrigerator

According to Cryomech, its model PT420 is the world's largest 4 K pulse tube cryorefrigerator and its first- and second-stage cooling capacities—2.0 W at 4.2 K and 55 W at 45 K—are superior to those of other available products. The PT420 has a base temperature of 2.8 K with no load, and it has steady-state power consumption of 12.5 kW at 60 Hz operation and 11.4 kW at 50 Hz. Its CPA1114 compressor package is available as water cooled only. Like the company's other pulse tube cryorefrigerators, the PT420 is available with a remote motor option for vibration-sensitive applications; has an extended mean time between maintenance, compared with Gifford–McMahon cryorefrigerators; and is fully customizable. ***Cryomech Inc,*** *113 Falso Dr, Syracuse, NY 13211, www.cryomech.com*

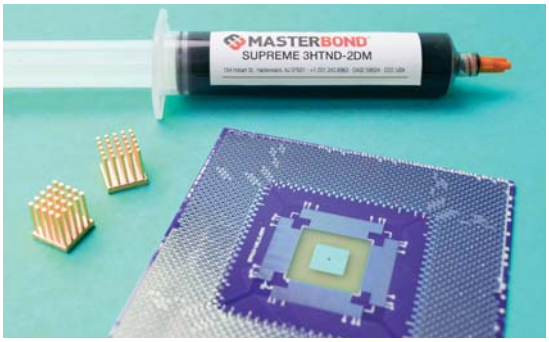
Ultrasmall portable device pump

The diminutive KNF NMP 03 micro-diaphragm gas-sampling pump starts at 11 g and measures 12.9 mm wide and 24.2 mm long. According to KNF, it delivers consistent, linear transfer from a few milliliters to 500 ml/min and offers a long service life, high efficiency, leak tightness, and quiet, low-vibration operation. It is suitable for handheld battery-operated applications. Typical portable applications include emissions measurement and gas analyzers, ion-mobility spectrometry (trace detection), drugs and explosives detection, and handheld pipetting and dosing. With an environmental and gas operating temperature range of –20 °C to 60 °C, the NMP 03 can be used outdoors and in applications involving hot or cold gases. Five standard motors are offered to balance controllability, lifetime, and cost. ***KNF Neuberger Inc,*** *2 Black Forest Rd, Trenton, NJ 08691-1810, www.knfusa.com*

Low-temperature scanning probe microscope

The Infinity closed-cycle UHV scanning probe microscope (SPM) from Sigma Surface Science and its partner Mantis Deposition is a next-generation cryostat that is cryogen free. It is designed for high-resolution scanning tunneling microscopy, qPlus atomic force microscopy, and spectroscopy experiments that have a low-temperature range between 10 K and 300 K. The renewable cryostat has no moving parts in the company's Tribus SPM cold head; a novel pulse tube cooler located in a separate high-vacuum chamber cools the microscope. Because it does not need liquid helium or nitrogen, the Infinity is simple and safe to use. It can stay cold for several months and does not need to be serviced often. It features 3D coarse motion, high intrinsic stability, and easy tip and sample exchange. The sensitive SPM is mounted in a dedicated UHV chamber with ports for sample transfer, optical access, and evaporators. ***Mantis-Sigma,*** *10200 E Girard Ave, Bldg A, Ste 300, Denver, CO 80231, www.sigma-surface-science.com*

Epoxy for specialty encapsulation



Master Bond Supreme 3HTND-2DM is a rapid-curing, toughened, one-part epoxy used for the dam-and-fill method of chip-on-board encapsulation. The material is dispensed around the area to be encapsulated, cures in place, and in essence forms a dam. An encapsulating material is then applied to cover the remaining area to be protected. Supreme 3HTND-2DM passes ASTM E595 specifications for NASA low outgassing and can be used in vacuum, aerospace, electro-optic, and related applications. It bonds well to various substrates used in electronics, including silicon and other semiconductors, metals, ceramics, and many plastics. It has a tensile strength of 6000–7500 psi at room temperature, resists rigorous thermal cycling, and is a reliable electrical insulator. The epoxy withstands exposure to water and chemicals such as acids, bases, fuels, and some common solvents. It cures at 250 °F in 20–30 min or at 300 °F in 5–10 min and is serviceable from –73 °C to 204 °C. ***Master Bond Inc,*** *154 Hobart St, Hackensack, NJ 07601, www.masterbond.com*

Multiscale imaging system

The HeliScan MicroCT from Thermo Fisher Scientific is a multiscale system that provides large-scale, high-fidelity 3D images of samples. It allows materials scientists to nondestructively visualize and characterize internal structure down to the micrometer scale. According to the company, unlike a conventional circular scan, the helical scan enables fast, artifact-free imaging, even on challenging high-aspect-ratio samples. It can give users insight into the internal structure of large, dense samples and eliminates the need to stitch circular sections together. HeliScan features proprietary dynamic autofocus and drift-correction capabilities. It is suitable for imaging various types and sizes of samples, such as fiber-reinforced and other polymers; carbon, metals, and manufactured parts such as batteries; and life-sciences samples such as bone, tissue, plants, and insects. ***Thermo Fisher Scientific Inc,*** *168 Third Ave, Waltham, MA 02451, www.thermofisher.com*

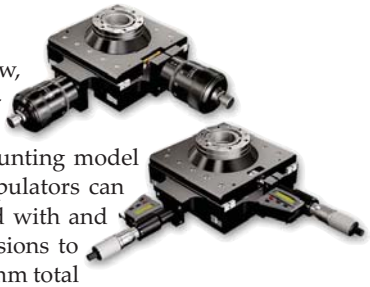
Triple mirror coatings

Laser Components offers triple mirrors that reflect three wavelengths and can be used in, for example, neodymium-doped yttrium aluminum garnet laser systems that emit at the fundamental wavelength—1064 nm—and at higher harmonics at 532 nm and 355 nm. Wavelengths can be individually chosen from many combinations. The company has developed a new coating process for triple mirrors that makes it possible to apply the complex layer designs in one pass, especially in combination with an ion-assisted deposition or ion-beam sputter coating. Those ion-supported technologies allow an exact and reproducible result that is faster and more precise than previous complex methods involving two passes, according to Laser Components. ***Laser Components USA Inc,*** *116 S River Rd, Bldg C, Bedford, NH 03110, www.lasercomponents.com*

Magnetically coupled rotary vane pump

Pfeiffer Vacuum's Duo 11 ATEX rotary vane pump is designed to meet the requirements of ATEX directive 2014/34/EU, which covers equipment used in processes that take place in potentially explosive atmospheres or that convey explosive gases and vapors. It is equipped with a frictionless magnetic coupling that eliminates the need for the shaft seal rings used with other rotary vane pumps. Thus media inside the new pump cannot escape through faulty shaft seal rings. The Duo 11 ATEX can be used with many types of applications that need explosion-proof equipment, including gas filling machines that are vulnerable to a risk of explosion and hazardous gas atmospheres that can be present in research experiments, industrial processes, biotechnology, and chemistry laboratories. It offers a pumping speed of 9 m^3/h at 50 Hz and 10.5 m^3/h at 60 Hz. It can convey all gases up through explosion group IIC. ***Pfeiffer Vacuum Inc,*** *24 Trafalgar Sq, Nashua, NH 03063-1988, www.pfeiffer-vacuum.com*

Micrometer-driven *x-y*-axis manipulator



Huntington Mechanical Labs has made available a new, larger version of its micrometer-driven *x-y*-axis manipulator. Standard versions of the company's TS-series now include a larger 4.5-inch ConFlat (CF) flange mounting model and its existing 2.75-inch CF flange model. The manipulators can also be supplied without flanges, and both are offered with and without bellows. They are available in motorized versions to allow greater flexibility in operation, and they offer 25 mm total axis movement along both the *x*- and *y*-axes. The company's technical support specialists can help users choose between a single and multiaxis encoder and select a cable set. Applications include conducting research, developing products, and testing devices in extreme environments on Earth or in space. ***Huntington Mechanical Laboratories Inc,*** *13355 Nevada City Ave, Grass Valley, CA 95945, https://huntvac.com*

Apparatus for metallic coating of optical fibers

Intlvac now offers a compact, automated fiber-coating machine for low-temperature deposition of low-stress, thin metal films and multilayers. The optical fiber metalizer is a dedicated production coating tool for metallization of optical fibers that are used in hermetically sealed optoelectric packages. Because of its low-temperature deposition, the machine does not damage the fibers. Designed for a small clean-room footprint, the system cleans the optical fiber and then applies a series of sequential coatings to it. The coatings consist of a metal film stack of titanium-platinum-gold and titanium-copper-nickel. According to Intlvac, the machine produces circumferentially uniform coating for accurate fiber alignment, and the atomic oxygen preclean produces excellent adhesion strength. With its load-lock design, the metalizer can coat jacketed and connectorized components. ***Intlvac Thin Film Corporation,*** *1401 Duff Dr, Unit 600, Fort Collins, CO 80524, www.intlvac.com*

Broadband pulsed light system

According to Xenon, its X-1100 high-intensity pulsed light system is the first benchtop tool for scientists and engineers who require rapid photonic exposure to characterize optical processes for fundamental and applied R&D. The flexible, economic system, which has a small footprint, delivers up to 9 J/cm^2 in 7 ms and offers a broadband spectrum of light from UV to visible to IR. Photonic curing, sterilization, and sintering applications may benefit from the intense light from the X-1100, which plugs into a standard 115 V or 220 V outlet. The system can calculate the theoretical energy set by a user and measure the actual pulse with a built-in oscilloscope. Sequences of pulses with varying on and off times can be created to enable complex energy-delivery schemes. The instrument stores and recalls numerous protocols, has a built-in diagnostic feature, and is available with accessories such as optical lamp housings and sample chambers. ***Xenon Corporation,*** *37 Upton Dr, Wilmington, MA 01887, www.xenoncorp.com*

Thin-film deposition platform

Kurt J. Lesker has enhanced its PVD 75 Pro Line thin-film deposition system platform used in magnetron sputtering, electron-beam evaporation, and thermal evaporation applications. The original Pro Line PVD 75, which features a modular chamber that allows multiple techniques to be used in the same process chamber, is still available. But the company has redesigned the 2017 model so users can configure the system to meet their unique requirements. They can select from many standard options, including high-power impulse magnetron and pulsed DC sputtering, high-temperature heating up to 100 °C, ion-assisted deposition, zero-footprint clean-room installation, a glove-box interface, and "smart" system monitoring and control. ***Kurt J. Lesker Company,*** *1925 Rte 51, Jefferson Hills, PA 15025, www.lesker.com*

Metrology systems for IC technologies

KLA-Tencor has introduced four metrology systems for developing and manufacturing sub-10 nm IC devices. They generate data that help the company's 5D patterning control solution better support techniques such as self-aligned quadruple patterning and extreme UV lithography. New optics and measurement targets in the Archer 600 overlay metrology system help chipmakers achieve a sub-3 nm overlay error for advanced logic and memory devices. The WaferSight PWG2 patterned wafer geometry measurement system produces data on wafer stress and shape uniformity and enables process tool monitoring and matching for film deposition, anneal, etch, and other modules. The SpectraShape 10 K optical-based metrology system measures the critical dimensions and 3D shapes of IC device structures after etch, chemical mechanical planarization, and other process steps. The SensArray HighTemp 4 mm *in situ* temperature measurement system provides temporal and spatial temperature information for advanced films processes. ***KLA-Tencor Corporation,*** *1 Technology Dr, Milpitas, CA 95035, www.kla-tencor.com*

Research kit for gold soldering

Indium Corp has released a solder research kit designed to use indium-based alloys for soldering to gold plating. Gold is often used in electronics assembly because it resists oxidation and solders readily, which makes it suitable for plating contact surfaces for switches and connectors. Tin-based solder alloys rapidly scavenge or dissolve the gold during the reflow process and lead to the destruction of gold conduction patterns. They also result in crack-inducing platelets in the solidified solder joint. According to the company, indium-based alloys, especially those in the indium–lead family, cause appreciably less gold scavenging damage than tin–lead solders. The research kit lets users choose three alloys from the seven offered. The alloys come in the form of 0.76 mm solid-core wire and have melting temperatures from 143 °C to 310 °C. The kit also features two compatible fluxes. ***Indium Corporation,*** *34 Robinson Rd, Clinton, NY 13323, www.indium.com* PT