

NEW PRODUCTS

Focus on cryogenics, vacuum, materials, and semiconductors

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



Large two-stage pulse tube cryocooler

Cryomech has announced the PT425 pulse tube cryocooler, an improved, more powerful version of its PT420. According to the company, the PT425 is the largest two-stage pulse tube cryocooler available. The PT425 offers a dual performance of 2.5 W at 4.2 K and 55 W at 45 K on an integrated motor platform. It operates with the same user interface and within the same physical footprint as the PT420 model but allows users to achieve more refrigeration (cooling power) at 4.2 K; the PT420 provides 2 W at that temperature. Featuring a base temperature of 2.8 K and a cool-down time of 60 min to 4.2 K, the PT425 operates in an ambient temperature range of 7 °C to 38 °C. **Cryomech Inc.**, 6682 Moore Rd, Syracuse, NY 13211, www.cryomech.com

Helium liquefiers

Quantum Design has added new features to its NexGen helium liquefiers and enhanced their mobility and performance. In addition to the standard 160 L model, the apparatus is now available in a 250 L dewar for users who prefer larger transfers. The NexGen's high liquefaction rates are now attained at 1 psig, so helium is always ready to transfer. A newly designed purifier offers the same high performance in a smaller size, and optional variable-speed compressors provide energy efficiency and longer cold-head life. New simplified software with an intuitive user interface makes operation more straightforward. **Quantum Design**, 10307 Pacific Center Ct, San Diego, CA 92121, www.qdusa.com



Low-vibration turbopump

According to Pfeiffer Vacuum, the advanced Laser Balancing system in the new HiPace 80 Neo reduces vibration and noise emissions from turbopump rotors and extends the turbopump's life before service. To ensure reliability, the turbopump has integrated sensors and a robust hybrid bearing design that combines an oil-lubricated ceramic ball bearing on the fore-vacuum side and permanently magnetic radial bearings on the high-vacuum side. A new high-performance lubricant protects the turbopump from excessive heat and extends its expected life span. A rotor temperature measurement system ensures optimal performance. The smart system features micro-USB interfaces with automatic accessory recognition. The light, compact HiPace 80 Neo can be integrated into portable and mobile systems. Applications for the vacuum pump range from mass spectrometry and electron microscopy to residual gas analyzer systems and leak detectors. **Pfeiffer Vacuum Inc.**, 24 Trafalgar Sq, Nashua, NH 03063, www.pfeiffer-vacuum.com



Compact vacuum transducer with USB connection

Thyracont now offers a compact vacuum transducer, the VSRUSB, with a piezo or Pirani sensor and a USB-C connection. The communication interface increases the transducer's flexibility and enables fast, easy interconnection to other portable devices. Sensors can operate while the vacuum process is running. Common computers and Android smartphones can display the measured vacuum quickly and precisely during process monitoring; no separate power supply is required. The company's intuitive VacuGraph software, which is available for various operating systems, allows users to easily monitor the VSRUSB and perform such functions as digitally readjusting the device to atmospheric or zero pressure. To support the visualization of measurements on smartphones and tablets, the software is supplemented by the VacuSniff Android app. **Thyracont Vacuum Instruments GmbH**, Max-Emanuel-Str 10, 94036 Passau, Germany, <https://thyracont-vacuum.com>



Silicone adhesive with high strength

MasterSil 153AO from Master Bond is an addition-cured two-part silicone adhesive with an unusually high tensile lap-shear strength of 700–800 psi. Though not considered a structural adhesive, MasterSil 153AO delivers a combination of flexibility and strength that other silicone adhesives do not provide, according to the company. The system is thermally conductive and electrically insulating and functions over the temperature range of -65°F to 400°F . MasterSil 153AO cures with the addition of moderate heat. After its components are mixed, it retains its smooth paste consistency and minimal flow and has a long working life of 4–6 h for a 100 g mass at 75°F . The white-colored compound bonds well to various substrates, including metals, glass, ceramics, many plastics, and silicone rubbers. MasterSil 153AO is generically low outgassing, contains no solvents, and is compliant with the Restriction of Hazardous Substances directive. **Master Bond Inc**, 154 Hobart St, Hackensack, NJ 07601-3922, www.masterbond.com



Sensitive Pirani gauges

The Thermovac TTR-RN series of robust, compact filament Pirani gauges from Leybold can reliably measure and control the vacuum level to ensure high efficiency in analytical applications and industrial processes. At the series' core is Leybold's new filament technology, which increases the sensitivity and thus the accuracy of measurements. The gauges are suitable for vacuum applications

that require a measurement range from atmosphere to 1×10^{-4} mbar (7.5×10^{-5} torr). For standard processes, the Thermovac TTR-RN series has a tungsten filament; a corrosion-resistant platinum variant is available for harsher process applications. To further increase reliability, a filter is integrated into the flange to block particles that would otherwise damage the filament. The new filament technology is coupled with high-end electronics and interfaces, including a bright light ring that immediately indicates the pressure range locally. **Leybold GmbH**, Bonner Str 498, 50968 Cologne, Germany, www.leybold.com

Streamlined cryogenic platform

Montana Instruments has released its CryoCore cryogenic platform for high-throughput electrical and optical materials characterization. The streamlined version of Montana's standard technology is geared toward users performing quantum materials research who want to work at low temperatures but are not experts in cryogenics or cannot afford complex cryogenic systems. The cost-effective CryoCore platform provides cryogen-free operation, vibration-optimized tabletop mounting, and direct sample and optical access. It includes a touchscreen user interface and the control electronics, vacuum pumps, and monitoring systems required to automate the temperature control across the entire 4.9–350 K range. To accommodate multiple optical and electrical measurements, it provides five window ports, 12 low-frequency DC lines, and two high-frequency RF coax lines. The CryoCore is suitable for use in early-stage materials development, quantum device testing, and training in undergraduate teaching laboratories. **Montana Instruments Corporation**, 101 Evergreen Dr, Bozeman, MT 59715, www.montanainstruments.com



FLUXGATE MAGNETOMETERS

Mag-13 Three-axis Magnetic Field Sensors



- Low noise option at $<6\text{pTrms}/\sqrt{\text{Hz}}$ at 1Hz
- Measuring ranges from ± 60 to $\pm 1000\mu\text{T}$
- Bandwidth of DC to 3kHz

CryoMag Three-axis Magnetometers



- Operating temperature down to 2K
- Measuring ranges from ± 70 to $\pm 500\mu\text{T}$
- Noise level down to $<20\text{pTrms}/\sqrt{\text{Hz}}$ at 1Hz

CryoMag-IE Independent Element version coming soon

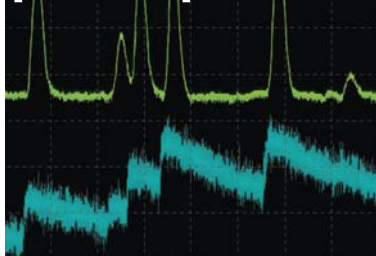
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product specifications and application notes at:

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Spreading resistance profiler

Semilab's latest spreading resistance profiling system, SRP-2100i, features the standard SRP technique, which can be combined with the optional point-contact current-voltage (PCIV) method. SRP-2100i characterizes layer structures and junction locations and monitors a wide depth-profile range of resistivities and defects at or below the surface of various compound semiconductors. Specifically for silicon structures, the well-established dual-probe method determines resistivity and electrically active carrier-density profiles. Thin layers can be measured with the company's Shallow Layer Measurement option. The system can be used to conduct failure analysis of fabrication processes and doping operations, including epitaxial growth, ion implantation, and diffusion. It is suitable for R&D and for manufacturers of silicon, compound semiconductors, silicon-on-insulator wafers, and power devices. **Semilab USA LLC**, 12415 Telecom Dr, Tampa, FL 33637, <https://semilab.com>



Maskless lithography system with UV light

Microlight3D has unveiled its SmartPrint UV (SP-UV) maskless lithography system equipped with a UV light source. It is suitable for application fields that require surface micropatterning, such as microfluidics, biotechnologies, and microelectronics. The new 385 nm LED source means the SP-UV system is compatible with a wide range of microelectronic photoresist materials for semiconductor processing. Those include i-line resist SU-8, which is indispensable

for microfluidics applications. SP-UV's optical projection technology gives users access to four different writing resolutions and combines writing precision with a writing speed up to 1000 mm²/min. According to the company, that speed is twice as fast as that of competing brands at 6 μm resolution and up to 10 times as fast at 15 μm. Resolution can be changed within 2 s using Microlight3D's quick-release objective system. The SP-UV's objective lens range allows for a long working distance up to 3 cm. It can therefore be used with nonstandard substrates, including those that are flexible, thick, and curved, such as optical lenses. **Microlight3D**, 5 Ave du Grand Sablon, 38700 La Tronche, France, www.microlight.fr

Temperature-controlled optical profilometry

Linkam and Sensofar have partnered to develop a technique for characterizing the temperature-induced topographical evolution of nanoscale materials. The technique uses Sensofar's S neox 3D optical profiler and Linnik interferometer coupled with Linkam's LTS420 heating and freezing stage. Due to imaging issues caused by changes in spherical aberration with temperature of the front lens of the objective and the quartz window of the LTS420 stage, it has been difficult to conduct temperature-controlled optical profilometry experiments. With temperatures up to 380 °C, the new combination resolves spherical aberration issues and enables the user to accurately measure 3D topographic profiles of silicon wafers as they evolve. Mapping the changes in roughness and waviness of silicon wafers yields critical information that can help producers and users optimize their processes and improve semiconductor properties and wafer durability. **Linkam Scientific Instruments Ltd**, Unit 8, Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey, KT20 5LR, UK, www.linkam.co.uk



IT'S ALWAYS SAFER TO HAVE BACKUP

KNF LeakTight gas pumps offer ultra-low leak rates of 6×10^{-9} mbar l/s and include a safety back-up diaphragm to prevent leakage even in the event of failure. Optional O-rings and seals are available for added protection against air intrusion.

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Large-diameter ceramic break

The addition of a large-diameter ceramic break expands MDC Precision's line of vacuum breaks for use in demanding UHV environments. Also known as electrical isolators, vacuum breaks are composed of metal adapters brazed to each end of a ceramic tube that isolate the charge and voltage between the conductive metal ends. The electrical break between the vacuum chamber and other external parts protects the vacuum system's sensitive components from electrostatic discharge. MDC's new large vacuum break is constructed using high-purity alumina ceramic insulators hermetically bonded to low-expansion metal Kovar sleeve adapters. It operates in a UHV range of 1.0×10^{-10} Torr and in temperatures from -100°C to 450°C and features a 298.4 mm inner diameter to maximize flow, enhance seal joint integrity, and ensure high hermeticity and performance. The ceramic breaks are suitable for use in fusion energy, particle accelerators, and research equipment. **MDC Precision Products LLC**, 30962 Santana St, Hayward, CA 94544, www.mdcprecision.com



Compact Pirani gauge series

Edwards designed its APG200 series of high-performance Pirani gauges to be both reliable and compact. Using electronics developed in-house, Edwards maximized the filament length, which increased sensitivity and reduced the overall package size. Also offered are filament material options for corrosive environments, with measurement from atmosphere to 5×10^{-4} mbar (M or MP series) or 1×10^{-4} mbar (LC series). More flange types and outputs are available than with the previous APG100 series; the expanded flexibility allows for easy integration into existing systems without software and hardware updates. A range of upgrades and feature enhancements make the APG200 suitable for all vacuum markets. Analytical instrument users can take advantage of the reduced size and flexible outputs; in the semiconductor field, new interfaces and light rings enable better system maintenance. In R&D, the local pressure indication helps users monitor experiments away from the main interfaces. **Edwards Ltd**, Innovation Dr, Burgess Hill, West Sussex, RH15 9TW, UK, www.edwardsvacuum.com

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PT

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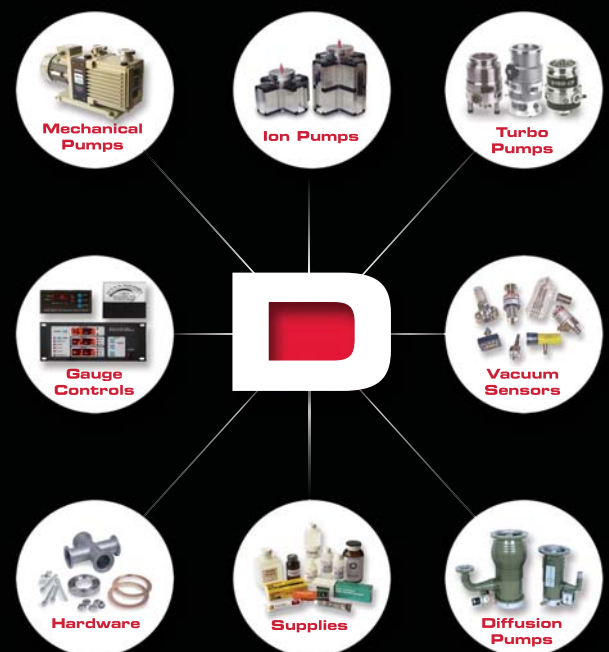


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