

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

Contact resonance viscoelastic mapping

The contact resonance (CR) viscoelastic mapping mode is an option Asylum Research now offers exclusively for its Cypher and MFP-3D atomic force microscopes. Some other nanomechanical imaging techniques measure only the elastic modulus of materials, not the loss modulus. However, both the elastic and dissipative responses are critical to the performance of many modern materials. CR enables high-resolution, quantitative imaging of both elastic storage and viscoelastic loss moduli. The technique is suitable for characterizing moderate- to high-modulus materials—composites, thin films, biomaterials, polymer blends, and even ceramics and metals—in the range of about 1 GPa to 200 GPa. According to Asylum, its hardware and software developments have made CR imaging faster, more quantitative, simpler to use, and applicable to a wider range of materials. *Asylum Research, 6310 Hollister Avenue, Santa Barbara, CA 93117, <http://www.asylumresearch.com>*

Fused-silica melting vessels

Excellent thermal and chemical stability make fused silica a popular choice of melting vessel material, so it can be used with materials that may be subject to rapid temperature changes during processing. However, some manufacturing methods can yield inconsistent vessels, which can result in a reduced vessel lifetime or failure during the



melting process. To overcome those shortcomings, Goodfellow molds its high-purity, fused-silica melting vessels. Features include seamless one-piece construction of fully dense material; a uniform microstructure with isotropic properties; and a nonporous, unreactive internal surface to easily remove melted material. Goodfellow offers the vessels in a wide range of sizes and capacities. Shapes include square, cylindrical, and rectangular. *Goodfellow Corporation, 125 Hookstown Grade Road, Coraopolis, PA 15108-9302, <http://www.goodfellow-ceramics.com>*

Thermally conductive flame-retardant epoxy

A two-part silicone system, Master Bond's MasterSil 156 is addition cured and does not require exposure to air for complete cross-linking. It has a convenient one-to-one mix ratio by weight and



will not outgas while curing. Formulated for potting, encapsulation, and sealing applications, MasterSil 156 is a good electrical insulator with a low viscosity that can cure in sections beyond 2.5–5 cm thick. It is thermally conductive, and Underwriters Laboratories has temperature rated it to 105 °C in thicknesses 0.64 cm or larger. Its flexibility allows it to withstand aggressive thermal cycling and resist vibration and shock. It is resistant to water, humidity, oils, and other environmental elements and has passed the rigorous UL 94V-0 tests for flame retardancy. MasterSil 156 bonds well to various substrates, including metals, composites, glass, ceramics, and

many rubbers and plastics. *Master Bond Inc, 154 Hobart Street, Hackensack, NJ 07601, <http://www.masterbond.com>*

Semiconductor defect review system

Park Systems has introduced Park NX-HDM, a fully automated defect review and subangstrom surface roughness atomic force microscopy system for device substrates and disk media. It analyzes, identifies, and scans media for all wafer sizes up to 150 mm. According to the company, the system increases



throughput up to 1000% and offers a 30% higher success rate than prior systems. Suitable for the hard disk drive, LED, solar, and general semiconductor device industries, the NX-HDM speeds up the automatic defect review for media and substrates. The survey scan, zoom-in scan, and analysis of imaged defect types are automated with a wide range of optical inspection tools. Combined with the low noise floor, the true noncontact mode provides accurate and reliable measurements for the subangstrom surface roughness of diverse media and substrates. *Park Systems Inc, 3040 Olcott Street, Santa Clara, CA 95054, <http://www.parkafm.com>*

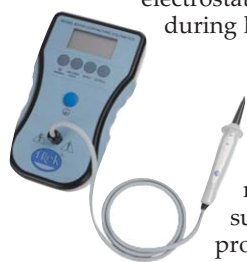
Dry particle counter

The ADPC 302 from Pfeiffer Vacuum is an in-process management system for particle contamination monitoring in semiconductors. It measures the number of particles in wafer transport carriers—that is, front-opening unified pods and front-opening shipping boxes. The fully automated, patented process localizes and counts particles from the carrier surfaces, including the door. Submicrometer particles can cause de-

fects that can lead to considerable yield loss; even particles measuring 0.1 μm may damage the structure of semiconductor chips. The system can be used for both serial production and R&D analysis. The main applications are carrier characterization, cleaning strategy optimization, and cleaning quality checks. The test time is only seven minutes, which makes the ADPC 302 four times as fast as traditional systems. It is possible to test eight transport carriers in one hour. *Pfeiffer Vacuum Inc, 24 Trafalgar Square, Nashua, NH 03063-1988, <http://www.pfeiffer-vacuum.com>*

Electrostatic voltmeter for materials research

With model 821HH, Trek expands its InfiniTron ultrahigh impedance voltmeter technology. It performs effective contacting measurement—without charge transfer—of site-specific voltage on devices and materials sensitive to



electrostatic discharge (ESD) during handling and processing. There is no charge transfer because the probe tip assumes the voltage level of the measured object's surface as the tip approaches and results in no current flow at the time of contact and therefore no change in surface potential. The unit can be used to measure both conductive and insulating surfaces. Applications for model 821HH include semiconductors, photovoltaics, LEDs and other electronic devices, and materials research. According to Trek, the new technology may enable advancements in surface characterization and ESD prevention and control. *Trek Inc, 190 Walnut Street, Lockport, NY 14094, <http://www.trekinc.com>*

High-temperature sealant

Aremco-Seal 529 is an advanced, single-part, optically clear silicone coating for components and substrates used in applications to 600 °F. Up to that temperature, Aremco-Seal 529 is optically stable, noncrazing, and impermeable to moisture. It is also resistant to a wide range of chemicals and provides a high dielectric strength of 350 V/mil. It is

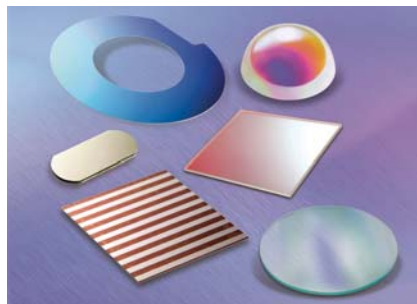
suitable for sealing microelectronic substrates, printed circuit boards, electrical connectors, pyrolytically deposited films, ceramic-filled cartridge heaters,



and high power resistors. Aremco-Seal 529 is effective at stabilizing the electrical resistance values against changes induced by atmospheric conditions. The low-viscosity formulation (100–300 cP) is easily applied by brush, roller, or spray equipment. The coating air dries in 15 minutes and cures fully to a hard, durable finish in 30–60 minutes at 450–500 °F. *Aremco Products Inc, 707 Executive Boulevard, Valley Cottage, NY 10989, <http://www.aremco.com>*

Optical thin-film coatings

Deposition Sciences has expanded its family of optical thin-film coatings for commercial and IR applications. The company offers antireflection and IR coatings and hot, cold, and front-surface mirrors. The new coating products include UV, visible, and near-IR, and short-wave, mid-wave, long-wave, and very long-wave IR wavelengths. The durable optical coatings can be



applied to various substrates, among them glass, ceramics, plastics, metal, and active-device silicon wafers. According to the company, its proprietary deposition methods allow for exceptionally conformal coatings on unusual geometries, from complex shapes to ball lenses, beamsplitters, domes, mirrors, windows, tunnels, and tubes. *Deposition Sciences Incorporated, 3300 Coffey Lane, Santa Rosa, CA 95403, <http://www.depsci.com>*

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new products

Dark material

Surrey NanoSystems has deposited the world's blackest material on lightweight, temperature-sensitive substrates. Its new "super black" coating can be applied to optical instruments for space applications to reduce reflections and increase sensitivity. The innovation stems from the company's patented process for manufacturing carbon nanotubes at low temperatures. The technology allows the company to fabricate super-black coatings on space-qualified lightweight aluminium components. According to Surrey NanoSystems, the black coating, with a total hemispherical reflectance of less than 0.15% across the mid-IR wavelength region, exhibits the lowest reflectance in the IR spectrum on materials such as aluminum. *Surrey NanoSystems Ltd, Unit 24, Euro Business Park, New Road, Newhaven, BN9 0DQ, UK, <http://www.surreynanosystems.com>*

Chemical vapor deposition system

Chemical vapor deposition is widely used in R&D laboratories, especially for the synthesis of carbon nanostructures of graphene, vertically aligned carbon nanotubes, and silicon nanowires. Oerlikon Leybold Vacuum now offers the CVD Cube, a compact and reliable system that grows a bilayer graphene using a thermoplastic polymer as a solid carbon source. The thermal reactor paves the way for new experimental



setups, since different solid carbon sources, including other polymeric films and small molecules, can be used as feedstocks. It allows each reaction step to be sequentially programmed through its CVD Express software. *Oerlikon Leybold Vacuum USA Inc, 5700 Mellon Road, Export, PA 15632, <http://www.oerlikon.com/leyboldvacuum/us>*

Pulsed lasers for micromachining

The new Helios series of subnanosecond solid-state lasers from Coherent feature both a pulse repetition frequency of 50 kHz that translates into a pulse energy of 100 μ J and a pulse width of less than 600 ps. Helios's combination of high average power and high peak power enables faster throughput in industries such as electronics and photovoltaics.



Specific applications include scribing of both thin-film and crystalline silicon solar cells—for example, selective opening of antireflection or passivation layers—dicing of silicon wafers, and precision marking of various products. Helios is suitable for black marking metals and marking delicate materials that would suffer peripheral thermal damage from fiber lasers. Coherent currently offers Helios lasers at 1064 nm with several output powers, with total power up to 5 W; the company will soon be offering the lasers at 532 nm. *Coherent Inc, 5100 Patrick Henry Drive, Santa Clara, CA 95054, <http://www.coherent.com>*

Gas sorption analyzer

The latest generation of Quantachrome's gas sorption analyzer, the Autosorb 6 iSA, is designed to meet the needs of laboratories with high analytical throughput that requires rapid and accurate surface-area and pore-size data. Its flexibility allows up to six samples to run concurrently and independently. Among its enhancements are dewar shields that protect both the operator and the analyzer. Improved lighted displays clearly show the status of the instrument's operation. Features in the updated ASWin software facilitate compliance with 21 Code of Federal Regulations 11. In both CFR and non-CFR modes, the software provides enhanced import and export capabilities, flexible data storage, and full 64-bit compatibility with current Windows operating systems. *Quantachrome Instruments, 1900 Corporate Drive, Boynton Beach, FL 33426, <http://www.quantachrome.com>* ■