

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

Coating analysis software

Edax, part of the Ametek materials analysis division, has introduced x-ray coating analysis software for its Orbis micro-x-ray-fluorescence elemental spectrometer. With the new software, the Orbis provides simultaneous multi-layer film thickness and composition analyses for metal, oxide, nitride, and carbide coatings and for coatings containing elements within the system's observable range, from sodium to berkelium. Applications include analysis of electrical contact coatings for electronics, magnetic media, and semiconductors; anticorrosion and antiwear coatings; and solder coatings compliant with the Restriction of Hazardous Substances directive. The software simplifies material analysis and improves accuracy by using few reference materials or standards. Thicknesses can be measured in the range from 1 nm to 50 μm for up to five layers with 10 elements in each layer. Result reporting is consistent with EN ISO 3497 and ASTM B568. *Edax Inc, 91 McKee Drive, Mahwah, NJ 07430, <http://www.edax.com>*

Fourier transform near-IR system

Bruker has launched the Tango stand-alone Fourier transform near-IR spectrometer, a robust, compact benchtop system with simple touch-screen operation. It offers economical, efficient analysis for the identification and quantification of constituents in various application fields in the food, feed, chemical, and pharmaceutical industries. Tango fully complies with GMP—good manufacturing practice—and with 21 *Code of Federal Regulations* 11 for working in regulated environments. One version is for measuring solids in reflection, and the other is for measuring liquids in transmission. Available in many languages, the intuitive user interface guides users through the work flow; the new automated background measurements help them operate the spectrom-

eter securely and without errors. *Bruker Optics Inc, 19 Fortune Drive, Manning Park, Billerica, MA 01821-3991, <http://www.brukeroptics.com>*

High-temperature insulating material

Goodfellow has made available Superwool 607 HT, a range of high-temperature, fiber-based insulation products that are safe to use and that retain the properties that make them reliable even at elevated temperatures. Historically, health issues have been associated with the use of fiber-based insulation products. According to Goodfellow, it developed the Superwool 607 HT alkaline-earth-silicate insulating material as a safe alternative with low bio-persistence, meaning that inhaled fibers are rapidly removed by the body's natural processes. Superwool has very low thermal conductivity for maximum energy savings in minimal space; low shrinkage, which prevents hot spots and reduces costly maintenance; a high classification temperature of 1300 °C; and good strength and thermal stability. *Goodfellow Corporation, 305 High Tech Drive, Oakdale, PA 15071-3911, <http://www.goodfellowusa.com>*

Spectroscopic ellipsometer for thin films

The Smart SE from Horiba Scientific is a spectroscopic ellipsometer for fast and accurate thin-film measurements. It characterizes thin-film thickness from a few angstroms to 20 μm , optical constants n and k , and thin-film structure properties such as roughness, optical grade, and anisotropic layers. The



Smart SE measures spectral range from 450 to 1000 nm in a few seconds, and it analyzes ellipsometric data using the DeltaPsi2 software platform. The software can perform both routine analysis with predefined recipes and advanced analysis with ellipsometric modeling. The Smart SE provides an integrated vision system for accurate spot positioning and seven automated microspots with size ranging down to a few tens of microns for measurement of small features. It can rapidly measure the complete 16-element Mueller matrix for the study of complex samples. Application areas for the new R&D tool include microelectronic, photovoltaic, and optical coatings. *Horiba Scientific, 3880 Park Avenue, Edison, NJ 08820-3012, <https://www.horiba.com>*

Medical-grade epoxy adhesive

The EP42HT-2ND2Med black adhesive from Master Bond fully complies with the testing requirements of US Pharmacopeia class VI plastics. The two-component epoxy resists recurrent autoclaving and sterilizations, including radiation, steam, ethylene oxide, and chemical sterilants. It is an electrical insulator with a volume resistivity over 10^{12} ohm-cm, a thermal expansion coefficient of 35–40 in/in $\times 10^{-6}/^{\circ}\text{C}$, a dielectric constant of 3.8, and a tensile strength exceeding 12 000 psi at ambient temperatures. Heat resistant up to 450 °F, it also withstands chemicals such as inorganic and organic acids, alkalis, organic solvents, and aromatic hydrocarbons. The epoxy cures at room temperature in 48–72 hours. The EP42HT-2ND2Med black has a noncritical mix ratio of 100:40 by weight or 100:50 by volume and a paste consistency with minimal flow when applied. It has a lengthy working life of 30–45 minutes for a mixed 100-g batch at ambient temperature and can be increased by using shallow mixing vessels or mixing smaller batches. *Master Bond Inc, 154 Hobart Street, Hackensack, NJ 07601, <http://www.masterbond.com>*

Laser micro-fabrication workstation

The laser μFAB from Newport is a tabletop microfabrication workstation optimized for research applications. It is designed for use in both additive and



subtractive processes, including 3D microfabrication by two-photon polymerization, laser ablation and surface structuring of various materials, and volumetric writing of waveguides and microfluidics. Industrial materials employed in ablation and surface structuring applications include metals, polymers, semiconductors, and biological targets. Waveguides and microfluidics can be volumetrically fabricated in glasses and polymers. Nanosurgery and microdissection may be performed in vivo for subcellular investigations of model organisms. Newport can configure the laser μ FAB for use with femtosecond laser oscillators, amplifiers, optical parametric amplifiers, and other types of lasers in the visible to near-IR range. Measuring submicron spot sizes on the sample is possible using high numerical aperture objectives. *Newport Corporation, 1791 Deere Avenue, Irvine, CA 92606, <http://www.newport.com>*

Metallization pastes

Ferro Electronic Materials has introduced new metallization pastes formulated to make solar energy more cost-effective by providing higher electrical efficiencies and reducing material usage. The MWT paste system for p-type cells has the potential to boost the electrical efficiency of polycrystalline silicon-based solar cells to more than 18%. The NS 3166 MWT, a next-generation rear silver plug hole paste, can be used as the p-contact paste. Its glass chemistry provides excellent shunt resistance to improve conductivity and strong adhesion to the silicon wafer. The AL 5161 MWT back-contact aluminum paste provides high open voltage current and a strong, uniform back surface field with lower material deposition over wide process conditions. It delivers excellent adhesion to both silicon and ethylene vinyl acetate films, with low bow for wafers 180 μ m thick. The NS 3130 and NS 3131 are high-efficiency front silver contact pastes designed to be compatible with Ferro's MWT paste system. *Ferro Corporation, 1000 Lakeside Avenue, Cleveland, OH 44114-7000, <http://www.ferro.com>*

Pentaprisms for laser applications

Research Electro-Optics offers pentaprisms with coatings optimized for demanding laser applications such as target designation and range finding. The pentaprisms feature all-dielectric antireflection and high-reflection coatings manufactured using ion-beam sputtering technology. IBS delivers fully densified films that exhibit superior laser-damage-resistance characteristics—more than 12 J/cm² in 20-ns pulses at 1064 nm for the antireflection coatings—as well as environmental stability and mechanical durability. That



makes them suitable for applications in harsh environments. The technology enables highly consistent production of optical coatings with complex spectral characteristics, including multispectral operation. The pentaprisms can be fabricated from a wide variety of materials—including fused silica, silicon, germanium, and zinc selenide—suitable for the visible and near-IR spectral ranges. *Research Electro-Optics Inc, 5505 Airport Boulevard, Boulder, CO 80301, <http://www.reoinc.com>*

Photomask etch system

Applied Materials has announced its Centura Tetra extreme UV advanced reticle etch system for EUV lithography. The new system can etch EUVL photomasks with nanometer-level accuracy to fabricate high-performance semiconductor chips. The EUVL photomasks differ from conventional photomasks that selectively transmit 193-nm wavelength light to project circuit patterns onto the wafer. At the 13.5-nm wavelength used by EUVL, all photomask materials are opaque, so the mask contains complex multilayer mirrors to reflect circuit patterns onto the wafer instead. The Tetra is designed to etch new materials and complex layer stacks to meet the stringent pattern accuracy, surface finish, and defectivity specifications required to achieve high lithography yields when operating in the

reflected mode. *Applied Materials Inc, 2821 Scott Boulevard, P. O. Box 58039, Santa Clara, CA 95050, <http://www.appliedmaterials.com>*

Machinable glass-ceramic

Aremco has developed the Aremcolox 502-400 machinable glass-ceramic for use in electrical and electronic high-temperature applications to 700 °F (371 °C). Its features include high electrical resistance, low thermal conductivity, high mechanical strength, zero porosity, and ease of machinability using carbide tools. It has compressive and flexural strengths of 40 000 and 15 000 psi, respectively; a dielectric strength of 400 V/mil; a dielectric constant of 6.9 at 1 MHz; and thermal conductivity of 2.88 Btu-in/hr-ft²-°F (0.41 W/m-K). Applications include high-voltage insulators, connector housings, and instrument and appliance insulators. The Aremcolox 502-400 is available from stock in 18-inch rods from 1/4 to 1 inch in diameter and 14 × 20 inch rectangular plates from 1/8 to 1 inch thick. Custom sizes and parts can also be produced. *Aremco Products Inc, 707 Executive Boulevard, Valley Cottage, NY 10989, <http://www.aremco.com>*

Diode laser systems for materials processing

The HighLight D-series, a new range of diode laser systems from Coherent, delivers high power and an increased range of "smart" output beam shapes. The HighLight 8000D, with output power of 8 kW, features free-space beam delivery for industrial materials processing. That delivery preserves the inherent brightness of the diode laser source and enables the use of an optical system with a large 275-mm working distance. In cladding, it yields a material deposition rate up to 18 pounds/h and allows the laser to cover large areas in a short amount of time. The HighLight D-series includes products with output powers of 2.8, 4, 6, and 8 kW at 975 nm. The design of the compact laser head enables a wide range of output-beam-size options. An optional beam-shaping accessory can expand the 1-mm beam width dimension up to 12 mm. *Coherent Inc, 5100 Patrick Henry Drive, Santa Clara, CA 95054, <http://www.coherent.com>* ■