Review of Scientific Instruments New Products

Cite as: Rev. Sci. Instrum. 93, 029501 (2022); doi: 10.1063/5.0086843
Submitted: 29 January 2022 • Accepted: 1 February 2022 •
Published Online: 18 February 2022

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AFFILIATIONS

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In order to supplement manufacturers' information, this department will welcome the submission by our readers of brief communications reporting measurements on the physical properties of materials that supersede earlier data or suggest new research applications.

https://doi.org/10.1063/5.0086843

NEW INSTRUMENTS AND COMPONENTS

Nanoscale infrared (IR) imaging platform

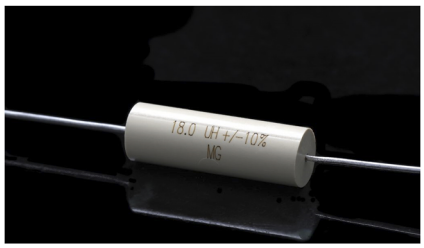
Bruker has launched its Dimension IconIR nanoscale IR spectroscopy and chemical imaging system. It combines the company's Dimension Icon atomic force microscope and nanoIR photothermal AFM-IR technology to generate chemical and material property mapping with <10-nm chemical imaging resolution. The new large-sample platform incorporates Bruker's proprietary PeakForce Tapping mode, which is both sensitive and robust and allows for the study of complex systems with strong mechanical heterogeneities. The standard system supports samples of up to 150 mm; versions for larger samples are also available. IconIR utilizes the full range of Bruker's Dimension platform accessories and scanning probe microscopy modes. According to the company, the platform constitutes the most complete correlative microscopy solution for quantitative nanochemical, nanomechanical, and nanoelectrical characterization. It is suitable for research in a broad range of polymer, geoscience, semiconductor, and life sciences applications. *Bruker Nano Surfaces and Metrology Division, 3400 East Britannia Drive, Suite 150, Tucson, AZ 85706, USA. (520-741-1044)* https://www.bruker.com

Fast qubit tuning

QDevil says its new-generation ultralow-noise multichannel voltage source, the QDAC-II, enables qubits to be tuned for optimal fidelity and function 100 times as fast as previously possible and, once tuned, to remain stable. More versatile and offering superior performance to its predecessor, the QDAC-II offers 25-bit resolution in DC mode, operates at a sample rate of 1 MS/s, and has features that make redundant several conventional laboratory instruments, such as current amplifiers, multimeters, and arbitrary waveform and pulse/signal generators. It provides 24 channels of ultrastable DC voltages; each channel has multiple standard waveform generators and an arbitrary waveform generator, and each is equipped with a DC current sensor with a resolution down to a few tens of picoamperes. The unique low pass output filter design offers three ranges that can be switched between with minimal transients. The high bandwidth mode has a cut-off of 300 kHz, the medium bandwidth 10 kHz, and the DC mode 10 Hz. Individual high-resolution low-frequency current sensors on every channel measure current simultaneously on all channels. Multiple QDAC-II units can be synchronized. Although designed for DC and intermediate-frequency control of quantum devices, for example, gate electrodes and flux bias coils in qubits, the versatile instrument can be used for many other purposes. *QDevil ApS, Fruebjergvej 3, 2100 Copenhagen, Denmark. (+45 3699 2145)* https://qdevil.com

Nonmagnetic radio frequency (RF) inductors

Gowanda Electronics designed its 28MG series of nonmagnetic RF through-hole (leaded) inductors to address the need to achieve inductance values of up to 18 μH. The series is suitable for use in magnetic resonance imaging, specific types of x-ray equipment, and other applications where the presence of magnetic materials could compromise system performance. Those include telecommunications; instrumentation; and equipment for laboratory analysis, electronic testing, aviation, and navigation. The performance range provided by the 60 discrete parts within the 28MG series includes inductance from 1.2 to 18 μH, DC resistance from 0.079 to 4.15 Ω, and DC current rating from 315 to 2400 mA. Gowanda's nonmagnetic surface mount and through-hole inductors provide relative permeability of ≤1.000 03. The 28MG series' operating temperature range is −55 to 125 °C. The 28MG inductors are epoxy encapsulated to withstand all types of reflow soldering and protect the environment. *Gowanda Electronics, 1 Magnetics Parkway, Gowanda, NY 14070, USA. (716-532-2234)* https://www.gowanda.com



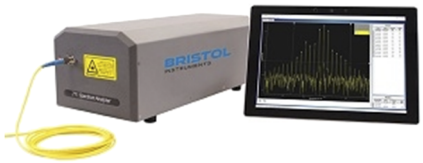
NEW DETECTORS, MEASUREMENTS, AND MATERIALS

Asphere metrology

Zygo Corporation, a business unit of AMETEK, has expanded its Verifire series of laser Fizeau interferometers used to perform noncontact three-dimensional (3D) metrology of aspheric surfaces. The new Verifire Asphere+ (VFA+) is designed to reduce the number of generation and measurement steps needed to achieve a highly precise and accurate final surface. Leveraging the benefits of Fizeau interferometry through precise, high-resolution, fast, and full-aperture metrology for axisymmetric aspheres, the VFA+ can help minimize the number of iterations required to produce a surface. It can thereby give optics manufacturers the flexibility and precision needed to produce a wide range of aspheric designs. The flexible system can measure a range of aspheres with only the change of the reference optic and is adaptable to multipart automated measurement of trays of optics. An optional secondary stage integrated in the VFA+ accommodates a computer-generated hologram to further enlarge aspheric shape coverage, which includes free-form, cylinder, and off-axis conic surfaces. *Zygo Corporation, Laurel Brook Road, Middlefield, CT 06455-1291, USA. (860-347-8506)* https://www.zygo.com

Laser spectrum analyzer for IR applications

To support the spectral analysis of IR lasers, Bristol Instruments has added the 771 NIR2 to its laser spectrum analyzer series. The new instrument uses the original 771 series' Michelson interferometer technology with fast Fourier transform analysis and offers the benefit of fiber-optic input. It is suitable for use by scientists and engineers who need to characterize the spectral properties of continuous-wave (CW) lasers that operate from 1.0 to 2.6 μm. The 771 NIR2 provides spectral resolution up to 2 GHz and measures wavelength to an accuracy as high as ±0.0002 nm. Its convenient pre-aligned fiber-optic input ensures optimal alignment of the laser under test and allows it to be placed in an out-of-the way location to conserve optical bench space. *Bristol Instruments, Inc., 770 Canning Parkway, Victor, NY 14564, USA. (585-924-2620)* https://www.bristol-inst.com



Automated silicon-photonics test system

Keysight's NX5402A Silicon Photonics Test System, integrated with its PathWave Semiconductor Test software technology, combines the company's multichannel optical and electrical test architecture and its optimized fiber alignment and positioning system. According to Keysight, the fully automated, high-throughput testing system maintains high accuracy, repeatability, and reproducibility and delivers advanced wafer-level photonic calibration and reliable performance monitoring with built-in system diagnostics. Its stable and repeatable test capabilities can enable semiconductor manufacturers to eliminate manual operations and speed up the delivery of silicon-photonics wafer production. Silicon photonics' primary applications are in the data-center market, but they may in the future be used in areas such as optical and quantum computing, automotive lidar, and health care. *Keysight Technologies, Inc., 1400 Fountaingrove Parkway, Santa Rosa, CA 95403-1738, USA. (800-829-4444)* https://www.keysight.com

Fiber-optic temperature monitoring

A new line of fiber-optic temperature sensors and monitors from Omega, a Spectris company, is suitable for surface or immersion applications where metallic probes cannot be used. Unlike traditional resistance temperature detectors and thermocouples, fiber-optic sensors use light for fast and reliable temperature analysis that is immune to RF interference, electromagnetic interference, and nuclear magnetic resonance. The fiber-optic temperature sensor allows measurements in small or precise locations. It has a range from −200 to 250 °C and an accuracy of ±0.8 °C and requires no recalibration. The fiber-optic monitor operates in a temperature range from −80 to 300 °C. It can monitor up to eight channels and offers micro-SD and universal serial bus (USB) data-logging capabilities and RS-485 and USB output with Modbus. *Omega Engineering, Inc., 800 Connecticut Avenue, Suite 5N01, Norwalk, CT 06854, USA. (888-826-6342 or 203-359-1660)* https://www.omega.com

Humidity and temperature sensors

Two ultrahigh-accuracy versions of Sensirion's fourth-generation humidity sensors, the SHT41 and SHT45, offer improved relative-humidity (RH) and temperature (T) specifications Typical accuracies have been honed down to $\Delta RH = \pm 1\%$ RH and $\Delta T = \pm 0.1$ °C. The sensors are built on Sensirion's new, optimized CMOSens chip that features ultralow power consumption. (CMOS denotes complementary metal-oxide-semiconductor.) The CMOSens technology integrates a humidity sensor, a temperature sensor, signal processing, and calibration memory. It provides a complete sensor system with a fully calibrated digital I^2C inter-integrated-circuit fast-mode-plus interface on a single chip. The sensors cover operating ranges from 0% to 100% RH and −40 to 125 °C. With the extended supply voltage range from 1.08 to 3.6 V and an average current of 400 nA, the SHT41 and SHT45 are suitable for mobile and battery-driven applications. The very small size and robust housing enable integration into challenging designs and ensure high reliability. *Sensirion Holding AG, Laubisrütistrasse 50, 8712 Stäfa, Switzerland. (+41 44306 40 00)* https://sensirion.com

Volatile chemical-species sampler

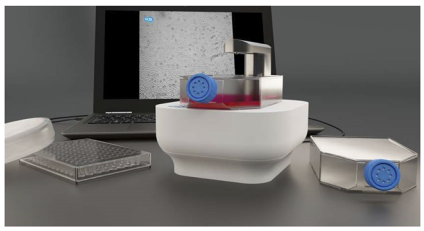
To provide analysts with an advanced yet easy-to-use instrument, Shimadzu has replaced its HS-20 headspace sampler with the HS-20 NX series. The new series uses the isolation gas flow to reduce carryover to 1/10 that of conventional models, according to the company. It provides reliable analytical results and supports a wide range of volatile chemical species, including compounds with a high boiling point and high polarity. The proprietary isolation gas flow prevents sample diffusion from the vent channel, which reduces carryover of highly adsorptive compounds and eliminates the need to repeat blank runs. Because the sample vial is loaded from the lower part of the oven, the instrument achieves excellent reproducibility. The sample vial delivery system minimizes heat dissipation in the headspace oven as the vial enters and exits, while maintaining high temperature stability during repeated analyses. The HS-20 NX series provides high temperature capability: The vial oven and sample line can be set to 300 °C and the transfer line to 350 °C. The sample path is designed to be inert and at the shortest distance, which suppresses peak broadening and adsorption of analytes, including high-boiling compounds. *Shimadzu Scientific Instruments, Inc., 7102 Riverwood Drive, Columbia, MD 21046, USA. (410-381-1227)* https://www.shimadzu.com

Benchtop optical power meters

Newport Corp, an MKS Instruments company, has introduced the next generation of its optical power and energy meters, suitable for high-speed, modulated light measurements. According to Newport, the new 1938-R and 2938-R meters are more powerful, more versatile, and faster than other products on the market. Depending on the range, the meters have up to 200 kHz bandwidth and are designed for use in Newport's 818, 918D, or 819C/D series photodiode detectors. They allow time-stamped data acquisition at up to 10 kHz to onboard or external USB memory. The 1938-R and 2938-R meters are equipped with analog output whereby the raw signal can be directly sent out to an oscilloscope or a data-acquisition board. They also feature trigger in and TTL (transistor–transistor logic) out connectors for synchronized measurements. With seven analog filters, ranging from 0.5 Hz to 250 kHz, and the averaging function, ranging from 1 s to 1 h of moving average, users can configure the power meter for stable average-power measurements of a CW light source, fast tracking of a rapidly changing optical power level, or peak-to-peak measurements of a modulated signal. The 1024 × 600-pixel, high-brightness, full-color 7-in. touch screen provides the feel of using a tablet. The user interface is designed so

that features such as advanced graphing, mathematical functions, offsetting, scaling, laser tuning, and logging can easily be accessed during measurements and experiments. *Newport Corporation, 1791 Deere Avenue, Irvine, CA 92606, USA. (949-863-3144)* https://www.newport.com

compared. The CytoSmart Lux3 BR has an incubator- and laboratory-friendly open design, and allows for remote data access via the CytoSmart Cloud with a smartphone, tablet, or laptop outside the laboratory. *CytoSmart Technologies B.V., Emmasingel 33, 5611 AZ Eindhoven, The Netherlands. (+31 88203 2200)* https://cytosmart.com



BIOINSTRUMENTATION AND BIOTECHNOLOGIES

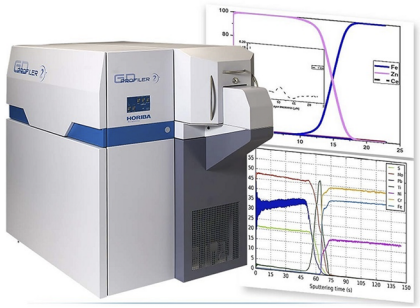
Live-cell imaging system

CytoSmart has announced its CytoSmart Lux3 BR label-free live-cell imaging system, a small brightfield microscope equipped with a high-quality 6.4-MP CMOS camera. Like the company's other CytoSmart microscopes, the new live-cell imager is designed to work inside a standard cell culture incubator, thereby safeguarding cultures from temperature, humidity, or carbon dioxide fluctuations. That ensures optimal cell growth and health and lets researchers perform long-term live-cell imaging experiments. Time-lapse movies can be made to investigate the development of cellular processes. The CytoSmart Lux3 BR allows for the capture of very detailed brightfield images. In both *x*- and *y*-directions, 2072 pixels combined with a 1.45-mm field of view provide a resolution of 0.7 μm/pixel. A setup with the CytoSmart Lux3 BR can be easily expanded to two or even four devices that can be operated and controlled individually via a single laptop. The Lux3 BR Duo Kit and Multi Lux3 BR devices can be placed directly next to each other in the same incubator. With all monitored cell cultures maintained in an identical culture environment, control and treated samples can be systematically

NEW FACILITIES AND HARDWARE

Facility for spectroscopy and chemical analysis

Horiba Scientific has partnered with Covalent Metrology to expand engineering and scientific access to chemical analysis instruments. The partnership will include the opening of the Horiba Scientific North American Demonstration Lab at Covalent's Silicon Valley headquarters. The laboratory will showcase spectroscopy solutions and bolster development methods for new chemical analysis applications. According to the companies, it will position them to accelerate research and development in the semiconductor, electronics, and advanced materials industries throughout North America while giving greater access to instrumentation and analysis services. The first instrument to be installed in the Horiba showroom will be the Horiba GD-Profiler 2 system for glow discharge optical emissions spectroscopy. It is designed for high-speed, quantitative analysis of all elements of interest such as nitrogen, oxygen, hydrogen, and chlorine and can be used for thin and thick film characterization and process studies. *Horiba Scientific Division of Horiba Instruments, Inc., 20 Knightsbridge Road, Piscataway, NJ 08854, USA. (732-494-8660)* https://www.horiba.com

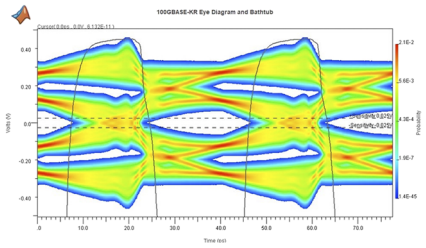


NEW LITERATURE AND SOFTWARE

Mathematical programming software

Release 2021b (R2021b) of the MathWorks' MATLAB and Simulink software is now available and offers two new products and many updated features and functions. New capabilities in MATLAB include code refactoring, block editing, and the ability to run Python commands and scripts from MATLAB. Simulink updates let users run multiple simulations for different scenarios from the Simulink Editor and create custom tabs in the Simulink Toolstrip. R2021b introduces two new products that support wireless communications: The RF printed circuit board (PCB) Toolbox enables the design, analysis, and visualization of high-speed and RF multilayered printed circuit boards. Users can design components with parameterized or arbitrary geometry, including distributed passive structures such as traces, bends, and vias. Using the frequency-domain method of moments and other electromagnetic techniques, coupling, dispersion, and parasitic effects can be modeled. The Signal Integrity Toolbox provides functions and apps for designing high-speed serial and parallel links. The toolbox supports standard-compliant IBIS-AMI (Input/output Buffer Information Specification-Algorithmic Modeling Interface) models for statistical and time-domain simulation to analyze equalization and clock recovery. Users can generate experiments covering multiple parameters, extract design metrics, and visualize waveforms and results. R2021b also includes major updates to the Symbolic Math and Lidar Toolboxes, Simulink Control Design, and other products in the

areas of predictive maintenance, deep and reinforcement learning, and statistics and machine learning. *The MathWorks, Inc., 1 Apple Hill Drive, Natick, MA 01760-2098, USA. (508-647-7000)* https://www.mathworks.com



Software for signal creation and analysis

Rohde & Schwarz (R&S) and Cadence have collaborated to create a tool for signal creation and analysis and, thereby, help speed the development of RF components used in wireless communications and radar design. The R&S VSESIM-VSS functions as an addition to the Cadence Visual System Simulator (VSS) software. It expands the capabilities of the VSS software by adding realistic signals for both simulation and testing, which helps to increase simulation accuracy and simplify the design process. The tool combines the signal-generation and signal-analysis functions from two R&S software tools for testing operative circuits, modules, and devices—the WinIQSIM2 simulation software and the VSE vector signal explorer—and adds plug-ins for Cadence electronic design automation tools. The data sink plug-ins provide access to the signal at any point in the design process. The signal can be transferred to a vector signal generator and applied to available hardware, enabling system-level analysis of hybrid hardware/simulated implementations. An important feature of R&S VSESIM-VSS is support of direct digital predistortion techniques to verify the effects of linearization already in the simulation phase of power amplifier development. The R&S VSESIM-VSS supports all major standards such as 5G and the latest Wi-Fi evolutions. It is particularly suitable for users in the wireless, automotive, and aerospace and defense industries and for manufacturers of active components and systems. *Rohde & Schwarz USA, Inc., 6821 Benjamin Franklin Drive, Columbia, MD 21046, USA. (410-910-7800)* https://www.rohde-schwarz.com