TESTING CHARACTERIZATION

BRIEFS

Ametek Calibration Instruments announces that the Jofra range of industrial pressure indicators is now Atex and CSA certified for potentially explosive environments in the field or in calibration laboratories. www.ametekcalibration.com

Atlas Material Testing Technology announces a weathering Center of Excellence at Atlas world headquarters in Chicago, Illinois. The current Atlas accelerated weathering laboratory in Miami, Florida, will be relocated to Chicago. www.atlas-mts.com

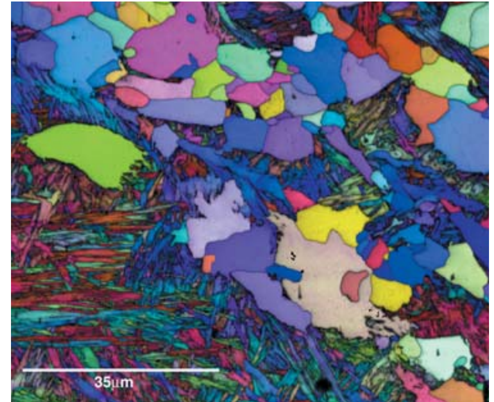
Bodycote plc has sold its **Bodycote Testing Group** to Clayton, Dubilier & Rice, a global private equity firm. The testing group operates over 130 laboratories in more than 25 countries worldwide. www.bodycote.com

Bruker AXS GmbH has signed an agreement to acquire all of the equity of **S.I.S. Surface Imaging Systems GmbH**, which manufactures and distributes advanced atomic force/scanning probe microscopy systems for materials research. www.bruker-axs.com

Electron backscatter diffraction detector has better sensitivity

The latest generation electron backscatter diffraction (EBSD) detector can acquire orientation mapping data via proprietary OIM software at rates up to 150 indexed patterns per second with improved sensitivity and contrast, says Edax Inc., Mahwah, N.J. Called DigiView IV, it can produce high-resolution images, and also provides phase identification by means of Genesis and Delphi software. The detector includes a bellows-based insertion and retraction system for operation while under vacuum and for live-imaging for maximum vacuum and system integrity.

"The instrument brings all of the advanced features of orientation mapping and calculations, including crystal orientation, phase analysis, and grain size and boundary information to the materials characterization scientist," says Del Redfern of Edax. It also smoothly integrates with the company's EDS detectors and WDS systems.



This image shows a quality and orientation map generated by the DigiView IV for dual-phase ferrite-martensite low-carbon steel.

For more information: Del Redfern, Edax Inc., 91 McKee Drive, Mahwah, NJ 07430; tel: 201/529-4880; fax: 201/529-3156; info.edax@ametek.com; www.edax.com.

Microscope combines X-rays and spatial resolution

A super-resolution X-ray microscope developed by a team of researchers from the Paul Scherrer Institut and the Ecole Polytechnique Lausanne in Switzerland combines the high penetration power of X-rays with high spatial resolution, reportedly making it possible for the first time to view the detailed interior composition of semiconductor devices and cellular structures.

The instrument is based on a Megapixel Pilatus detector (whose big brother will be detecting collisions from CERN's Large Hadron Collider), which has the ability to count millions of single X-ray photons over a large area. This key feature makes it possible to record detailed diffraction patterns while the sample is raster-scanned through the focal spot of the beam. In contrast, conventional X-ray (or electron) scanning microscopes measure only the total transmitted intensity.

It can nondestructively characterize nanometer defects in buried semiconductor devices and help improve the production and performance of future semiconductor devices with sub-hundred-nanometer features.

For more information: Franz Pfeiffer, Paul Scherrer Institut, Switzerland; tel: 41-763-201-045; franz.pfeiffer@epfl.ch; www.epfl.ch.

Diffraction contrast tomography shows cracks growing in steel

A technique called diffraction contrast tomography has reportedly been developed at the European Synchrotron Radiation Facility to determine how a growing crack interacts with the three-dimensional crystal structure of stainless steel. A team of researchers from the University of Manchester, England; the National Institute of Applied Sciences, France; and the European Synchrotron Radiation Facility (ESRF) developed the process.

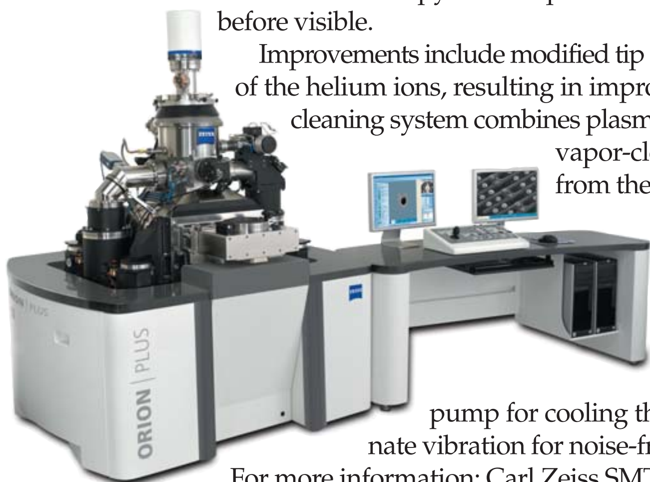
The technology enabled the researchers to make a three-dimensional map of all grains in a section of a stainless steel wire measuring 0.4 mm in diameter. This map contained the shapes, positions, and orientations of 362 different grains. The next stage of the experiment involved putting the wire into a suitable corrosive liquid, and applying a load to cause microcracks to grow between grains.

During the crack growth, 3D tomographic scans (of 30 minutes each) were made at intervals between two hours and a few minutes to follow the progress of the crack. This is the first in-situ experiment of this kind based on nondestructive 3D grain mapping techniques.

For further information: Montserrat Capellas , European Synchrotron Radiation Facility, France; tel: 33 476 88 26 63; capellas@esrf.fr; www.esrf.fr.

Helium ion microscope increases electron collection

A helium ion microscope called the Orion Plus, which incorporates several design enhancements for improved imaging, has reportedly been developed by Carl Zeiss SMT, Peabody, Mass. The original Orion instrument, introduced almost exactly one year ago, demonstrated that helium ion microscopy has unique features that allow scientists to see things never before visible.



Improvements include modified tip geometry to increase the accelerating voltage of the helium ions, resulting in improved resolution. A new Clear View sample cleaning system combines plasma cleaning, heating elements, and an in-situ vapor-cleaning technique to remove hydrocarbons from the sample and the environment.

Signal Boost is an enhanced signal collection technique that increases electron collection at short working distances for an improved signal-to-noise ratio. An operating mode called Quiet Mode Imaging is an approach based on a cryomechanical pump for cooling the source, enabling users to virtually eliminate vibration for noise-free images.

For more information: Carl Zeiss SMT Inc., One Corporation Way, Peabody, MA 01960; tel: 978/826-7909; www.smt.zeiss.com.

Photoacoustic spectroscopy detects distant explosives

Explosives can be detected at distances exceeding 20 yards with a laser and a device that converts reflected light into sound, say researchers at Oak Ridge National Laboratory, Oak Ridge, Tenn. The method is a variant of photoacoustic spectroscopy, but it overcomes a number of problems associated with this technique originally demonstrated by Alexander Graham Bell in the late 1880s. Most notably, ORNL researchers are able to probe and identify materials in open air instead of a pressurized chamber.

The technique involves illuminating the target sample with an eye-safe pulsed light source, and allowing the scattered light to be detected by a quartz crystal tuning fork.

"We match the pulse frequency of the illuminating light with the mechanical resonant frequency of the quartz crystal tuning fork, generating acoustic waves at the tuning fork's air-surface interface," says Charles Van Neste. "This produces pressures that drive the tuning fork into resonance."

The amplitude of this vibration is proportional to the intensity of the scattered light beam falling on the tuning fork, which because of the nature of quartz, creates a piezoelectric voltage. Other advantages of quartz tuning fork resonators include compact size, low cost, commercial availability, and the ability to operate in field conditions.

For more information: Charles Van Neste, Oak Ridge National Laboratory, Oak Ridge, TN 37831; tel: 865/574-6215; vannestecw@ornl.gov; www.ornl.gov.

Thermal FE-SEM integrates semi in-lens system for imaging

A scanning electron microscope capable of high-resolution, high-sensitivity analysis under any combination of operating conditions has reportedly been developed by Jeol USA, Peabody, Mass. Called JSM-7600F, it integrates a semi in-lens system for high-resolution imaging with an in-lens thermal electron gun.

The SEM incorporates a through-the-lens detection system that features a new energy filter designed to vary the mixture rate of secondary electron and backscattered electron images, thereby enhancing the topography or compositional differences of images as needed. It also has a new Graphical User Interface that enables easy navigation through imaging and analyzing procedures. *Continued*

BRIEFS

Imago Scientific Instruments, Madison, Wis., in conjunction with the **Noah Corp**., its representatives in Japan, announces the shipment of Imago's LEAP 3000 HR atom-probe microscope by the Central Research Institute of Electric Power Industry located in Tokyo, Japan.
www.imago.com

Instron announces the launch of its servohydraulic maintenance program, designed to minimize downtime, extend system operating life, and ensure the accuracy and repeatability of test results. The program includes an oil analysis, preventive maintenance, a periodic oil change, and a system refurbishment.
www.instron.com

India's **International Centre for Material Science** in Bangalore has selected **FEI Company** and its Mumbai-based agent, **Icon Analytical Equipment Private Ltd.**, to develop an advanced electron microscopy facility in India.
www.fei.com

NanoSight Ltd., a nanoparticle characterization company, has recently opened offices in the United States to provide local sales, applications, and service support in Morganville, N.J. NanoSight will share facilities with **XiGo Nanotools**, a company applying NMR technology for nanoparticle characterization.
www.nanosight.com

The **Spectrolab** optical system combines the advantages of both photomultiplier tubes and CCDs. It contains two separate spectral modules in one housing, in which signals are simultaneously processed by a completely redesigned high-performance readout system. www.spectro.com

Thermo Fisher Scientific Inc. announces the availability of a technical poster demonstrating the capability of collision cell-based inductively coupled plasma mass spectrometry (ICP-MS) for complete multi-elemental analyses of environmental and geological samples. www.thermo.com/cct-poster

The in-lens thermal electron gun, combined with a patented aperture angle optimizing lens, achieves a probe current of 200 nA or higher at an accelerating voltage of 15 kV, efficiently acquiring high-quality data in elemental analysis. Utilizing the electron beam finely focused at low accelerating voltage and high probe current, the microscope, when outfitted with an EDS detector, can rapidly acquire high-resolution X-ray mapping data.

For more information: Patricia Corkum, Jeol USA Inc., 11 Dearborn Road, Peabody, MA 01960; pcorkum@jeol.com; tel: 978/536-2273; www.jeolusa.com,

Extreme high resolution SEM enables 3D surface images

A class of instruments called extreme high-resolution scanning electron microscopes (XHR SEMs) has been announced by FEI Company, Hillsboro, Oregon. The Magellan XHR SEM allows scientists and engineers to quickly see three-dimensional surface images at many different angles and at resolutions below one nanometer. Most important, the Magellan XHR SEM images samples at very low beam energies, avoiding distortions otherwise caused by the beam penetrating into the material below.

Magellan is the only family of instruments to make sub-nanometer resolution accessible in a practical sense to non-experts and without restriction on samples, constraints that have previously limited the utility and acceptance of other systems. Sub-nanometer resolution has critical value in scientific research and industrial R&D. In addition, it is an absolute requirement in process development, monitoring, and control applications in advanced semiconductor manufacturing. The instrument extends this capability to applications that were previously impossible or impractical with conventional SEM, transmission electron microscope, or focused ion beam systems.

For more information: FEI Co., 5350 NE Dawson Creek Drive, Hillsboro, OR 97124; tel: 503/726-7500; www.feico.com.

Microscope combines AFM and confocal Raman technologies

A microscope system that combines Confocal Raman Microscopy for chemical three-dimensional imaging, and atomic force microscopy for structural surface imaging in an automated system for large samples has been developed by Witec GmbH, Germany. Called the Alpha500, it enables the automated execution of predefined measurement sequences on an arbitrary, user-defined number of sample positions for the most comprehensive, nondestructive and rapid sample analysis without any online process control by an operator. The automation and the fast image acquisition capabilities reduce the overall experiment duration, or allow more samples to be measured in a given time for improved utilization of the overall measurement resources.

The Alpha500 microscope technology has been selected as a winner of a *2008 R&D 100* award. It honors the automated Confocal Raman and Atomic Force Microscope combination as one of the 100 most technologically significant innovations of the year.

For more information: Witec Instruments Corp., Savoy, IL 61874; tel: 217/315-9705; www.witec-instruments.com.

Eye-size camera based on silicon array, rubber membrane

A camera based on an array of single-crystal silicon detectors and electronics configured in a stretchable, interconnected rubber mesh has reportedly been developed by researchers at the University of Illinois and Northwestern University. The researchers begin by molding a thin rubber membrane in the shape of a hemisphere about the size of a human eye. The membrane is then stretched with a specialized mechanical stage to form a flat drumhead. Next, a prefabricated focal plane array and associated electronics are transferred from a silicon wafer to the tensioned drumhead membrane.

When the tension is released, the membrane returns to its original shape. This process compresses the focal plane array, causing specially designed electrical interconnects to delaminate from the rubber surface and form arcs, pinned on the ends by detector pixels. The array package is then transfer-printed to a matching hemispherical glass substrate. Attaching a lens and connecting the camera to external electronics completes the assembly.

For more information: John A. Rogers, U. of Illinois at Urbana Champaign, Urbana, IL 61801; tel: 217/244-4979; jrogers@express.cites.uiuc.edu; www.uiuc.edu.