NEW AND INTERESTING AT M&M 2004

The following exhibitors at the recent Microscopy and Microanalysis-2004 meeting in Savannah provided these short summaries of what they considered new and/or interesting at their booths on this year's equipment floor.

4pi Analysis demonstrated several new features now available in its **Revolution EDX/Imaging** software package. 4pi is the only company to have incorporated into its software **Maximum Pixel Spectrum** acquisition, a new technique pioneered by David Bright at NIST and introduced at Scanning 2004. The technique enables detection of rare elemental features in x-ray spectra and maps. 4pi also demonstrated the first two tools of its Hyperspectral Imaging (HSI) analytical package: the **principal component analysis (PCA)** module, and the **dynamic elemental mapping (DEM)** module. PCA is a systematic analytical technique for finding elemental associations that are not obvious in ordinary mapping data. DEM is a new feature unique to the industry, allowing real-time selection of elements and processing parameters while any set of full spectrum-per-pixel x-ray maps is being acquired. To learn more about 4pi and its products, visit www.4pi.com or call 919-489-1757.

Announced at **M & M 2004**: **BAL-TEC, AG** of Liechtenstein, and **Boeckeler Instruments, Inc.**, of Tucson, Ariz., both leading manufacturers of EM sample preparation devices, recently formed a marketing alliance called **BAL-TEC RMC**. At M & M, the joint venture debuted the unique **BAL-TEC RES 120** combination SEM and dual beam ion mill. Also, unveiled was the computer-controlled ultramicrotome **RMC PT-PC**, with a powerful database and report generating capabilities of particular importance to the pharmaceutical industry and pathologists. For further information visit the alliance Web site www.baltec-rmc.com.

Ernest F. Fullam, Inc. exhibited an updated version of its 1000 lb (4.4KN) capacity tensile stage, with a low cost manual control. This system provides manual control of the strain rate, and included digital stress and strain readouts. The tensiles stages can be used in a SEM, an SPM, under a light microscope or on a bench top. For high resolution at low loads, a load frame can be provided with a range of load cells down to 1 Kg. Numerous options are available, including sample heaters, bending fixtures and EBSD-configured testers. Many custom testers have been built for specific applications. visit www.fullam.com

EDAX Inc. introduced the following new products at M&M 2004: **DigiView III**, OIM 4 with DigiView III, the only Peltier cooled camera for EBSD, is capable of indexing up to 80 points per second. The DigiView III uses standard firewire protocols to provide an efficient and flexible interface of camera to computer. Combined with the largest phosphor screen available on commercial EBSD systems, the DigiView III can be used over a wide range of magnifications and working distances without constant recalibration. **ChI-Scan with PCA** includes ChI-Scan with Phase Cluster Analysis (PCA). ChI-Scan chemical indexing software incorporates elemental composition information into the electron backscatter diffraction (EBSD) indexing process to increase the accuracy and speed of phase and orientation determination. PCA (Phase Cluster Analysis) compares the chemistry of each pixel cluster with other clusters to automatically search for areas of similar chemistry. By combining EBSD with PCA, EDAX offers the most advanced tool for obtaining crystallographic information from your SEM. **Max Channel Spectra (MCS)** is the latest feature within the GENESIS mapping application. MCS enhances the GENESIS Live Spectrum Mapping application by plotting the maximum intensity of any channel from any pixel. MCS reviews every pixel, and record the highest intensity of any channel from the whole map. The spectra can then be displayed / overlaid against the total counts spectra and the user can then identify which pixel contained the maximum intensity for any channel. **WDS Integrated Software: GENESIS WDS** is a fully integrated package allowing simultaneous EDS and WDS data collection, from multiple positions or a line of points. The user can overlay the collected data and perform full qualitative analysis. The WDS data can be quantified using similar standards and combined with the EDS information for further quantitative analysis. For more information please contact: Del Redfern, Del.Redfern@ametek.com, Tel: 201-529-4880

Energy Beam Sciences, Quorum Technologies' Exclusive USA Distributor, introduced a new compact high vacuum evaporator for TEM and SEM at M & M 2004. **The E6500** is a compact high vacuum turbo pumped evaporator ideal for SEM, TEM and general carbon and metal coating applications. No bigger than a domestic microwave oven the E6500 overcomes the disadvantages of many "compact" evaporation systems by using a horizontally mounted vacuum chamber. The design of the chamber and peripheral location of the evaporation sources, allows an optimal source to sample working distance (125mm), while keeping the chamber volume to a minimum (190mm diameter x 100mm deep). This ensures rapid pump down and cycle times. Features include: A 70 l/m turbo pump, Sample stage and source shutter located on the hinged chamber door, Sample stage angle externally adjustable, Single button pump down, Easy to set up - sources are mounted on a one-piece removable cartridge, Simple to clean and maintain – each evaporation source has a clip-on shield and the vacuum chamber fitted with removable liners for easy cleaning of evaporated materials. For further information please contact: Mike Dufraine, At Energy Beam Sciences Inc. Phone: 800-992-9037 or 413-786-9322 · Fax: 413-789-2786, E-mail: mdufraine@ebsciences.com

Evex's feature presentation was the ***Evex-QDD-Violin*** and ***Evex-QDD-Flexible*** X-ray Detectors. The Evex-QDD series of detectors can be installed in place of traditional Si(Li) Detector and/or Silicon Drift Detectors (SDD) and interfaced to Evex's X-ray ***NanoAnalysis Software***. The ***Evex-QDD*** series is capable of light element detection (B); Fine energy resolution (128 FWHM), Great peak stability, and no liquid nitrogen are enjoyed by this series of detectors. But, what captivated everyone's attention was the world's first flexible x-ray detector for electron microscopy (patent pending). The ***Evex-QDD-Flexible X-ray Detector*** allows the detector to be positioned closer to the sample, thus achieving a better solid-angle and greater collection rates (cps). Also the ***Evex-QDD-Flexible*** allows the detector to be positioned in orientations similar to other collection devices: Secondary (SED) or Backscatter (BED) for better correlation between the sensors. Also on display was the ***Evex-NanoTensile Tester,*** a miniature tensile and mechanical tester that performs the following test: Tensile, Compression, Strain, Shear, Torsion, Thermal, Tension - Torsion, Tensile - Shear, 3&4 Bending. Furthermore, Evex introduced the ***Evex-BioPod,*** a medical grade, pod to fit in the ***Evex-BioStage***. . The ***Evex-BioPod*** allows the ***Evex-BioStage*** to remain sterile and contaminant free. The ***Evex-BioPod/Stage*** will assist you in analyzing biological samples in your Scanning Electron Microscope, thus reducing time consuming and extensive preparation such as coating, drying, and sectioning. The ***Evex-BioPod*** can be used to monitor bacteria growth, and toxin effects on cells, tissue, organics, and food products. The ***Evex-Biostage*** offers a hot and cold option for precise environmental control. The ***Evex-Biostage*** is available in two configurations, either with 3 or 7 ***Evex-BioPod*** receptacles. Call Evex for more information (609) 252-9192 or visit them on the web at http://www.evex.com/detectors

FEI Inc. Highlights *Tools for Nanotech* and Sub-Angstrom Resolution at M&M 2004 featuring robust systems and technology announcements. FEI exhibited four systems including the all-new **Tecnai™ G² Spirit TEM**. Designed as the next-generation microscope for life science, it features a high degree of automation and is optimized for high contrast 2D and 3D imaging of cells, cell organelles and soft matter. Also featured were two DualDeam™ (FIB/SEM) systems--the **Nova™ NanoLab 600** and the **Quanta™ 3D**; and a **Quanta FEG SEM**. The popular **Nova NanoLab** is the ultimate tool for prototyping and analyzing nanoscale structures on one system. The Quanta 3D delivers complete below the surface (3D) analysis of samples with multi-mode operation including environmental SEM. After announcing the first commercially available sub-Ångstrom resolution on a 200 kV TEM just earlier this year, FEI announced during M&M that it has developed a new 300 kV S/TEM platform delivering sub-Ångstrom resolution without Cs correctors or a monochromator. With ultra high stability for transmission and scanning probe operation (STEM) in one system, this ultra-high resolution system will open doors for researchers to study morphology, crystallography, elemental and

chemical composition, as well as electronic structure at resolution levels not demonstrated before in a single instrument. With the ability to look between atoms, researchers will be able to study the chemical nature of atoms and what holds them together. The first such system was purchased by Germany's leading national center for Microscopy and Spectroscopy with Electrons–the Ernst Ruska Center. Please visit sales@feico.com for more information.

Fluid Imaging Technologies demonstrated a continuous imaging particle analyzer called the **FlowCAM®**. A laser works interactively with a CCD camera system to detect and capture data on a passing particle. It can eliminate time-consuming microscopy work. Data measurements include particle counts, length, width, shape, ESD. Particle size analysis capability ranges from one micron to three millimeters. The FlowCAM can be used in research, product development, quality control or continuous process monitoring. The FlowCAM is available in benchtop, portable (12 volt) or submersible models. All models offer pattern recognition capabilities and image management such as post-processing editing and library development. For more information, contact Kent Peterson at 207-882-1100 or email to kent@fluidimaging.com.

Gatan Inc. is excited to announce the launch of new, performance-enhancing products for Transmission Electron Microscopes and Scanning Electron Microscopes. These products include: **777 STEMPack**: a complete system for advanced digital STEM, line scans, and spectrum imaging on your TEM/STEM instrument. **EDS Acquisition and Analysis**: Capture and view your EDS data (from all commercially available EDS detectors) from within the industry-leading, programmable GMS data environment; allow simultaneous acquisition and side-by-side viewing of EELS and EDS spectral data; enable full EDS spectrum image acquisition when installed with STEMPack. **ES500W Erlangshen CCD Camera**: An affordable optical-lens coupled CCD camera designed to meet the needs of general purpose digital imaging. **Slope Cutter**: The PSC-Tool, in conjunction with the PECS, has essential advantages in comparison with mechanical grinding/polishing methods and can be applied universally to most materials. **Turbo Pumping Station**: A new modular approach offering more versatility. The TEM holder module offers intelligent design solutions for all cryo-TEM needs while the sample storage module provides vacuum storage for 3mm TEM samples. **ChromaCL**: A new system for live color cathodoluminescence (CL) imaging. ChromaCL uses a unique approach of dispersing light onto an array detector, and live color mixing of the different photonic pulse maps. **Tomography Holders**: A new range of room temperature, cryo-transfer and narrow gap pole piece tomography holders. Many of these new products were demonstrated or displayed at M&M 2004. For more information, please contact your local Gatan representative or visit www.gatan.com.

Hitachi's S-3400N Introduction: Shown for the first time in North America at M&M in Savannah, GA, the S-3400N is Hitachi's ninth generation Variable Pressure SEM. The S-3400N achieves incredible low voltage performance in the VP mode of operation. Built on the success of the S-3000 series Dual Gun Bias, the S-3400N incorporates a patented Quad Gun Bias design that boosts emission current at several set points throughout the accelerating voltage range. This new emission source system, plus Hitachi's patented Continuous Gun Bias ensures the highest possible beam brightness even for demanding low voltage, VP applications. A newly designed five-segment solid state BSE detector allows for specimen observation at fast scan rates and higher resolution, far surpassing other solid state BSE detectors requiring slow scan observation. Other innovative designs include a fully automatic aperture alignment feature that eliminates the daunting task of manual aperture alignment. An analytical chamber incorporates a total of ten analytical ports with three high take-off angle ports for EDS, PBS and full focusing WDS spectrometers. All X-ray detectors plus EBSD can be operated simultaneously at an analytical working distance of 10mm with superior collection geometries. Sample exchange has been reduced to 90 seconds with the addition of a TMP, provided as standard equipment. Standard features such as five axis computer eucentric motorized stage, signal mixing, 5210 x 3840 pixel resolution and PCI image database all built on an easy to use Windows XP platform. Contact: Hitachi High Technologies America, Inc. Steve Joens / Beth Moseley, steve.joens@hitachi-hta.co, 925.218.2800

JEOL USA announced four new high performance instruments at M&M 2004. The new **JSM-6480LV** and **JSM-6380LV** are flexible instrument choices with ultra-wide magnification ranges of 5X to 300,000X, low-vacuum, and high resolution. A large specimen chamber and large stage for observation of very large samples provide users with much versatility for applications ranging from forensics to semiconductors. A new compact footprint fits the requirements of multi-user lab environments. Many new automated features - such as asynchronous five-axis stage movement, unattended data acquisition, and "smart", programmed settings for common samples – make operation fast and easy to use. Additional options include customized toolbars for repetitive functions and enhanced SE. The new **JEM-2100** with LaB_6 is the most recent addition to the JEOL TEM product line-up and shares many of the features of the ultra high performance JEM-2100F. With an ultrahigh stability platform, versatile column configuration, unsurpassed optical performance and high performance LoDrift goniometer, this LaB_6-equipped JEOL TEM is an excellent choice for solving today's problems in nanotechnology and many demanding structural biological applications, including tomography. The **JSM-7401F** is the latest addition to JEOL's field emission scanning electron microscope product family. Equipped with JEOL's unique [patented] Gentle Beam and r-filter for unprecedented imaging quality down to 0.1kV, operators can now observe true, fine surface details. The r-filter mixes secondary electrons and backscattered electrons to clearly image contrasts varying from true secondary images to compositional images. For more information about these or other JEOL instruments, call 978-536-5900, email eod@jeol.com, or visit us @ www.jeol.com

New **KODAK Darkroom Illuminator LED Safelight** is now available from Kodak's Scientific Imaging System's group. Self-contained and ready for immediate use, this unit screws into any standard light socket. Comprised of a cluster of 20 light emitting diodes in the film safe spectrum, The KODAK Darkroom Illuminator enables microscopists to produce high quality TEM images while improving visibility in the darkroom. Eliminating concerns over worn or damaged lamp filters or incorrect bulb types, the KODAK Darkroom Illuminator is maintenance-free and warranted for a full three years. Cost of this new safelight is less than traditional safelight systems. The Kodak Darkroom Illuminator is available through dealers of KODAK Electron Micrography Products. The introduction of The KODAK Darkroom Illuminator reinforces Eastman Kodak Company's commitment to the electron microscopy community to continue providing specially designed films and accessories for TEM imaging. Kodak continually reviews its electron micrography film products and accessories to identify opportunities to incorporate technology improvements or enhancements requested by customers. Rumors that Kodak is planning on discontinuing the manufacture of electron micrography films are false. Kodak plans to continue producing **KODAK Electron Microscope Film 4489 and Electron Image Film SO-163** and the accessories to support these film products. Kodak electron micrography products are and will continue to be readily available world-wide. Please contact our website www.kodak.com/go/scientific or call 1-800-225-5352 or 585-588-2572 for ordering information.

nPoint designs, manufactures, and sells devices for rapid, precise, and repeatable positioning and motion at the nanometer scale. Among the products shown in Savannah included the **PiezoMAX™** series of nanopositioning systems and sensors, the **C-300 series controllers** and the **iC series of closed-loop AFM kits.** The closed-loop AFM kits are of particular interest to those users of AFMs who wish to have more than a microscope for producing surface imagery. To run a fully quantitative, metrology-quality experiment requires a closed-loop linearization system and many of the older commercial AFMs lacked this essential control capability. With this in mind and having excellent scan positioning control capability, nPoint now supply kits for AFMs from manufacturers such

as Veeco and Quesant. Nanopositioning is becoming a critical enabling technology across a variety of industries and is increasingly important in various research and microscopy applications. nPoint, offers a range of nanopositioning products covering all axes of motion and also possesses the capability to accomplish custom projects for Original Equipment Manufacturers (OEMs). The ability to work at this level of precision has become more important in the areas of semiconductor fabrication, materials science and biotechnology as well. Visit www.npoint.com or contact Dr. Katerina Moloni (608) 204 8756 for details of how these products may assist in your research programs.

Oxford Instruments launched two new software packages to add to their INCA software platform – **INCA**Steel and **INCA**Crystal Montage. Additionally, software enhancements to the INCA Microanalysis Suite were also announced. The extra features include, as standard, the functionality to automatically export images and spectra into the Soft Imaging Systems (SIS) software package Scandium. Spectra, images and X-ray Maps can now be batch exported, and spectra and X-ray maps can be associated with an image. Exported with the data are the conditions of analysis, which are then accessed by the Scandium software. **INCA**Steel is a dedicated package developed specifically for the analysis and classification of steel inclusions, using EDS in the SEM. With the increased use of speciality steels in demanding applications an important controlling factor for mechanical properties is the 'cleanliness' of the steel, a measure of the amount and type of small non-metallic inclusions. **INCA**Steel offers a fast and powerful solution for the location and analysis of steel inclusions, giving results that comply with any of the major published standard methods (ASTM, SS, DIN and ISO). **INCA**Crystal Montage combines beam and stage mapping for automated large area crystallographic texture measurement, by EBSD. The accurate stage and image calibrations reduce the need to re-align individual images and maps post acquisition. All the processing options available in INCA Crystal can be performed on the montaged image, including grain boundary/size and orientation measurements and automated texture determination using the unique AutoQ texture functionality. For more information please contact Joe Carr at info@ma.oxinst.com. Tel: +1 800 447 4717

Pacific Nanotechnology, Inc. (PNI) announced the introduction of the **Crystal Scanner™**, a revolutionary approach to nanoscale imaging without the complexity and difficulties associated with atomic force microscopes. This exciting option is compatible with PNI's family of scanning probe microscopes (SPMs). There is no laser associated with the Crystal Scanner™, which means there is no light-lever mechanism for adjustment, giving users a completely new approach to nanoscale imaging. The Crystal Scanner™ uses a new type of force sensor. This is a small crystal oscillator that has a sharp probe mounted at the end of the crystal to scan the surface of the sample. With no laser, operator interaction is minimal, reducing the potential for errors in measurement and making routine imaging available to all potential users. It is no longer necessary to have highly skilled operators to set up, run and interpret data. With the versatile **Crystal Scan Software,** users can rapidly learn how to use the microscope through on-screen video tutorials and have standard sample menus available to reduce operation to a simple method: Point and Scan™ Technology. Whether users are in an academic research environment, or in an industrial analysis laboratory, today's demand is for routine nanoscale measurements to be made from an imaging tool capable of providing results faster with minimal time required to learn the technique. Analogous to the routine use of an SEM, Crystal Force Microscopy (CFM) provides an easy to learn instrument for table-top metrology and imaging available for everybody at an affordable price. For more information, please contact Dr. Paul West, (949) 253 8813

South Bay Technology, Inc. featured some of the latest developments in **Low Energy Ion Polishing** for TEM and SEM sample preparation as well as **Ion Beam Sputter Deposition and Etching** for high resolution FESEM applications. The Low Energy Ion Polishing System featured 3 types of unique ion sources - the standard high energy TeleTwin™ sources with power ranging from 2-10kV, the patented focussed Low Energy Source operating effectively from 50eV to 2kV and the new high energy Focussed Ion Beam Source for extremely high thinning rates.The Ion Beam Sputter Deposition and Etching System (IBS/e), in addition to examples of fine grain thin films on display, also featured the new **Large Area Stage** (LAS) which can accommodate samples up to 4" in diameter! Several completely new products were also introduced including the Model 880 Multi-Wire Saw, a unique "non-contact" polishing system and a bench top EDM system. For more inforamtion contact South Bay Technology at 800-728-2233 or visit them on the web at www.southbaytech.com.

Thermo Electron Corporation exhibited new equipment and software for X-ray microanalysis at Microscopy and Microanalysis 2004. The **UltraDry Silicon Drift X-ray Detector** is a new LN-free solution for high-throughput EDS applications that combines ultra high-count rate, high-resolution performance associated with silicon drift technologies and high sensitivity for light element detection (down to carbon at high count rates). At M&M this year, Thermo demonstrated its ability to run multiple detectors on the same X-ray microanalysis system, which can cut acquisition times in half, or enable input from different X-ray detector types. New **XPhase software** extends the elemental and compositional mapping capabilities of the **NORAN System SIX X-ray Microanalysis System**. Now users can extract chemically unique phases, and create phase distribution map/spectra reports from X-ray maps and COMPASS-processed data. This removes a level of subjectivity required to interpret data and simplifies the process of identifying phases. Thermo also showed new tools for analysis on the NORAN System SIX, including a Photoshop-style "magic wand" area selection tool, isometric map contouring tools, and integration between the NORAN System SIX and the Channel EBSD system from HKL Technology. The **Nicolet™ Almega™ XR Dispersive Raman System** exploits a very small excitation laser spot size (down to 1 μm) and high-quality visible-light optics for exceptional dispersive Raman microscopy. It features high-performance Raman components, several options for specific applications, and a wealth of automation features and advanced viewing options such as DIC, making it an indispensable tool for routine analysis and spectroscopic research. The **Nicolet Continuμm™ XL FT-IR Imaging Microscope** melds FT-IR spectroscopy with microscopic sampling and imaging by combining an infrared imaging detector with a fast automated stage and high quality optics to rapidly generate sharp, high-fidelity chemical images. Enhanced capabilities enable the rapid collection of very large images without compromising microsampling. Both dispersive Raman and FT-IR microsampling systems capitalize on Thermo's leadership in developing software for molecular spectroscopy, including OMNIC™ Atlμs™ software which integrates data collection, processing and visualization in a single, powerful analysis package. For more information, contact Carl Millholland at 1-608-276-6112. carl.millholland@thermo.com

WITec, showcased the Confocal Raman Microscope CRM 200, which is capable of Confocal Raman Imaging of Living Cells. Due to its sensitivity, Raman images with resolution down to 200 nm can be easily acquired. The confocal setup even allows obtaining 3D information. At each image pixel, a complete spectrum is recorded and stored, enabling post-processing data evaluation and image processing capabilities. With the CRM 200, completely new application areas are accessible: The primary focus at the M&M had been the confocal Raman imaging of living cells. Different components of a cell can be easily distinguished in a color coded Raman image. Due to the chemical sensitivity of this method, dedicated parts and organelles of the cell can be made visible without dyeing the sample in advance. The modular setup of the CRM 200 ensures high flexibility and upgrade possibilities to Atomic Force Microscopy and/or Near-field Scanning Optical Microscopy. Additional application areas are materials science, pharmaceuticals, geology or polymer science. Contact: WITec GmbH, Harald Fischer, harald.fischer@witec.de, Phone: +49 (0) 700 94832 366