

NEW AND INTERESTING AT PITTCON 2006

The following exhibitors at the recent M&M-2006 meeting provided these short summaries of what they considered new and/or interesting at their booths on this year's equipment floor.

Nanonics' MV4000 multi-probe SPM systems allow independent scanning of four probes with ultra low noise in a variety of SPM imaging modalities. The system allows upgrading from 1, 2, 3 and ultimately 4 probes. Patented Nanonics ultra thin 3D FlatScanners™ are employed together with probes designed with exposed probe tips for intimate contact (within 10 nm). Unprecedented Z range of 130 microns is provided with 160 microns in X and Y scanning. Probes, as small as 5 nm, permit ultimate SPM resolution even with the multiprobe requirement for exposed probe geometries. A variety of unique probes are available that allow the MV4000 to address the most challenging of today's problems. Multiprobe systems allow for next generation electrical/thermal characterization and imaging of nanodevices with nanometric probe separations. Pump/probe near-field optical (NSOM/SNOM) in all modes of imaging is standard and nano-fountain pens for ultimate chemical writing using a variety of inks (including liquids, gases and solids) is available with on-line ultrafine AFM topographic imaging. Diamond and cylindrical probe nano-indentation is available with on-line super-resolution AFM. Free optical axis from above and below facilitates online optical and electron/ion optical characterization. Thus, the MV4000 is readily integrated with confocal/micro-Raman imaging, opening new avenues for on-line chemical mapping and tip enhancement Raman (TERS) with multiple plasmonic probes. In addition, non-linear optical second harmonic and 4pi microscopies are also permitted. Furthermore, an MV4000 fitted SEM/FIB allows for lamella nanolithout and nanoelectronic device probing with SEM imaging.

Ladd Research – New Product Releases at M&M 2006:

1. **Digital Thermal Evaporator** – Mechanical and diffusion pump system with a water baffle to eliminate the need for liquid nitrogen. Turbo system optional.
2. **Microwave Systems** – Designed to meet all the requirements of life scientists at an economical price.
3. New line of **Drukker diamond knives** – These include the famous Drukker diamond and the new economical Ultra-One for compression free cutting.
4. **EM Specimen Holders** – Including a new line of Hitachi holders.
5. **X-ray Apertures** – As small as five μm in Pb, Ta, W, Rh, etc.
6. **Customized Strip Apertures** – For your EM's and FIB's.

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SEMTECH SOLUTIONS demonstrated the new Elionix 3-D **Electron-beam Roughness Analyzing Microscope (e-RAM)** that has been designed to offer a one nanometer vertical resolution with the incorporation of 4 secondary electron detectors and a Thermal Field Emission (TFE) source. Comparisons to AFM were highlighted on a traceable standard and showed excellent correlation in terms of step height and roughness parameters. The major benefit of the e-RAM compared to AFM is its ability to quickly find the target area of today's 3-D nanostructures, zoom in with high magnifications, and perform roughness measurements with high precision. In addition, the e-RAM offers a broader range of surface roughness height deviations, as well as an expanded lateral resolution compared to that of an AFM. The 3-D roughness measurements are performed with



no tilting required, as compared with the traditional stereo pair technique. This dramatically increases ease of use by removing systematic errors, and allows the e-RAM to perform measurements with magnifications far exceeding the typical stereo photogrammetry technique, thereby offering finer resolution for surface roughness details. The column configuration of the e-RAM is optimized to measure and analyze surface roughness with excellent precision first and foremost, with imaging resolution a second priority. The design of the e-RAM column is such that best imaging is ob-

tained at a 15mm working distance. This working distance is also optimal for X-ray analysis, which is available as an option. For more information contact SEMTECH SOLUTIONS at 978-663-9822, E-mail: sales@sts-elionix.com, Web: www.sts-elionix.com.

Duniway Stockroom Corporation displayed a wide range of vacuum equipment and supplies. We showed four new members of our line of **ion pumps** – 20, 50, 100 and 200 liter per second models. For the electron microscope market we sell a large selection of ion pumps – both standard and custom designs; ion pump control units, high voltage cables and rebuilding services for ion pumps of all manufacturers. In addition, we provide hardware, such as flanges, fittings, gaskets, nuts and bolts. We sell a full range of vacuum gauge controllers and sensors for pressure ranges from 10^{-11} torr to 10,000 torr. At this year's exhibit, we showed for the first time, our new **Terranova Model 970 Multi/Modular Vacuum Gauge Control/Display**. This unit controls/displays a range of sensors from companies such as MKS, Inficon and others. For more information, go to our website, www.duniway.com, email us at info@duniway.com or call us at 650-969-8811.

Olympus America Inc. had several recently introduced products in its booth at M&M. The **SZX2 series of stereo microscopes** offers the largest zoom ratio (16.4:1) and the highest resolution available in a life science stereo microscope. There are two microscopes in the series: the SZX16, for research stereo fluorescence and other high-level life science applications, and the SZX10, for both advanced and standard research requirements such as selecting and sorting specimens. The **DP71 microscope digital camera** combines versatility, exceptional color fidelity and ultra-fast display and transfer rates, providing unmatched performance in its class for both research and clinical applications. The 12-bit digital color camera displays the native CCD's full-resolution live image at 15 frames per second, a new standard among cameras in its category. It can capture a 12.5 megapixel image in under three seconds. The 2-megapixel **DP20 microscope digital camera** displays 1600 x 1200 resolution images at 15 fps on a monitor, projector or PC. In addition, the camera's versatility, ultra-sharp images and outstanding color make it ideal for consultation, education, tumor boards, or with any application that requires frequent documentation, such as pathology, hematology, cytology and microbiology. The **MacroView MVX10 macro zoom microscope** allows zoom macro- to micro-level fluorescence imaging of specimens. The MVX10 offers large working distances and fields of view, similar to stereomicroscopes, making it well suited for visualizing whole organisms and large tissue slices. It also provides high-NA plan Achromat objectives and is optimized to handle low-light fluorescence for imaging cellular features.

Electron Microscopy Sciences proudly introduced their **C-Flat™ holey carbon grids for cryo-transmission electron microscopy**. C-flat™ is an ultra-flat, holey carbon-coated TEM support grid for transmission electron microscopy (TEM). Unlike competing holey carbon films, C-flat™ is manufactured without plastics, so it is clean upon arrival and the user has no residue to contend with. Made with patent pending technology, C-flat™ provides an ultra-flat surface that results in better particle dispersion and more uniform ice thickness leading to higher quality data and ultimately higher resolution. C-flat™ holey carbon grids provide the ideal specimen support to achieve high resolution data in cryo-TEM making them an ideal choice for single particle analysis, cryo electron tomography and automated TEM analysis.

Diatome introduced many new knives including their unique: **Cryo immune knife** which optimizes cryo sectioning for the Tokuyasu technique, **Ultra sonic oscillating diamond knife** for room temperature sectioning offering compression free sections, **Cryotrim 45° and 25°** which optimizes trimming with diamond blades and eliminates the need for glass knives, **Ultra AFM & cryo AFM knives** which are the first diamond knives for AFM at room and low temperatures. And **Cryo 25° knife** for the perfect sectioning of frozen hydrated specimens.

NEW AND INTERESTING AT M & M 2004

Hitachi High-Technologies America (HTA) released a new scanning electron microscope--the **S-3700N**, which features a newly developed large specimen chamber and stage to allow observation of specimens at diameters up to 300mm. Hitachi Variable Pressure SEM (VP-SEM) series have been received with high reputation from customers around the world. They



feature low vacuum observation method (6 - 270Pa), which enables observation of non-conductive samples like electronic components, and water containing samples such as cultured cells, without any sample preparation.

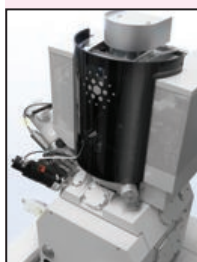
Hitachi High Technologies America (HTA) debuted its newest scanning electron microscope (SEM) in the market—the **SU-70**. This new SEM can perform ultra-high resolution imaging together with various analytical functions. This is to meet

the demands of a new market trend that increasingly demands for image observation at ultra-high resolution and a wide variety of analytical work together in one SEM. The newly developed Model SU-70 is a new-concept SEM, incorporating Hitachi's field-proven semi-in-lens technology and a new Schottky electron gun. It features not only ultra-high resolution (1.0 nm/15kV, 1.6nm*/1 kV) but also reduced charge-up imaging, compositional-contrast imaging, and ultra-low voltage imaging* derived from Hitachi's highly reputed Super ExB filter technology. The new Schottky electron gun, which can produce probe currents in excess of 250 nA†, enables a wide variety of analytical capabilities at high throughput. The newly designed specimen chamber also allows simultaneous mounting of various detectors such as EDX, WDX, EBSP, STEM, BSE, CL. This versatile port design also provides the option for a cryogenic sample stage.

IXRF Systems introduced it's new **EDS user interface called "Horizon"** to meet up with Microsoft's "Vista" that is to be expected for release around the end of the year to replace Microsoft's current operating system XP. This new GUI takes advantage of the new "feel" that Microsoft calls "Aero glass". Image Stitching along with X-ray Map Stitching was also released for free to existing IXRF customers and offered standard in their EDS software suite. Part of the EDS software release was "RoboStage" which allows the user to automate the sampling process using stage automation to define just about anything an EDS system can do, at any Magnification, anywhere on the sample or samples thus the name "RoboStage".

IXRF demonstrated more advancement in the world's only commercially available Micro-XRF tube adapted to the Scanning Electron Microscope. By the addition of XRF to the microanalysis industry, customers can now take advantage of their existing EDS detector and use their SEM as a small-spot or bulk XRF analyzer. IXRF has fully integrated the XRF quantitative software into our EDS2004 software allowing for trace analysis for all non-conductive samples as well as thickness coating measurements for the semiconductor industry.

FEI Company showcased their newest DualBeam™, the **Helios NanoLab™**. The interest built throughout the week as attendees learned of this leading-edge instrument for FIB/SEM applications and its combination of



sub-nanometer SEM performance with next generation FIB capabilities. Helios NanoLab in part owes its performance to the market-leading engineering technology of Titan S/TEM. Combining similar shielding and constant power lenses as well as a refinement of auto-alignments, it achieves the unsurpassed resolution, stability and ease of use required for today's work at the sub-nanometer scale. Helios NanoLab excels at the techniques which support fundamental research at the nanoscale. It is the ultimate sample prepara-

tion tool, providing the thinnest S/TEM samples with minimum beam damage. It delivers stunning image resolution and contrast performance in a variety of detection modes, as well as 2D cross-sectional information or 3D volumetric information with ease. Furthermore, Helios NanoLab integrates a number of patterning, milling, deposition and beam writing processes to enable a wide range of advanced nanoprototyping applications. To learn more about FEI's new Helios NanoLab DualBeam, please visit our web site: www.fei.com

EDAX is delighted to introduce the **Hikari camera for all EBSD applications**. The new high-speed, high sensitivity CCD detector provides a significantly improved EBSD pattern acquisition rate. The mixture of high speed and high quality imaging will meet all your EBSD analysis needs. The Hikari detector performs EBSD scans at 200 indexed points per second (pps) while accomplishing indexing success rates of greater than 99%. The combination of high-speed pattern acquisition with reliable and accurate pattern analysis provided by the Hikari allows users to obtain consistent high-quality data in shorter times. This high level of performance is unequalled by any other EBSD product providing: 200 indexed patterns per second, new camera console integrated within OIM software, new image processing functionality, dual processor for faster indexing rates with greater accuracy, user configurable camera positioning, sleeker camera design, and advanced CCD camera chip and improved pattern imaging optics. The performance benefits of EDAX's Hikari CCD detector include: significantly reduces OIM scan times, high speed reduces the need for overnight scans, a blend of speed and quality well suited for both production and research lab environments, and rapid collection rates that reduce susceptibility to long term SEM beam instability.

South Bay Technology introduced the **Fortress™ FIB Holders**, which are reusable holders that secure FIB samples that are held in a specific orientation without the use of adhesives, adhesive pads, or conductive paint. Fortress™ FIB Holders can be used to position a thin, whole or cut TEM grid/disk in an orientation such that either an in-situ or an ex-situ FIB lift-out technique can be used to attach a FIB-prepared sample. Physical protection of the mounted sample on the grid is provided with the **CastleGuard™** protection design. CastleGuard™ protection provides a rigid support structure that shields the sample while allowing required access for processing. Fortress™ FIB Holders are designed to fit into the SS200 SampleSaver™ storage container for storage and transport in an inert environment. Up to 30 Fortress™ FIB holders can be stored in a single SS200 SampleSaver™ storage container. Once a sample is stored inside the inert atmosphere, the sample does not undergo reactions such as oxidation during storage and/or transportation. It is ideally suited to the preservation of microscopy samples that may undergo changes during the delay between sample preparation and analysis. Special holders are available for secure storage of samples for TEM, SEM, EBSD, FIB and SPM. The storage container can be evacuated and backfilled or purged with an inert gas. Gas can be supplied by connecting it directly to an inert gas cylinder or dry nitrogen can be boiled off of liquid nitrogen and pumped into the storage container using the **Thing-A-Ma-Jug™ Cryogen Gas Supply**. South Bay Technology **True Blue™** and **Final Green™ abrasive films** are produced with a proprietary process combining a unique mixture of abrasive particle sizes and shapes that are bonded to a film backing which enable the film to produce finer surfaces than are normally found in similarly graded micron films. True Blue™ film is typically used after the 1 micron diamond lapping film step and provides a flat, nearly scratch free surface. Final Green™ film is typically used after True Blue™ film and produces an ideal sample surface for analysis.

Delaware Diamond Knives puts sharp edges on hard materials. We offer quality tools optimized for a variety of sectioning application. Our **diamond knives** for ultrathin sectioning and histo knives for thicker sections are known for longevity. The **histo knives** have proven to be excellent