

Wednesday Lunch, October 30, 2013

Exhibitor Technology Spotlight

Room: Hall A - Session EW-WeL

Exhibitor Technology Spotlight V

Moderator: C. Moffitt, Kratos Analytical Limited, UK

12:20pm **EW-WeL2 High-Sensitivity, Quadrupole Mass Spectrometry Method for Measuring Water Vapour Transmission Rate (WVTR) of Barrier Membranes to 10^{-6} g/m²/Day using Deuterium Oxide (D₂O), S. Swann, M.P. Dobson, N. Singh, VGScienta Ltd., UK**

We present a vacuum-enabled measurement technique and equipment utilising mass spectrometry and deuterium oxide combined with a novel calibration method, enabling traceability to national standards. This method incorporated in the VacuTRAN™ instrument allows measurements to 10^{-6} g/m²/day WVTR and the ability to measure multiple species simultaneously. The sensitivity of the UHV system with respect to residual gases and D₂O proton-exchange reactions are discussed.

12:40pm **EW-WeL3 High Efficiency, High Capacity, and Economical "Point of Use" Gas Abatement, S. Yee, CS Clean Systems Inc., D.K. Prasad, CS Clean Systems, Inc.**

Air pollution regulations, employee health concerns, and growing awareness of toxic agents from semiconductor processes demand increased improvements in exhaust gas conditioning. The NOVASAFE® Dry Scrubber reduces the hazards associated with flammable, toxic or corrosive gases and vapors. NOVASAFE® effluent gas scrubbers offer an extremely safe and efficient way to treat toxic and corrosive gases resulting from hazard processes. This scrubber is a technologically advanced dry chemical scrubber containing approximately 2.5 gallons (9.5 liters) of scrubbing media. The scrubber is suitable for use in production and general laboratory environments. Operating passively at ambient temperature, chemical resins in the canister react on contact with process gases and by-products, converting them to non-volatile inorganic solids. NOVASAFE combines high efficiency and high capacity in a compact, in-situ solution providing compliance with appropriate exhaust gas regulations and protocol NOVASAFE is a passive abatement solution for semiconductor, vent gas, R&D and Lab instruments application. As a zero footprint scrubber, the NOVASAFE can be easily integrated with your vacuum pump system. Effluents are abated with the NOVASAFE to sub-TLV levels from roughing pumps and cryopumps. There are no moving parts. Change-outs are accomplished easily and have minimal impact on operations. With its compact and low impact design, the NOVASAFE is the ultimate uptime and economical abatement solution. Typical applications include; Etch, CVD, Implant, MOCVD, ALD, and advanced processes such as III-V Etch. The majority of semiconductor processes gases can be safely abated, including challenging gases such as; AsH₃, SiH₄, Cl₂, F₂, MO's as examples.

1:00pm **EW-WeL4 AFM and Raman Spectroscopy: Correlated Imaging and TERS, I. Armstrong, Bruker**

The desire to identify materials and their properties to understand complex systems and better engineer their functions has been driving scanning probe microscopies since their inception. Both atomic force microscopy (AFM) and Raman spectroscopy are techniques used to gather information about the surface properties and chemical information of a sample. There are many reasons to combine these two technologies, and this presentation discusses both the complementary information gained from the techniques and how a researcher having access to a combined system can benefit from the additional information available.

1:20pm **EW-WeL5 Can Your AFM Do This—Advanced Characterization with Asylum AFM Accessories, A. Labuda, R. Proksch, A. Moshar, Asylum Research, an Oxford Instruments company**

Asylum Research, an Oxford Instruments company, will discuss the performance and results from a variety of AFM accessories used for advanced characterization for MFM, stress and strain measurements, and imaging in fluid. We'll show our Variable Field Module 2 that applies in-plane magnetic fields of more than ±0.8 Tesla (8,000G) and offers ~1G field resolution. Our NanoRack™ Stretching Stage applies symmetric tensile or compressive loading to samples about a central area that can be simultaneously observed with the AFM. Finally, we'll discuss the blueDrive™ Photothermal Excitation capability for Cypher™, the highest resolution fast scanning AFM. blueDrive enhances the performance of AC (tapping) mode imaging by providing extremely clean tunes in both air and water.

1:40pm **EW-WeL6 Nanofabrication Below 10nm Using He and Ne Ions, D. Elswick, B. Singh, Carl Zeiss Microscopy**

Ion microscopy using helium or neon beams created from a gas field ion source (GFIS) shows great potential and flexibility for many imaging and nanofabrication applications. With helium or neon, sub-10 nm structures can be routinely fabricated in a variety of materials including sensitive materials such as graphene. Additionally, the beam-sample interaction dynamics of helium/neon ion beams offer unique contrast and stunning surface detail at sub 0.5nm lateral resolution.

The helium ion beam introduces a unique opportunity for high precision patterning in graphene. High aspect ratio nanoribbons have been machined down to 5 nm without damage. Due to the nature of imaging with the helium ions, non-destructive imaging of graphene with excellent surface sensitivity can be achieved both before and after patterning. Helium and neon beams have also been used for a diverse range of other nanofabrication applications. Solid state nanopores for DNA sequencing devices with holes down to 3 nm in diameter and aspect ratios greater than 10:1 have been created in a variety of materials. In plasmonic applications, dislocation damage to surrounding structural elements is greatly reduced compared to gallium FIB when using helium or neon, thus allowing work on delicate and sensitive membranous materials. Plasmonic devices with nearly vertical sidewalls have been patterned in films demonstrating machining precision of better than 5 nm. Direct write lithography using commercial resists HSQ and PMMA resulted in line features as narrow as 4 nm. Finally, the use of helium and neon ions beams for circuit edit applications is being developed. Deposition of conducting and insulating materials creates features smaller than those obtained with gallium FIB and with better electrical properties due to the absence of gallium.

A gallery of helium ion microscopy imaging and nanofabrication results will be presented to showcase the capability and performance of this novel microscope.

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