Tuesday Afternoon, November 10, 2009

Exhibitor Workshops
Room: Exhibit Hall 1 - Session EW-TuA

Exhibitor Workshop
Moderator: B.R. Rogers, Vanderbilt University

3:20pm **EW-TuA5 *Ztherm*™ Modulated Thermal Analysis with Sub-Zeptoliter Resolution Using the Asylum Research Cypher and MFP-3D AFMs**, ***J. Li***, *R. Proksch*, Asylum Research

Asylum Research, the technology leader in Scanning Probe and Atomic Force Microscopy (SPM/AFM) will present the new *Z*therm Modulated Local Thermal Analysis Option for its MFP-3D™ and Cypher™ AFMs. *Z*therm provides highly localized heating with sensitivity to $\leq 10^{-22}$ liter (sub-zeptoliter) materials property changes, more than an order of magnitude improvement in volume over that previously available with commercial systems. A standing problem with existing AFM-based thermal analysis systems is thermally induced bending of the cantilever that results in spurious deflection signals and variable loads being applied during heating. Asylum has developed a patent-pending cantilever compensation and control solution that corrects this problem, providing constant-load detection of thermally induced melting (Tm), phase transitions (Tg) and other morphological and compliance effects for materials studies and material identification – for areas less than 20nm x 20nm. In addition to standard thermal analysis capabilities, the *Z*therm package can also be used to evaluate contact stiffness and dissipation as a function of temperature with advanced techniques such Dual AC Resonance Tracking (DART™). The contact stiffness and dissipation – measured at the cantilever resonance – are much more sensitive to temperature dependent properties, including surface melting and transition temperatures, than conventional deflection-based measurements. In addition, integrated piezo actuation allows high resolution AC imaging of samples for surface topographical mapping before and after thermal measurements.

3:40pm **EW-TuA6 Difference Raman for Enhancing Image Resolution by Accurate Tip Positioning of an Atomic Force Probe that Enhances or Shadows the Raman Signal**, *J. Ernstoff*, ***R. Dekhter***, *H. Taha*, *A. Israel*, *D. Lewis*, Nanonics Imaging Ltd., Israel, *A. Lewis*, Hebrew University of Jerusalem, Israel

Tip enhanced Raman scattering (TERS) has been shown as a potential technique for overcoming limitations of conventional micro Raman spatial resolution and for other apertureless near-field optical measurements based on plasmonic interactions. In this talk we will compare the resolutions obtainable by such plasmonic enhancement techniques as compared to a method we have developed based on the ultra-sensitive nature of difference Raman. In this latter technique an AFM probe with an exposed tip geometry that is optimized to block a nanometric region of a sample will be used in conjunction with difference Raman to obtain significant improvements in Raman image resolution over conventional far-field scattering. For this new imaging protocol one has to have not only exposed tip geometries but also an AFM system that can modulate and scan the probe independently of the sample scanning required for Raman imaging systems. The tip scanning is required for optimizing the position of the probe tip for maximizing the shadow effect on the sample in the near-field. The independent tip movement is required for bringing the probe in and out of the near-field of the sample so that a difference Raman can be recorded at each pixel and an image formed as the sample is scanned point by point. All of the above in terms of the Shadow protocol are predicated by having an AFM system that has a completely free optical axis from above and is completely independent from the lens of the micro-Raman. Results will be shown on structured thin films of strained silicon on silicon to show the relative fidelity of these imaging modalities. The results indicate that Shadow Near Field Scanning Optical Microscopy (sNSOM) is a powerful technique that can be applied for significant improvements in Raman imaging spatial resolution.

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