Tuesday Afternoon, October 21, 2008

Exhibitor Workshops
Room: Exhibit Hall - Session EW-TuA

Exhibitor Workshops
Moderator: R. Langley, Consultant

3:20pm **EW-TuA1 Deposition Tolerant Langmuir Probe**, *D. Gahan, B. Dolinaj, **M.B. Hopkins***, Impedans Ltd.

In a standard Langmuir probe system the monitoring of plasma parameters during plasma deposition is limited by the effects of probe surface contamination. A number of issues arise: i) A Langmuir probe immersed in the plasma during deposition processes is subjected to the deposition of a layer resulting in a large disturbance of the probe characteristic. Surface contamination changes the work function, resulting in a shift of the probe characteristic and/or in hysteresis in the I-V Characteristic. The formation of dielectric layers causes the slope of the characteristic to become shallow and eventually reduce the current to zero. This problem is addressed in current Langmuir probe systems based on electron or ion cleaning but limits the probe operation to plasma with low deposition rates. ii) A poor ground return path for the electron current causes shifts in the plasma potential. While this problem is addressed in modern probe systems by using a floating reference probe to compensate for low frequency effects, in deposition plasmas the reference electrode cannot be cleaned by electron bombardment and may be become insulating. The poor electron ground return is made worse by insulating coatings on the wall. In order to produce a Langmuir probe that can operate well in deposition plasma we have introduced a high frequency swept probe. The probe attains a dc bias negative relative to the plasma potential and draws a net current close to zero. The probe records the ac IV characteristic or complex impedance of the sheath and determines the plasma parameters. This technique is valid even in the case of a fully insulating layer forming on the probe surface. The probe draws little net current and minimal ground return is required. We show that the plasma to ground sheath capacitance provides sufficient current during the electron collection period. A unique feature of the probe is the ability to attain a bias voltage above the plasma potential even when coated with a non-conducting layer. We show results of the system in an O2/N2 plasma and compare the swept probe with a standard Langmuir probe.

3:40pm **EW-TuA2 Latest Developments and Application of the Qtac100 for High Sensitivity LEIS**, ***N. Havercroft***, ION-TOF USA, Inc., *E. Niehuis, T. Grehl*, ION-TOF GmbH, Germany

The new high sensitivity and high resolution Low Energy Ion Scattering (LEIS) instrument, the $Qtac^3$, delivers quantitative top atomic layer characterization. It is able to quantitatively analyze the outermost atomic layer of a solid and gain in-depth information in a non-destructive way. The surface is bombarded with low energy (up to 8 keV) noble gas ions that scatter from individual surface atoms. The energy of the ions after scattering is characteristic of the mass of the surface atom. If the scattering event occurs below the surface, an additional depth dependent energy loss can be measured, providing information about the composition of the sample up to 10 nm deep (“static depth profiling”). With its unique energy analyzer, the scattered ions are detected with high sensitivity, while simultaneous high mass resolution allows unambiguous elemental identification. With a pulsed ion beam and time-of-flight filtering, the background of sputtered ions can be resolved from the scattered ions, improving the detection limits for light elements and for trace element detection. Together, this allows an application of the Qtac to many technologically relevant fields. We will present the latest developments of the Qtac100, and show the benefit of the instrument to a variety of applications from traditional surface science to industrial uses. Among these, semiconductor materials (e.g. thin films, layer growth) and heterogeneous catalysts (e.g. Au/Pt nano-clusters, determination of poisoning sites) are the most prominent ones, but other fields that require quantitative top atomic layer characterization will also be addressed.

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