Wednesday Lunch, November 9, 2016

Exhibitor Technology Spotlight
Room Hall C - Session EW-WeL

Exhibitor Technology Spotlight Session
Moderator: Chris Moffitt, Kratos Analytical Limited

1:00pm **EW-WeL3 Why Test Inks Cannot Tell the Full Truth About Surface Free Energy***, **Thomas Willers**, M. Jin,* KRUSS

There are a range of methods for activating the surface when treating materials before coating, bonding or printing. These include thermal or electrical methods, such as plasma, flame or corona treatment, and chemical treatment with oxidizing gases. Equally important are cleaning steps which remove hydrophobic substances from the surface. All these methods increase the surface free energy (SFE) and therefore improve wettability and adhesion. Norms such as DIN 55660 for coating materials and DIN EN 828 for adhesive processes specify contact angle measurement as the method for determining the SFE of surfaces and for checking an activating or cleaning pre-treatment process. In addition, these inks, which are intended to reflect the SFE based on liquids with set surface tension (SFT) are also frequently used. According to the ink test method, complete wetting always occurs when the values of he SFE of the solid and the SFT of the liquid are equal. Many scientific authors have refuted this wetting theory and have shown that only an analysis of the polar and dispersive interaction fractions of the SFE and the SFT provide a complete picture of the wetting process. Contact angle measurements, which take these interactions into account, and ink tests should accordingly lead to different evaluations of surfaces and therefore also to different assessments of the quality of a pre-treatment process. In the present study, we have compared SFE results from contact angle measurements with those from ink tests for 13 very different materials. We also carried out comparative measurements on three plasma-treated plastics. Both the small number of consistent results and the large number of deviations can be conclusively explained when we take the effect of polar and dispersive interactions into account. It appears that the SFE result of an ink test must be called into question for many samples. In this discussion, we also point out some advantages of the contact angle method in measurement practice.

1:20pm **EW-WeL4 A Vacuum Species Sensor using Remote Plasma Emission Spectroscopy for Direct Monitoring of Vacuum Processes***, **Joseph Brindley**, D. Benoit, V. Bellido-Gonzalez,* Gencoa Limited, UK

Some form of monitoring of the vacuum environment is essential for the efficient operation of any vacuum processes. This can be achieved through a variety of sensors; from simple total pressure sensors, to highly sensitive quadrupole mass spectrometers. In particular, residual gas analysis (RGA) can be performed with quadrupole mass spectrometers. Residual Gas Analysis allows for detection and identification of individual species within the vacuum. This can result higher process yields through faster troubleshooting, scrappage reduction through contamination detection, more efficient use of pumping time, or a more controlled vacuum environment. The limiting factor for Quadrupole RGAs is the pressure range over which they can operate. Above $1x10^{-4}$ mbar damage will occur to the sensor's filament – restricting its use above this pressure. To overcome this obstacle a differential pump can be used to bring the local pressure at the sensor down to the required range. However, this is a costly addition and spurious readings can be generated from the differential pump itself. An alternative residual gas monitoring sensor that operates directly at pressures above $1x10^{-4}$ has been built around plasma emission monitoring. A small "remote" plasma can be generated inside a sensor that is part of the main vacuum. Consequently, species that are present within the vacuum will become excited in the sensor's plasma, emitting light at certain wavelengths, which can then be used to identify the emitting species. Advances in miniature spectrometers in combination with advanced spectrum identification software has resulted in a robust, lower-cost, multi-purpose vacuum sensor. Presented are a number of examples of its use in monitoring a variety of vacuum conditions such as contaminant detection, water vapour outgassing, etching process monitoring, pump down analysis and reactive deposition control.

1:40pm **EW-WeL5 Raman Imaging of Samples with Complex surface Topographies Using Renishaw's inVia Qontor***, **Tim Prusnick**,* RENISHAW, INC.

Recent advancements in hardware and software have been made to enable micro-Raman focus to be maintained over large areas during data collection. These developments allow analysis of samples that in the past were impractical or even impossible because of variations in surface topography. With the addition of Renishaw's latest innovation, Live Track™ focus tracking technology, the inVia Qontor enables users to analyze samples with uneven, curved or rough surfaces.

2:00pm **EW-WeL6 Ampoules and Bubblers 101***, **William Kimmerle**, K.S. Kimmerle,* NSI

NSI Bubblers and Ampoules are commonly used in Atomic Layer Deposition, Chemical Vapor Deposition, Epitaxial growth on crystalline substrates and numerous other applications. The drive for smaller structures continues to demand new materials and molecules as well as methods for depositing these new materials. Bubblers and ampoules provide a means of safely transporting and precisely delivering these new molecules to wafer substrates. Additionally, as higher vapor pressure materials are utilized, temperature control and ampoule content monitoring become salient. A discussion of safety (Code of Federal Regulations - DOT 4B), various types of ampoules and bubblers for use with liquids and or solids at increasingly higher temperatures will be discussed. NSI – is the largest premium quality manufacturer of Ampoules and Bubblers for use in ALD, CVD, Compound Semi and Epi in the world.

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