Tuesday Lunch, November 1, 2011

Exhibitor Technology Spotlight
Room: West Exhibit Hall - Session EW-TuL

Exhibitor Technology Spotlight
Moderator: Langley

12:20pm **EW-TuL2 New Developments in Surface Analysis from Thermo Fisher Scientific**, *T.S. Nunney*, ***R.G. White***, *A. Bushell, P. Mack*, Thermo Fisher Scientific, UK

Surface structure and chemistry are crucial to the successful production and operation of innumerable devices, materials and coatings. X-ray photoelectron spectroscopy, with its high surface specificity and chemical state sensitivity, is an ideal tool for the evaluation of material composition. XPS depth profiling allows the identification of chemical variations in materials from the surface to bulk, and facilitates characterisation of complex layer structures. Recent advances in ion source design have seen the introduction of noble gas cluster ion beams for depth profiling applications, which allow materials that are unstable under monatomic ion bombardment to be analysed.

Solutions to structural and chemical problems using the full range of state-of-the-art, fully integrated X-ray photoelectron spectrometers from Thermo Fisher Scientific are presented. These include the characterisation of thin film polymer coatings, and determination of the structure of multilayer stacks. The effectiveness of the analyses, and the automated data refinement processes using new features of the award-winning Avantage datasystem, are shown for each of these examples.

12:40pm **EW-TuL3 A Complementary Approach to the Chemical and Structural Characterization of Graphene with Raman and X-ray Photoelectron Spectroscopy**, ***T.S. Nunney***, *R.G. White*, Thermo Fisher Scientific, UK, *M. Wall*, Thermo Fisher Scientific, *K. Bolotin*, Vanderbilt University, *H.M. Meyer III*, Oak Ridge National Laboratory

The application potential of graphene is currently being extensively explored by the materials science community. Its utility as a transparent conductive electrode for the microelectronics industry is already being exploited. More recent progress has demonstrated how the unique combination of electronic, chemical, and structural properties of graphene will have a significant impact on the development of next-generation thin film transistors. Additional applications of graphene to molecular sensors are underway. In all stages of development there is a critical requirement for materials characterization and analysis: from the initial research stages through to testing of the finished devices. Because most materials need to be analyzed for compositional homogeneity both across the surface and through the thickness of a given sample, a complementary approach involving several techniques is often required.

In this presentation we will discuss how a multi-technique approach using Raman spectroscopy and XPS can address the problems associated with the analysis of ultra thin film materials. Raman microscopy is a vibrational technique that is very sensitive to small changes in a molecule's geometric structure and its environment. This sensitivity allows Raman to be used as a probe for a number of properties important to a specific graphene sample. These properties include, but are not limited to layer thickness, the presence or absence of defects, and local strain. XPS enables complete characterization of thin graphene films with respect to chemical modification, in addition to the chemical interaction between the film and the substrate. The combined XPS/Raman measurement approach will be applied to graphene produced by both exfoliation and CVD methods, providing a full comparison of the chemical and structural information offered by each technique.

1:00pm **EW-TuL4 Optimized XPS Depth Profiling of Organic Materials using Polyatomic Ion Sources**, ***D. Surman***, Kratos Analytical Inc., *C. Blomfield, A. Roberts, S. Page*, Kratos Analytical Ltd., UK

Over the last several years multiple methods have developed for the depth profile analysis of organic materials using a variety of different polyatomic species as the sputtering ion. It has also become clear that different classes of polymers require quite different sputtering parameters to be effectively profiled with no loss of chemical information. In this presentation we discuss a variety of approaches that have developed in order to effectively sputter profile a wide range of materials. These approaches utilize differences in ion beam energy, impact angle and sample temperature in order to achieve an effective sputter profile.

1:20pm **EW-TuL5 Advances in XPS Chemical Imaging and Depth Profiling**, ***J.S. Hammond***, *D.G. Watson, P.E. Larson, S.N. Raman*, Physical Electronics

Optimized scanning x-ray microprobe technology has been shown to provide superior sensitivity with minimal data artifacts for micro-area XPS. To improve the chemical state sensitivity, computation methods have been developed to provide a 10X improvement in count rate for chemical state spectroscopy with reduced x-ray damage. Utilizing the unscanned analyzer mode of operation, a user selectable number of data channels are now available for optimized chemical state imaging and chemical state depth profiling. Examples of these new computational methods will be presented for XPS chemical state imaging of patterned semiconductor and polymer samples as well as organic XPS depth profiling.

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