Exhibitors & Manufacturers Technology Spotlight
Room: Southwest Exhibit Hall - Session EW-TuL

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Moderator: D.J. Surman, Kratos Analytical Inc., R. Langley, Consultant

12:20pm **EW-TuL2 A Multi-technique Approach to the Characterization of Patterned Polymers Using ESCALAB 250Xi**, ***P. Mack****, R.G. White, A. Wright*, ThermoFisher Scientific, UK

Surface treatment of polymers produces materials that exhibit a wide range of surface compositions, properties and structures. The chemical and structural properties of these novel materials can be exploited for the fabrication of devices for bio-medical and electronics applications. The combination of a variety of complementary surface-sensitive electron spectroscopies maximizes the information available to the analyst for full quantitative surface characterization of standard and patterned polymer surfaces

This presentation will show how the new Thermo Scientific ESCALAB 250Xi, a multi-technique surface analysis system, can be used to investigate the chemistry and structure of various standard and patterned polymer samples. Chemical changes produced by surface treatments were examined by high energy resolution XPS and angle resolved XPS. Complementary REELS measurements were used to examine the level of carbon unsaturation at the uppermost surface of each of the polymer samples. Ultraviolet Photoelectron Spectroscopy (UPS), REELS and XPS valence band analysis were used together to comprehensively evaluate the valence electronic structure of the polymers.

Chemical and elemental changes as a function of X, Y coordinate were evaluated on both the microscopic and macroscopic scale, employing techniques such as high spatial resolution parallel imaging. The continuous position imaging detector on the ESCALAB 250Xi allows fully quantitative images to be acquired, with full XPS region spectra at each imaging pixel. The ability of ESCALAB 250Xi’s advanced Principal Components Analysis algorithms to streamline the processing of such imaging data will be demonstrated.

12:40pm **EW-TuL3 A New Cluster Ion Beam for Depth Profiling Challenging Organic Materials**, ***J.S. Hammond***, Physical Electronics

C_{60} and coronene cluster ion sources have been recently introduced for XPS and TOF-SIMS sputter depth profiling of many polymer materials. These sources have also been very successful for the removal of common organic contamination before XPS and TOF-SIMS surface analysis. This experience with C_{60} and coronene cluster ion sources has revealed several polymer systems for which these cluster sources can not produce “non-destructive” chemical depth profiling with XPS and TOF-SIMS. Typically these polymers are either cross-linked, highly susceptible to radiation induced cross-linking, or are polymerized with bonds that are not amenable to sputter depth profiling. A new gas cluster ion beam (GCIB) source that produces massive argon cluster ions will be shown to successfully produce XPS and TOF-SIMS depth profiles on challenging materials such as polyimide thin films. The GCIB source can also be used to remove ion beam and plasma induced damaged layers on polymer materials.

This new ion source will greatly expand the breadth of materials for which XPS can produce chemical state depth profiles on multi-layer thin films. In addition, the use of a dual beam depth profiling approach with GCIB and LMIG sources on TOF-SIMS instruments will expand the applications for 3D characterization of polymer and biomaterial samples. Examples will be presented demonstrating the benefits of the GCIB for both XPS and TOF-SIMS analyses.

1:00pm **EW-TuL4 Recent Developments in X-ray Photoelectron Spectroscopy Data Acquisition and Processing**, ***D.J. Surman****, C. Moffitt,* Kratos Analytical Inc.*, C.J. Blomfield, A.J. Roberts, S.J. Hutton, G. Mishra*, Kratos Analytical Ltd., UK

X-ray Photoelectron Spectroscopy (XPS) is a powerful analytical technique for material characterization. Over the last several years the instrumentation associated with this technique has undergone many significant enhancements and changes that have substantially improved the capability and effectiveness. These improvements have been related to both the hardware and software systems. We have previously described enhancements that relate to both spectroscopy and imaging as well as detector designs. In this presentation we will describe newer developments that have extended the range of materials that can be analyzed as well as substantially improved the interpretation and understanding of the data.

New developments in the use of Polycyclic Aromatic Hydrocarbons (PAH's) for the preparation and analysis of organic surfaces will be presented. These developments have resulted from an enhanced understanding of the processes involved and optimization of the sputtering conditions required to achieve optimal results. Once the spectral data has been obtained, improvements and the development of new software processing techniques have been employed to further enhance the information content and understanding of the sample composition. The application of these techniques to both organic and inorganic materials will be described.

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