Exhibitor Technology Spotlight Workshops
Room: West Hall - Session EW-TuM

Exhibitor Technology Spotlight
Moderator: Chris Moffitt, Kratos Analytical, Inc.

10:20am **EW-TuM8 Development of a Novel Single Cold Cathode Ionization Gauge with Operation from High Vacuum to Atmosphere using Advanced Manufacturing Techniques**, ***Dave Kelly***, *G. Brucker*, MKS Instruments, Inc., Pressure and Vacuum Measurement Group

Cold cathode ionization gauges (CCIGs) have been used for decades to make high vacuum measurements on a variety of production equipment. Traditionally, wide-range CCIGs involve multiple gauge techniques for pressure measurement, making this technology cost-prohibitive and not as robust for many industrial applications. In order to expand the scope of CCIG technology to address cost-sensitive and rugged applications, we have developed an innovative wide-range CCIG. This new CCIG utilizes a one gauge technique – gaseous discharge – which is capable of measuring pressures from high vacuum to atmosphere. Advanced manufacturing techniques were employed that allowed for the testing and selection of low-cost construction materials that are well suited for industrial environments. Moreover, these manufacturing techniques allowed for a design of this new gauge to be easily serviceable during routine preventive maintenance cycles, lowering the overall cost of ownership for a given application. The result of this development yielded a manufacturable low-cost wide-range CCIG capable of accuracy that meets the needs of the industry from 1E-7 Torr to atmosphere.

10:40am **EW-TuM9 New Developments from Thermo Fisher Scientific**, ***Timothy Nunney***, *P. Mack, C. Deeks, A. Bushell*, Thermo Fisher Scientific, UK

In this presentation we will highlight the latest developments in surface analysis and materials analysis instrumentation from Thermo Fisher Scientific.

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

Exhibitor Technology Spotlight
Moderator: Chris Moffitt, Kratos Analytical, Inc.

12:40pm **EW-TuL2 Design and Application of a New Laboratory-Based Scanning XPS/HAXPES Instrument**, *R. Inoue, H. Yamazui, K. Watanabe*, ULVAC-PHI, Japan, *S.R. Bryan*, ***John Newman***, *J.E. Mann*, Physical Electronics

X-ray Photoelectron Spectroscopy (XPS) is a widely used surface analysis technique with many well established industrial and research applications. The surface sensitivity (top 5-10 nm) of XPS and its ability to provide short-range chemical bonding information make the technique extremely popular in materials characterization and failure analysis laboratories. While its surface sensitivity is an important attribute, in some cases, the depth of analysis of XPS is not sufficient to analyze buried interfaces without first sputter etching the sample surface. However, sputter etching can often lead to alterations of the true surface chemistry. For this reason, some scientists turn to another technique - Hard X-ray Photoelectron Spectroscopy (HAXPES), available in some synchrotron radiation facilities. HAXPES utilizes X-rays typically defined as having energies greater than 5 keV. Depending on the energy used, these hard x-rays can provide for depths of analysis 3 or more times those of soft x-rays used on conventional XPS systems. This presentation will describe a newly developed laboratory-based instrument, the PHI Quantes, equipped with monochromated scanning Al Kα (1486.6 eV) and Cr Kα (5414.9 eV) x-ray sources, thus enabling both traditional XPS and HAXPES experiments in the same instrument. Combining both soft and hard x-ray analyses, we can gain an even better understanding of composition with depth and information at buried interfaces.

1:00pm **EW-TuL3 Application of X-ray Photoelectron Spectroscopy for the Characterisation of Biomaterials**, *C. Moffitt*, Kratos Analytical Ltd, *D. Surman*, Kratos Analytical Limited, *S.J. Coultas*, ***Jonathan Counsell***, Kratos Analytical Limited, UK

The Kratos AXIS series of photoelectron spectrometers are now widely applied to the characterisation of surfaces of biological interest. With its high energy resolution and excellent sensitivity at selected areas, XPS is routinely used to determine the surface chemistry of materials which interact with the native-tissue, organ or function in a body. Both the AXIS Supra and AXIS Nova utilize large sample holders and, when combined with the standard automated sample transfer capability, provides the ability for high sample throughput. These strengths are demonstrated in the XPS characterisation of printed micro-patterned co-polymer arrays leading to the discovery of novel biopolymers. The high spatial resolution imaging capability of the AXIS spectrometers is also used to probe the lateral distribution of surface chemistry of these co-polymer array samples. The recent development of the gas cluster ion source (GCIS) for depth profiling 'soft' materials means that XPS is no longer limited to simple surface analysis. The characterisation of the sub-surface and bulk biomaterial properties is now a reality and is demonstrated in the depth profiling of drug eluting bioresorbable stents. The efficacy of these stents is dependent on the drug distribution through the coating which is measured during a GCIS depth profile. In this presentation we will demonstrate the capabilities of the latest Kratos X-ray photoelectron spectrometers lateral resolution, depth distribution of elemental and chemical states, and detection sensitivity through the characterisation of biomaterials.

1:20pm **EW-TuL4 Advanced Photoelectron Spectroscopies Setup As a Key for Current Research**, ***Lukasz Walczak***, PREVAC, Poland

PREVAC is intended to provide advance equipment for professionals around the world to state-of-the-art research and development in the field of nanoscience and nanotechnology. We would like to promote the latest products, equipment, technology solutions and innovations for the photoelectron spectroscopies field. Few selected PES systems will be presented for study of important topics, including new materials, topological insulators, surface alloys, superconductors and others phenomena. Details technical descriptions from the systems and subsystems will presented for the laboratory and synchrotron research. Also, it will be displayed some new development of the cry manipulators and various types of the photoelectron spectroscopy components.

1:40pm **EW-TuL5 Advanced Ion Beam Techniques for Thin Films and Structuring**, ***Marcel Demmler***, AARD

Latest techniques using Ion Beam Technology for localized trimming of thin films to Angstrom level, CMP error correction, precision angled sidewalls, and highly adjustable selectivity of etch.

2:00pm **EW-TuL6 From Surface Spectrometry to 3D Analysis - Latest Trends and Instrumentation for TOF-SIMS**, ***Nathan Havercroft***, ION-TOF USA, *R. Moellers, A. Pirkl*, ION-TOF GmbH, Germany

During the last 25 years IONTOF has continuously made significant development efforts to further improve the instrumentation for Time-of-Flight Secondary Ion Mass Spectrometry (TOF-SIMS) and related techniques. Some of the most recent achievements include in-situ sample preparation and tomography by FIB, enhancement of maximum count rates and dynamic range in conventional depth profiling of inorganic materials, the design of a TOF-SIMS / SPM combination instrument, as well as the integration of an Orbitrap™ mass spectrometer with unrivalled mass resolution and mass accuracy into the TOF.SIMS 5 instrument. IONTOF's, new TOF.SIMS NCS instrument platform combines all the well-known options of our high-end TOF.SIMS 5 system with the possibility to perform in-situ SPM measurements. The sophisticated, large area SPM unit has a scan range of up to 80 x 80 μm^2 and is ideally suited to provide topographic information for SIMS measurements. Beside AFM, MFM, KPFM and multi-frequency modes it also supports a unique surface profiler mode which allows for fast measurements of large SIMS craters. The new piezo sample stage with submicron position accuracy ensures fast and precise movement between the TOF-SIMS and the SPM measurement position. Depth profiling of organic materials, e.g. layer systems for optical and electronic devices, can be ideally performed using gas cluster ion beams (GCIB) in combination with TOF-SIMS. For optimum performance, a dual-beam approach is usually utilized, employing a lower energetic quasi DC sputter beam for material removal and a short-pulse small-spot analysis beam for optimal mass spectral and imaging performance. However, molecular identification of unknown substances, e.g. contaminants, is usually hampered by constraints in mass resolution and mass accuracy of the TOF analyzer. Furthermore, ions generated in the sputter phase of the dual-beam experiment are lost for analysis. In order to overcome these limitations, a TOF / OrbitrapTM SIMS hybrid instrument has been developed in order to combine all advantages of a state-of-the-art TOF-SIMS with the mass spectrometry performance of a Q Exactive™ HF mass analyzer. The Q ExactiveTM HF provides a mass resolution of more than 240,000 @ m = 200 u, <1 ppm mass accuracy, and full MS/MS capabilities for structural analysis of complex molecules. By utilizing these unique features, the SIMS analyst can make peak identifications with much greater confidence.

Exhibitor Technology Spotlight Workshops
Room: West Hall - Session EW-TuA

Exhibitor Technology Spotlight Session
Moderator: Chris Moffitt, Kratos Analytical, Inc.

4:00pm **EW-TuA6 eSpectra: Surface Science**, ***Jessica Hoy***, AIPP/AVS
When you search through scientific scholarly journals for specific information within the data, do you sometimes wish you didn't have to sort through multiple papers and the static figures buried within them but instead an organized set of graphs, datasets, or peak assignments? eSpectra: Surface Science is an online platform where you can access and plot peer-reviewed datasets of more than 4,000 spectra from 700 materials published in over 600 articles in Surface Science Spectra (SSS), the definitive international journal of spectral data published by the AVS. The only interactive tool of its kind, eSpectra includes XPS, AES, and UPS experimental techniques. Upload and plot your own data and compare it to SSS data to better understand, analyze, and validate your results. Download and print plotted graphs, or save, share, and store your graphs and data in a secure environment. We offer both free and Premium Access options. When you register for free, you also receive a 30-day free trial of Premium Access. Learn more today at eSpectra.aip.org.

Exhibitor Technology Spotlight Workshops
Room: West Hall - Session EW-WeM

Exhibitor Technology Spotlight Session
Moderator: Chris Moffitt, Kratos Analytical, Inc.

10:20am **EW-WeM8 State-of-the-art Pump Technologies for Clean High and Ultra-high Vacuum**, *M. Audi*, Agilent Technologies, Italy, ***Jim Ramsden***, Agilent Technologies

A close-up look at recent developments in pump technologies that deliver clean high and ultra-high vacuum, with a focus on the benefits for research applications in those regions. Come see the new quiet, hermetic IDP dry scroll pumps which deliver excellent performance and require only simple, infrequent maintenance. We'll also be looking at the most recent TwisTorr FS turbomolecular pumps with robust floating suspension and exceptional light gas pumping capability, which permit the use of smaller primary pumps than other turbos of the same size. And we'll have look at the new VacIon Plus 200, the first ion pump with maximum pumping speed at low pressure, as well as a preview of some new developments for UHV.

Authors Index

Bold page numbers indicate the presenter