Exhibitor Technology Spotlight Workshops
Room Hall A - Session EW-TuB

Exhibitor Technology Spotlight Session I
Moderator: Christopher Moffitt, Kratos Analytical Inc

10:20am **EW-TuB-2 IMPULSE HIPIMS Power Supply with Positive Pulse Option Advantages*, Jason Hrebik,*** Kurt J. Lesker Company

HIPIMS is an ionized PVD technique that produces a high density, high performance films. The extreme power densities in HIPIMS create a higher ionized plasma that creates a very high energy of material being deposited onto the substrate.

The IMPULSE HIPIMS supply offers a cost effective solution for HIPIMS research and process development. The IMPULSE is a scalable option for higher power applications ideal for production application scale up.

The supplies broad range of parameter adjustment along with its positive kick pulse option, provide the tools necessary to tune each process for ideal performance. This presentation will share examples of applications and performance data to support the many advantages of the IMPULSE power supply. The available configurations and examples of ideal operating parameters will be shared.

10:40am **EW-TuB-3 Choosing the Proper Equipment for Vacuum Heat Treatment*, Rachael Stene,*** Across International

Selecting the proper equipment is the first step in completing a successful process. There are several factors to consider such as target temperature, required heating rate to achieve a certain time to temperature, desired vacuum level, sample size, chemistry of the system's atmosphere, and more. Here, we elaborate on the many aspects which may be involved in your application, helping you select the perfect components for the operation. Across International's line of material processing equipment offers several advantages and comes with many helpful features, which sets us apart. We'll elaborate on these factors and the AI advantage in this presentation.

Exhibitor Technology Spotlight Workshops
Room Hall A - Session EW-TuL

Exhibitor Technology Spotlight Session II

Moderator: Christopher Moffitt, Kratos Analytical Inc

12:40pm **EW-TuL-3 Correlative Spectroscopy with the Thermo Scientific Nexsa*, Tim Nunney,*** *P Mack, R Simpson,* Thermo Fisher Scientific, UK

In this presentation we will highlight how the multi-technique capabilities of the Thermo Scientific Nexsa system can be used to analyse samples from a range of application areas.

1:00pm **EW-TuL-4 Exploring the Capabilities of a Modern XPS Spectrometer: In-situ Surface Preparation & Modification*, Adam Roberts,*** Kratos Analytical Limited, UK*; D Surman, C Moffitt,* Kratos Analytical Inc*; J Counsell,* Kratos Analytical Ltd, UK

XPS is unique in being able to generate quantitative, chemical state information from a wide range of conducting, semiconducting and insulating materials. The information can be extremely surface sensitive, probing the outermost 1 -3 nm of the surface by angle resolved XPS. Higher energy X-ray excitation sources, such as Ag Lα (2984.2 eV) can be used to generate information from the near surface, up to 20 nm, whilst the destructive sputter depth profiling using Ar_n^+ gas clusters can provide XPS data from several microns into the 'bulk' material.

These attributes of the modern spectrometer can be used in combination with in-situ modification of surface chemistry. Such an approach is of importance in gaining a better understanding of the functionality of materials. To aid research of these types of samples Kratos has developed a high pressure gas reaction cell allowing samples to be exposed to pressures up to 20 bar and temperatures of 1000 °C with static or dynamic gas flow conditions. The integrated gas handling system ensures that the samples can be processed for oxidation and reduction reactions dependent on the gases used. Use of this accessory is independent of the main analysis chamber with samples transferred from the gas reaction cell for analysis at normal UHV conditions. This approach ensures that the photoelectron transmission of the spectrometer remains constant and charge neutralisation is not compromised during the XPS analysis.

A further development for in-situ sample preparation is the integration of evaporation sources onto the AXIS spectrometers. The easy movement of samples through the spectrometer ensures that chemistry of thin-film deposition can be followed by XPS through the deposition cycles. It is also possible to compliment XPS measurements with low energy ion scattering spectroscopy (ISS), probing the outermost atomic layer of the sample and allowing the determination of film-closure for example.

This presentation will demonstrate the latest capabilities of the Kratos X-ray photoelectron spectrometers for lateral and depth distribution of elemental and chemical state through the characterisation of in-situ deposited and high temperature/pressure modified surfaces.

1:20pm **EW-TuL-5 Design and Characterization of Nanomaterials using PREVAC's Research Platforms*, Lukasz Walczak,*** PREVAC sp. z o.o., Poland

Magnetics, optoelectronics, energy storage and renewables, catalysis and nanoelectronics, semiconductors, new graphene-type materials and their surface are under intensive investigation of many research groups [1-3]. The wide variety of novel technologies and materials available, precise, well defined scientific problems or proprietary production recipes demand customized analysis and deposition systems. Innovative and compact PREVAC surface analysis platform as part of multi-technique surface analysis system will be presented, in order to permit complete characterization of nanomaterials in the UHV and ambient pressure conditions. We will report some results from these systems. Also we introduced PREVAC deposition platforms, based on well tested MBE system technology, offering a high quality and stable UHV performance. Compact construction allows the connection of different deposition sources at versatile configurations as well as the incorporation of RHEED, inventive alternative GIFAD [4] and other analysis techniques. As the next deposition platform the sputtering systems for depositing metal and dielectric thin films on substrates at the different temperature will be shown. A range of magnetron sputtering sources, using RF, DC, or pulsed DC power, can be operated in the multimode by SYNTHESIUM software for producing thin films. Finally we describe PREVAC's PLD systems. Typically it is used with a focused pulsed excimer laser to vaporize a small section of a solid target material in a vacuum chamber in order to produce thin-films. Standalone configuration or as part of a larger integrated research system, system is fully automated. The transfer system features a six position target manipulator which allows transfer of both target and substrate holders for simple and efficient operation.

References:

1. L. K. Preethi, et al., Sci. Rep. 7, 14314 (2017)

2. M. Weis, et al., Sci. Rep. 7, 13782 (2017)

3. N. M. Freitag et al., Nature Nanotechn. 13, 392-397 (2018)

4. A. Momeni et al. J. Phys. Chem. Lett., 9, 908–913 (2018)

1:40pm **EW-TuL-6 Agilent's New Helium Leak Detector*, John McLaren,*** Agilent

Earlier this year Agilent Technologies introduced its new Helium Leak Detector (HLD). Building on Agilent's leadership position in mass spectrometry, this new instrument sets the standard for ease of use and application-specific operation. Users can quickly navigate to one of six unique setup screens and be guided in setting the proper test parameters, achieving optimum performance and efficiency for their specific application. No more guessing, wasting time or making costly mistakes. A large 8.4 in. (21 cm) display features a completely revised user interface, with eight available languages, that is extremely intuitive and employs familiar icons and imagery simplifying training. Selectable security levels protect the integrity of the test while allowing access for operators, process engineers, and maintenance technicians. Agilent is the only helium leak detector manufacturer that designs and manufactures the entire instrument, mass spectrometer, high vacuum split-flow turbomolecular pump and rotary vane and dry scroll roughing pumps. The latter employing our patented dual pump design, delivering superior pumping speed and helium handling performance even in high background environments. Components are designed to work together and with everything Agilent-made and Agilent supported, users are secure in their investment. The HLD is available in 3 different form factors, both wet and dry primary pumps, each in three different sizes, allowing the most configurations in the industry. Unparalleled ease-of-use and application guidance makes the HLD the instrument of choice for any leak test. Our spotlight session will demonstrate how our application setups guide the user in correctly configuring their instrument for the best performance, establishing correct parameters for a thorough and efficient test. Each setup offers the following benefits:

• Display all relevant settings on one page. No need to navigate through multiple screens or struggle to recall which settings are needed.

• Save time in both setup and testing.

• Automatically incorporate certain settings as dictated by the application. No need to decipher every arcane detail in the manual and wonder what settings should be turned on or off.

• Provide on screen help and guide the user through the setup.

2:00pm **EW-TuL-7 Auger Multi-Technique: EDS, EBSD, BSE, FIB*, John Newman,*** Physical Electronics

Auger Electron Spectroscopy (AES) is a very power surface sensitive technique used for determining the composition of micron and sub-micron sized features, as well as for general thin film analysis. Its application has found widespread use in various fields of study such as semiconductors, microelectronics, metallurgy, fracture analysis, corrosion, catalysis, thin film coatings, and failure analysis. While Auger by itself can solve many problems, at times, the combination of other techniques with Auger can provide complementary data useful for more complete characterization of materials. This presentation will describe PHI's 710 Multi-technique instrument with Auger, EDS, EBSD, BSE and FIB capabilities. Applications of each technique will be shown, demonstrating how the instrument can be used for advanced materials characterization.

Exhibitor Technology Spotlight Workshops
Room Hall A - Session EW-TuAB

Exhibitor Technology Spotlight Session III

Moderator: Christopher Moffitt, Kratos Analytical Inc

4:00pm **EW-TuAB-2 eSpectra, your Data, and your Collaborations*, Jessica Hoy,*** AIPP/AVS

Are you looking for an easier way to analyze spectral data and share your results with your collaborators? Learn more about eSpectra, the new online platform where you can plot, compare and share your data in just a few clicks. Brought to you by AVS and AIP Publishing, eSpectra is the only interactive tool of its kind that lets you easily plot your data against peer-reviewed data, public data, or your team's 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. It includes XPS, AES, and UPS experimental techniques, with additional techniques planned for Fall 2018. Our Free Access and our Individual or Team Premium Access options support a range of research needs from academic to corporate. When you register, you receive a 30-day free trial of Premium Access. There will be 3 chances to win a $25 Starbucks® gift card at the session. If you're unable to attend, you can sign up anytime for free at eSpectra.aip.org.

Exhibitor Technology Spotlight Workshops
Room Hall A - Session EW-WeB

Exhibitor Technology Spotlight Session IV
Moderator: Christopher Moffitt, Kratos Analytical Inc

10:20am **EW-WeB-2 HAXPES-Lab: A Laboratory Based System for HAXPES Measurements*, Susanna Eriksson,*** Scienta Omicron

Scienta Omicron's HAXPES-Lab brings hard X-ray photoelectron spectroscopy (HAXPES) capability directly to the end user's laboratory. This novel system enables the investigation of buried interfaces, in-operando devices and real world samples, all without the need for a synchrotron end station. By combining a state-of-the-art, monochromized 9.25keV Ga X-ray source with the proven Scienta Omicron wide acceptance angle hemispherical analyzer, the HAXPES-Lab sets the standard for laboratory based high energy photoelectron spectroscopy.

10:40am **EW-WeB-3 Coatings Characterization Solution from Fischer Technology - XRF, Nanoindentation and Progressive Load Scratch*, Rahul Nair,*** Fischer Scientific

This talk discusses the key features that aid in increased productivity and usability of the Fischer's non-destructive coating thickness (XRF) and mechanical (nanoindentation and scratch) testers. Fischer is a pioneer in the field of nanoindentation (since 1985) and XRF (since 19XX). The standard measurement and computation of coating thickness and mechanical properties are performed in accordance to ISO and ASTM standards with minimal influence by the operator. Fischer's primary focus has been on reduced measuring time and higher throughput while producing accurate and precise measurements. Some of the key features in our nanoindentation and scratch testers that aid this are single-step tests, programmable test cycles, significantly reduced time to detect surface, improved autofocus, graphical presentations and automated report generation. Additionally, because of the high resolutions for load and distance the Fischer instruments can be used for a broad range of applications and materials. It is even possible to determine the plastic and elastic material properties of even very hard and thin coatings.

Exhibitor Technology Spotlight Workshops
Room Hall A - Session EW-WeL

Exhibitor Technology Spotlight Session V
Moderator: Christopher Moffitt, Kratos Analytical Inc

12:40pm **EW-WeL-3 The TESLA JT SPM*, Markus Maier,*** Scienta Omicron GmbH, Germany

The TESLA JT SPM provides access to more than 5 days SPM measurement time at temperatures down to 1K (4He

operation) with magnetic fields larger than B > 3T. Careful thermal design of the bath cryostat and JT cooling stage

as well as the integrated UHV magnet lead to exceptionally low LHe consumption of only 11 liters LHe for 120

hours, specifically also during magnet operation and field variation. The external JT Helium supply allows for 3He

operation and significantly lower temperatures in the range of 500mK.

The microscope head is a proven, highly stable design developed specifically for high magnetic field environments.

It offers the full range of SPM measurements modes, including Scienta Omicron's leading QPlus AFM technology.

Safe and independent tip/sample exchange under optical control is one of several key ease-of-use features delivering

dependable high performance SPM and successful scientific work.

In contrast to a conventional wet magnet concept, the dry split-pair magnet provides for optical access enabling

various optical experiments and even in-situ evaporation into the SPM at low temperatures.

We will discuss the technical concept and will show performance evaluation measurements at T=1K that prove

stability below 1pm as well as energy resolution on superconductors.

Specifically, continuous STM and QPlus AFM imaging at varying temperatures during magnetic field ramping

without increasing the LHe consumption differentiate the concept from traditional 4He and 3He systems and open

up new experimental possibilities.

1:00pm **EW-WeL-4 MKS Instruments, Inc., 523 Granville-Phillips® Wide-Range Cold Cathode Transducer: Applications and Market Update*, David Kelly,*** MKS Instruments

A dual-discharge, wide-range cold cathode ionization gauge, marketed by MKS Instruments, Inc. as the 523 Granville-Phillips® Wide-Range Cold Cathode Transducer, was commercially disclosed at the Exhibitor Technology Spotlight session one year ago. This novel technology promised unprecedented low-cost of ownership for industrial vacuum applications requiring limited pressure measurement accuracy between atmosphere and 10^-7 Torr.

Several facilities have now tested the technology and vacuum technologists all over the world are quickly experiencing first-hand the unique capabilities of this revolutionary technology. This presentation describes several examples of real-world applications of the new product with a focus on process compatibility, sensor lifetime, and overall cost-reductions experienced by customers in manufacturing, research facilities and general vacuum applications, who are seeking alternative pressure measurement capabilities. The initial voice-of-customer reports confirm the original performance and cost features and benefits assertions originally stated by MKS Instruments.

Author Index

Bold page numbers indicate presenter