Tuesday Afternoon, October 23, 2018

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.

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