

Tuesday Lunch, October 22, 2019

Exhibitor Technology Spotlight Workshops

Room Hall A - Session EW-TuL

Exhibitor Technology Spotlight Workshop II

Moderator: Christopher Moffitt, Kratos Analytical Limited

12:20pm **EW-TuL2 New Developments from Thermo Fisher Scientific, Timothy Nunney, P. Mack, R.E. Simpson, 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.

12:40pm **EW-TuL3 New Trends in Photoelectron Spectroscopy: Momentum Resolved Photoelectron Spectroscopy, Spin-resolved ARPES, Small Spot and Hard X-ray XPS, A. Thissen**, SPECS Surface Nano Analysis GmbH, Germany; **Thomas Stempel Pereira**, SPECS Surface Nano Analysis GmbH

Over the last two decades, significant developments have been done in Photoelectron Spectroscopy instrumentation. The significant expansion of XPS into near ambient pressure environments (NAP-XPS), especially new concepts for electron optics, new concepts for X-ray sources, and new type of detectors have opened the field for new applications.

New electron optical concepts have been introduced, allowing for k-resolving lenses in Angle resolved Photoelectron Spectroscopy and Small Spot Momentum Spectroscopy and Microscopy. The brand new ASTRAIOS 150 is a consequently k-resolving hemispherical analyzer for cutting-edge ARPES with large acceptance angles at ultimate energy and k- (or angle) resolutions. For limiting the acceptance areas to μm -ranges or momentum microscopy applications k-resolving immersion lenses have to be used. The KREIOS 150 series demonstrates perfectly the applications to small and/or inhomogeneous samples.

On the detector field the 2D-CMOS detector has proven to be the perfect choice for ultimate resolution and highest linearity at significant time resolution. Especially for momentum microscopy the direct imaging spin detector DISpin allow for highest sensitivities and uncompromising energy and k-resolutions.

Switching gears, on the XPS field the above mentioned new analyzers also can make a significant contribution to small spot-XPS. On the other hand still a high power small spot monochromatic X-ray source is needed. Thus the μFOCUS 195 is presented for the first time, being a Al Ka and Ag La dual anode monochromator source is presented, with a spot diameter smaller than $10\mu\text{m}$.

For higher information depth the μFOCUS 730 HE is presented, a Cr Ka monochromator source with a $100\mu\text{m}$ spot size for laboratory HAXPES and NAP-HAXPES.

1:00pm **EW-TuL4 Latest Trends and Instrumentation for TOF-SIMS, Nathan Havercroft**, IONTOF USA, Inc.

During the last 30 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 OrbitrapTM mass spectrometer with unrivalled mass resolution and mass accuracy into the TOF.SIMS 5 instrument.

In this spotlight session we will showcase the latest TOF-SIMS developments from IONTOF.

1:20pm **EW-TuL5 New Versatile and Compact In Situ AugerProbe from Staib Instruments for REELS & Auger Analyses in Growth Environments Even Under Higher Pressures, Eric Dombrowski**, Staib Instruments, Inc.

Here we present recent updates for Staib Instrument's versatile and compact AugerProbeTM, winner of the 2016 R&D 100 award. This high sensitivity and throughput electron energy analyzer is adaptable to environments from UHV surface analysis to in-situ growth. The Probe is used to collect Auger data for elemental analysis. In addition, the high resolution achieved through the entire energy range (20-2000 eV) permits collection of high quality Reflection Electron Energy Loss Spectroscopy (REELS) data for bonding and compositional analysis. The control software acquires user programmable sequences for individual energy ranges, with the added ability to record Auger intensities over time to assess dynamic surface changes. By coupling this analyzer with a Reflection High-Energy

Electron Diffraction (RHEED) excitation source, the surface crystallographic structure can be assessed concurrently with the Auger derived elemental makeup and REELS surface energy loss structure. The AugerProbeTM is ideal for applications where high pressures and/or harsh deposition conditions are utilized. The Probe provides a better understanding of the structure and composition of materials, a useful tool for developing new and novel functional devices. By expanding the scope of possible materials, deposition techniques, and growth procedures, the AugerProbeTM analyzer can ultimately aid new developments and maintain fidelity of existing procedures. The AugerProbeTM is a flexible solution in providing Auger and REELS results.

1:40pm **EW-TuL6 Kratos Analytical – 50 Years of XPS, Christopher Blomfield**, Kratos Analytical Limited, UK

In 1969 Kratos, then AEI, shipped the first commercially available X-ray photoelectron spectrometer to Dr David Clark at the University of Durham. In this presentation we will outline the developments from the first ES-100 to the state-of-the-art AXIS Supra⁺ and have established Kratos Analytical as a leader in the design and manufacture of XPS instruments.

We will detail the development of the Aberration Compensated Input Lens (ACIL) in the early 1980's. Importantly the nature of the ACIL provided the analyst with an easy to use microprobe-like capability, enabling exact correlation of classic spectroscopic analysis with XPS and physical images – the advent of spatially keyed spectroscopy. A further significant development came with the AXIS series of spectrometers which were the first to incorporate a magnetic immersion (snorkel) lens. The combination of magnetic and electrostatic lenses lead to much greater collection efficiency of photoelectrons when compared to previous instruments, providing a step-change in performance specifications.

Another Kratos innovation, launched in the late 1990's, was the incorporation of the spherical mirror analyser (SMA) with the hemispherical analyser in the AXIS Ultra. The SMA allowed fast, high spatial resolution parallel imaging, where an image of the sample is projected onto a 2D detector. This technology is still used today and allows us to define $1\mu\text{m}$ imaging spatial resolution.

There have been a number of other momentous advances including software, automation and accessories. Probably the most significant of these recent developments is the gas cluster ion source (GCIS). This accessory has allowed the successful depth profiling of organic polymers and inorganic samples with retention of chemistry throughout the profile.

It is hoped that in reviewing milestones in Kratos' development of XPS over the previous 50 years we will trigger discussion on requirements for the technique in the next 50 years.

2:00pm **EW-TuL7 What's New at PHI, K. Artyushkova, J.E. Mann, B.W. Schmidt, L. Swartz, John Newman**, Physical Electronics

PHI has multiple exciting projects currently underway in our XPS product line. This presentation will provide updates on:

- The PHI Quantes, laboratory based, XPS/HAXPES instrument
- Some new analytical options for complete characterization of electronic band structures on the PHI VersaProbe
- New features for XPS data acquisition and data reduction.

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