INTERNATIONAL CENTRE FOR DIFRRACTION DATA

# Denver X-ray Conference

## 65th Annual
## Conference on Applications of X-ray Analysis

• • •

www.DXCICDD.com

## 1-5 August 2016

The Westin O'Hare Hotel
Rosemont, Illinois, USA

# DXC 2016 Program

*Sponsored by*

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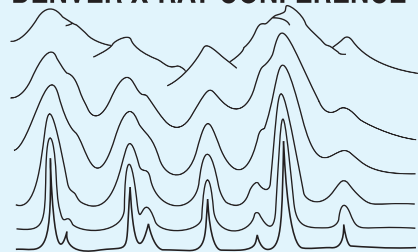
Clay Ruud, Spokane, WA


## *Future Conferences:*




**31 July – 4 August 2017**

***Big Sky, Montana***

**6-10 August 2018**

***Westminster, Colorado***

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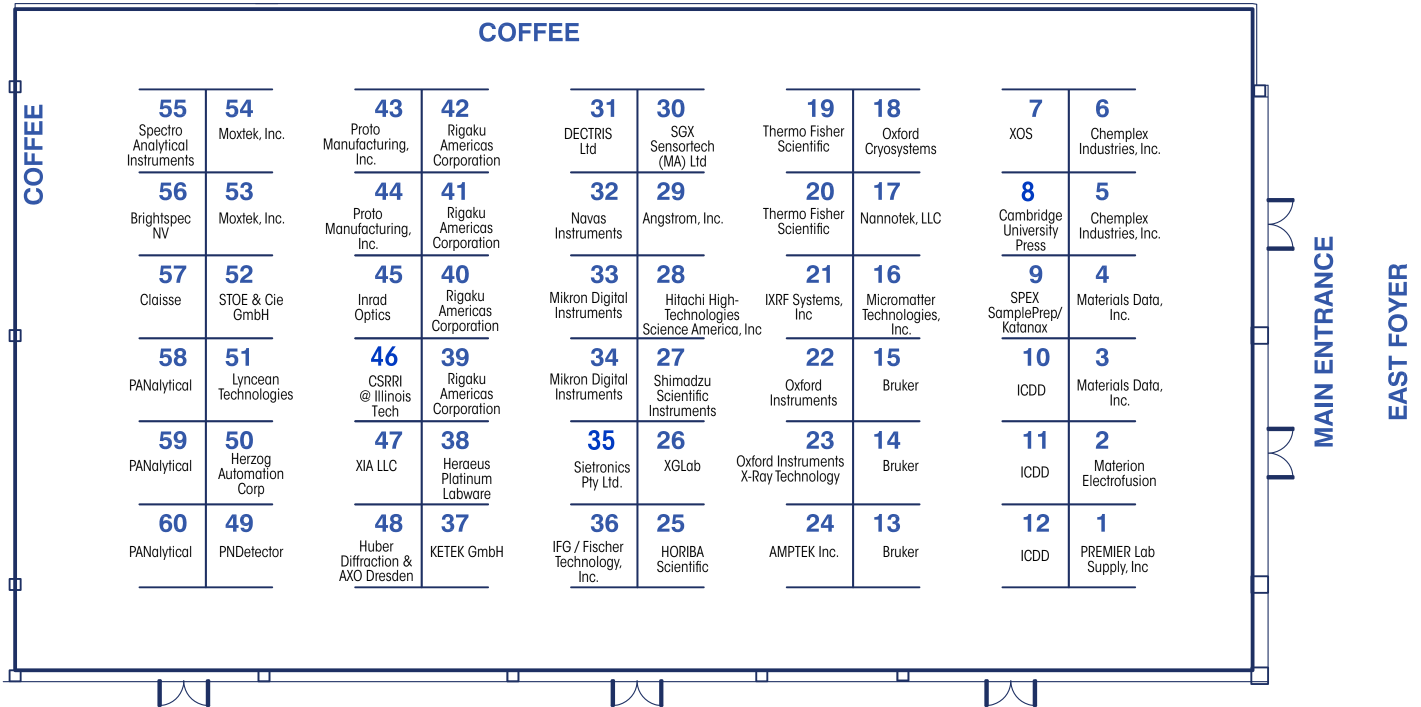
# Westin O'Hare Grand Ballroom

Rosemont, IL




SOUTH FOYER

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| AMPTEK Inc. | 24 |
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**Exhibit Hours**

**Tuesday: 10:00am - 5:00pm**

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# Exhibitors

**AMPTEK, Inc.**
**Booth(s): 24**
Website: www.amptek.com
Email: sales@amptek.com
Phone: 781-275-2242

Amptek's FAST SDD® detectors perform at 10 times the throughput of a standard SDD with typical resolution of 125 eV FWHM at 8 µs peaking time, or 155 eV FWHM at 0.2 µs and 1,000,000 counts per second. Also available – high performance, standard SDD detectors and Si-PIN detectors. Amptek offers simple to use, low-cost systems that are ideal for laboratory and field use and for OEMs developing table-top or hand-held XRF analyzers. Amptek – OEMs #1 choice.

**Angstrom, Inc.**
**Booth(s): 29**
Website: www.angstrom-inc.com
Email: sales@angstrom-inc.com
Phone: 734-697-8058

Angstrom manufactures the well known TE250 Laboratory Ring Pulverizer and 4451AE Laboratory Briquet Press for preparation of various types of samples for X-ray analysis. Both products are built to last, providing many years of service and are rugged enough to handle the toughest workloads. A programmable version of the 4451AE Press is also available and will be on display at the Angstrom booth. A complete line of aluminum sample cups are offered to complement the 4451AE Briquet Press.

**Brightspec NV**
**Booth(s): 56**
Website: www.brightspec.be
Email: sales@brightspec.be
Phone: +32 (0) 3 844 95 86

BrightSpec NV designs and manufactures instruments and intelligent solutions for nuclear and X-ray market. BrightSpec is proud to present bAXIL software – advance software for X-ray spectrometry. This time, featuring its newly developed and ultra-fast spectrum analysis algorithm for image scanning applications. BrightSPec also presents TopazX, the advanced and compact DPP-based MCA for energy dispersive X-ray spectrometry, which implements innovative digital pulse analysis algorithms and LIST mode of data acquisition.

**Bruker**
**Booth(s): 13, 14, 15**
Website: www.bruker.com
Email: info.baxs@bruker.com
Phone: 800-234-9729

Bruker AXS is the worldwide leading supplier of advanced X-ray solutions. Continual innovation in X-ray sources, optics, detectors, software and sample handling ensures that Bruker is able to offer a solution for virtually any X-ray analytical task. Visit us at booth 13 to see the latest innovations in diffraction and fluorescence systems, including our D8 DISCOVER, D8 ADVANCE, D2 PHASER, S2 PUMA, S8 TIGER, S2 PICOFOX, M4 TORNADO and S4 TStar. Unique classroom and online trainings complete the Bruker product portfolio.

**Cambridge University Press**
**Booth(s): 8**
Website: www.cambridge.org
Email: newyork@cambridge.org
Phone: 212-337-5000

Cambridge University Press' publishing in books and journals combines state-of-the-art content with the highest standards of scholarship, writing and production. Visit our stand to browse new titles, available at 20% discount, and to pick up sample copies of our journals. Visit our website to find out more about what we do: www.cambridge.org/academic

**Chemplex Industries, Inc.**
**Booth(s): 5, 6**
Website: www.chemplex.com
Email: shows@chemplex.com
Phone: 772-283-2700

A leading global provider of XRF Sample Preparation Products. We manufacture an extensive line of grinding machines and pellet presses, including the SpectroPulverizer® in-field grinding/pelletizing kit. We carry a line of FusionFlux® formulations, platinum ware and a new line of Fluxers. We have over 40 different sizes and style sample cups from Chemplex® along with thin-film sample supports, including our exclusive SpectroMembrane® thin-film carrier frames. We offer thin-films made from Etnom®, Prolene®, Mylar® and more in a variety of thicknesses.

**Claisse**
**Booth(s): 57**
Website: www.claisse.com
Email: maprovencher@claisse.com
Phone: 418-656-6453

Claisse provides instruments, consumables and services in sample preparation for XRF, ICP and AA analysis. By acting as a close partner with laboratories working with spectrometry analysis for 40 years, our forefront expertise powers their performance. We are constantly driven by the desire to do better by innovating, and this is why we are proud to introduce you to our new automated borate flux dispenser: LeDoser. Stop by our booth to discover this new instrument and much more!

**CSRRI @ Illinois Tech**
**Booth(s): 46**
Website: http://appleton.phys.iit.edu/csrri
Email: segre@csrri.iit.edu
Phone: 312-567-3498

Description not available.

**DECTRIS Ltd**
**Booth(s): 31**
Website: www.dectris.com
Email: info@dectris.com
Phone: + 41 56 500 2100

DECTRIS Ltd. is the leading company in Hybrid Photon Counting (HPC) X-ray detection. DECTRIS' pioneering technology has transformed basic research at synchrotron light sources, as well as X-ray applications in laboratory diffractometers. The broad portfolio of DECTRIS' detectors is carefully scaled to meet the needs of various applications. With an aim to continuously improve the measurement quality, DECTRIS also provides solutions for customer developments in scientific and industrial x-ray detection, thereby pushing the state of the art and enabling new scientific findings.

**Heraeus Platinum Labware**
**Booth(s): 38**
Website: www.ptlabware.com
Email: heraeus-platinum-labware@heraeus.com
Phone: 480-392-6657

Improve the quality of your Sample Preparation by improving the quality of your Platinum Labware. Since 1851, Heraeus has produced the highest quality Platinum Labware and Precious Metal Products. Whether you prepare your samples manually or with an automatic fusion machine, Heraeus is the Perfect Solution for your Platinum Labware needs. Visit booth # 38 to learn more.

**Herzog Automation Corp.**
**Booth(s): 50**
Website: www.herzogautomation.com
Email: info@herzogautomation.com
Phone: 440-891-9777

Herzog Automation Corp. is the leading supplier of manual and fully automatic sample preparation systems for spectrographic and x-ray analysis, tube delivery systems for sample transport, and laboratory automation for the steel, aluminum, cement and mining industries. Please visit our website at www.herzogautomation.com for our full product line.

**Hitachi High Techologies Science America Inc.**
**Booth(s): 28**
Website: www.hitachi-hightech.com/hhs-us
Email: sales@hitachi-hitec-science.us
Phone: 818-280-0745

Hitachi High-Technologies Science America's Vortex® Silicon Drift X-ray Detectors deliver unparalleled performance at extremely high count rates. Developed and customizable for demanding synchrotron applications, the Vortex® is the detector of reference for many beam lines. Rugged reliability and a wide range of sizes make these detectors a compelling choice for experimental stations and instrument applications. The Vortex® is available in single and multi-element configurations. Experience the benefits of our 1mm thick detector, which provides better quantum efficiency at higher energies!

**HORIBA Scientifić**
**Booth(s): 25**
Website: www.horiba.com/scientific
Email: info.sci@horiba.com
Phone: 732-494-8660

HORIBA Scientific manufactures high performance Raman instrumentation, fluorescence & EDXRF microscopes for rapid spectroscopy and imaging. Our SLFA sulfur-in-oil analyzers offer cost effective methods to measure new low sulfur fuels, diesel and RG. Our Micro-XRF analyzers include XGT X-ray fluorescence micro-analyzers combining fast, non-destructive elemental analysis of EDXRF with the ability to pinpoint individual particles with diameters down to 10 µm, while automated sample scanning provides detailed images of element distribution over areas as large as 10cm x 10cm.

**Huber Diffraction Equipment / AXO DRESDEN**
**Booth(s): 48**
Website: www.xhuber.com; www.axo-dresden.de
Email: info@xhuber.com
Phone: 49-80516 8780

HUBER DIFFRACTION is a manufacturer of precise positioning and diffraction equipment for laboratory, synchrotron and neutron applications.
AXO DRESDEN is a specialist for high precision deposition and multilayer coatings and will present latest developments in multilayer X-ray optics for 1- and 2-dimensional diffraction applications (from Cr K- to Ag K-radiation) and soft X-ray polarization (< 1keV), broadband/bandpass multilayer mirrors as well as thin film X-ray fluorescence reference samples.

**ICDD**
**Booth(s): 10, 11, 12**
Website: www.icdd.com
Email: marketing@icdd.com
Phone: 610-325-9814

ICDD is celebrating 75 years of serving the scientific community through the publication of the Powder Diffraction File™ and by providing forums for the exchange of ideas and information. The 2016 Powder Diffraction File™ product line will be released September 2016 with many new entries and features. These material identification databases, designed for rapid materials identification, are interfaced with diffractometers and data analysis systems of the world's leading software developers and manufacturers of X-ray equipment.

**IFG / Fischer Technology, Inc.**
**Booth(s): 36**
Website: www.ifg-adlershof.de
Email: ifg@fischer-technology.com
Phone: 860-683-0781

IFG (Institute of Scientific Instruments) and Fischer Technology are world leaders in the field of high quality measurement technology and components for the analytical industry. IFG and Fischer Technology offer measurement instruments for coating thickness, material testing, nanoindentation and material analysis. Products include XRF-spectrometers as well as high precision capillary optics for beam shaping of X-rays, the iMOXS modular X-ray source and X-ray windows. Our products are used in process-near in and off-line metrology.

**Inrad Optics**
**Booth(s): 45**
Website: www.inradoptics.com
Email: sales@inradoptics.com
Phone: 201-767-1910

Inrad Optics manufactures exceptional crystalline materials, precision glass and metal optical components and photonic devices. Vertically integrated from growth through systems, products include thin crystal toroids for monochromatic X-ray imaging. Crystals can be produced in quartz, germanium, silicon, and other semiconductor materials.

**IXRF Systems, Inc.**
**Booth(s): 21**
Website: www.ixrfsystems.com
Email: sales@ixrfsystems.com
Phone: 512-386-6100

Micro X-ray Fluorescence Analyzer:
The new ATLAS from IXRF Systems raises the standard in Micro-XRF analysis. ATLAS boasts the largest chamber volume, mapping area travel, and SDD detection area ($150mm^2$) as well as the smallest spot size available to the market (10µ). Additionally, the ATLAS is complimented by a comprehensive software suite including multi-point analysis, unattended automation, in-depth feature/image analysis, unprecedented mapping, thin-film and phase analysis, custom reporting, and much more. Models may be operated under air, vacuum, or helium.

**KETEK GmbH**
**Booth(s): 37**
Website: www.ketek.net
Email: info@ketek.com
Phone: 49 89 67346770

As the leading manufacturer of Silicon Drift Detectors, KETEK is offering a broad SDD module portfolio with collimated areas from $7mm^2$ up to unprecedented $150mm^2$. With our ultra-low-capacitance VITUS-CUBE series, energy resolutions below 123eV with P/B ratios > 25.000 and count rates up to 2 Mcps at peaking times down to 50ns are achievable. KETEKs modern signal processing portfolio is now extended by our brand new, fast and stable Digital Pulse Processor DPP2, optimized for the usage with the fast VITUS-CUBE SDDs.

**Lyncean Technologies**
**Booth(s): 51**
Website: www.lynceantech.com
Email: info@lynceantech.com
Phone: +1 650 320-8300

Description not available.

**Materials Data, Inc.**
**Booth(s): 3, 4**
Website: www.materialsdata.com
Email: mdi@materialsdata.com
Phone: 925-449-1084

MDI (www.MaterialsData.com) creates software for X-ray Powder Diffraction. Our products for XRD Analysis and Instrument Control are strongly embraced world-wide. We're a group of PhD Materials Scientists with a vision for better methods to analyze, characterize, quantify and simulate both the exotic and routine. For over 25 years we have continued to bring break-through ideas and methods to the XRD community. Visit our booths at DXC for a demo of all the latest Jade software tools as well as a closer look at the rest of the MDI's software products for XRD professionals and students.

**Materion Electrofusion**
**Booth(s): 2**
Website: www.materion.com/electrofusion
Email: electrofusion@materion.com
Phone: 510-623-1500

Description not available.

**Micromatter Technologies, Inc.**
**Booth(s): 16**
Website: www.micromatter.com
Email: sales@micromatter.com
Phone: 604-221-2286

MICROMATTER has provided XRF calibration materials for more than 40 years. Our products include air quality standards, thick and multi-element standards. We also provide metallic, semiconductor, polymer, insulator and exotic thin films, foils, cathodes and coatings for x-ray windows, targets, tubes and detectors, as well as DLC foils. Recent developments include novel composite windows for low-energy X-ray detectors. Through our nanoRanch partners, we also supply equipment such as sputtering, evaporation and PECVD systems.

**Mikron Digital Instruments, Inc.**
**Booth(s): 33, 34**
Website: www.mikrondigital.com
Email: inst@mikrondigital.com
Phone: 734-525-2680

Mikron Digital Instruments designs and offers for sale intelligent XRF/XRD sample preparation equipment. Mikron's AplaStar 55c (compact) Ring Pulverizer is a very quiet ~55db programmable centrifugal flat table grinder. The AplaStar 55c Ring and Puck Mill grinds up to 20% faster thanks to a flat spin and is nearly silent during operation. The AplaStar 55c is also 20% smaller and 40% lighter than competing grinders with no loss of grinding power. Our Prensa 30T Programmable Bench-Top Press offers a 10" touch screen display and allows selecting a program to Step/Hold or ramp to pressure, hold at pressure and pressure release all under computer control. The Prensa 30T is typically 4-5 times faster than competing bench-top press units with an approximate 60 second pellet cycle time.

**Moxtek, Inc.**
**Booth(s): 53, 54**
Website: www.moxtek.com
Email: info@moxtek.com
Phone: 800-758-3110

Moxtek is a leading supplier of advanced nano-optical and x-ray components used in display electronics, imaging, and analytical instrumentation. 12W 60kV Magpro X-Ray Source: The Moxtek(r) MAGPRO 60kV 12W x-ray source is designed for the portable and benchtop XRF and XRD instruments. Small spot size makes it a good choice for x-ray imaging applications. N-Dura Window: N-Dura windows are made utilizing low-stress silicon nitride, which is noted for its strength, chemical resistance, and thermal shock tolerance.

**Nannotek LLC**
**Booth(s): 17**
Website: www.nannotek.com
Email: info@micromatter.com
Phone: 512-879-4776

Nannotek, LLC, a NJ based high-tech company, supplies advanced products for X-ray applications including: a) X-ray Windows: High transparency, corrosion resistant, robust windows for X-Ray and other detectors. b) Foils and Substrates: Thin, large area films or thicker substrates from high performance materials such as Diamond-Like Carbon (DLC), CVD Diamond and Hybrid Multi-layers of various combinations. c) MEMS: Windows and sample cells and structures other silicon nitride MEMS structures. For more information, visit us at: www.nannotek.com

**Navas Instruments**
**Booth(s): 32**
Website: www.navas-instruments.com
Email: info@navas-instruments.com
Phone: 843-347-1379

Navas has recently developed a revolutionary system for fusing beads for XRF analysis that eliminates most variables, including the need for precise flux dosing, with LOI included. The Navas Fusion System simplifies the process by calculating the final bead weight and the final sample weight, normally the only two parameters required for quantitative XRF analysis in a spectrometer. Navas Instruments is a family owned minority business that has been developing the highest quality laboratory instruments since 1994.

**Oxford Cryosystems**
**Booth(s): 18**
Website: www.oxcryo.com
Email: info@oxcryo.com
Phone: + 44 1993 883488

Oxford Cryosystems is best known for the Cryostream, a nitrogen gas open flow cryostat designed for X-ray diffraction, and used extensively to cool capillary samples for powder XRD. This market-leading cooler has a temperature range of 80- 500 Kelvin. The company also manufactures the PheniX, a liquid-free cryostat for use with flat-plate powder samples, operating as low as 12 Kelvin. More recently, Oxford Cryosystems launched the Chimera, another liquid-free flat plate chamber with a temperature range of 70-525 Kelvin.

**Oxford Instruments**
**Booth(s): 22**
Website: www.oxford-instruments.com
Email: industrial@oxinst.com
Phone: 978-369-9933

Oxford Instruments is a leading provider of handheld and bench top X-Ray Fluorescence (XRF) analyzers used for materials identification, thickness gauging, quality control and controlling processes to specification. Learn how to boost your quality program and have confidence in materials received through incoming inspection and ensure that products meet regulatory standards during out going inspections. Stop by booth 22 to ask about how our instruments can assist your team to provide costs savings and improve process control. For information email industrial@oxinst.com or call 978-369-9933.

**Oxford Instruments X-Ray Technology**
**Booth(s): 23**
Website: www.oxford-instruments.com/xt
Email: xray-sales@oxinst.com
Phone: 831-439-6061

Oxford Instruments X-Ray Technology is recognized as a global leader in the design and manufacture of low-to-medium power integrated X-ray solutions. Our products include integrated X-ray sources, power supplies, and individual X-ray tubes, featuring high stability, high X-ray flux and small spot sizes for the Analytical, Diffraction, and Industrial and Medical Imaging Markets. For more than 30 years, Oxford Instruments has been the best choice for analytical and industrial Original Equipment Manufacturers who demand the highest quality X-ray solutions.

**PANalytical**
**Booth(s): 58, 59, 60**
Website: www.panalytical.com
Phone: 508-647-1100

Get insight with PANalytical. Data quality – this is the drive for our research and development engineers in order to give you the best results. All of the instruments we make, from entry-level benchtops to high end floor standing instruments, are designed with this mantra in mind. We will present several new X-ray concepts at this year’s Denver X-ray Conference, setting new standards in data quality, functionality and flexibility. Learn more at PANalytical booths 58-60.

**PNDetector**
**Booth(s): 49**
Website: www.pndetector.de
Email: sales@pndetector.de
Phone: 49 8930 9087100

PNDetector is producing advanced radiation detectors for microanalysis, quality assurance and materials science in their own cleanroom fabrication facilities. PNDetector offers state-of-the-art detectors for X-ray spectroscopy and electron imaging such as SDDs and pnCCD camera systems used in a wide variety of instruments for X-ray Analysis. The new Color X-ray Camera is a high resolution Imaging Spectrometer based on the energy dispersive pnCCD detector, which enables excellent spectroscopic performance for a wide range of X-ray applications.

**Premier Lab Supply, Inc.**
**Booth(s): 1**
Website: www.premierlabsupply.com
Email: info@premierlabsupply.com
Phone: 772-873-1700

Visit our booth to learn about Drift Monitors and to see our electric xrFuse2 fusion machine on display. The xrFuse2 is engineered to prepare permanent and homogeneous fused beads under accurate reproducible conditions. The system brings 25 years of fusion technology to deliver best in class contamination free performance. The xrFuse2 represents the best elements and established fusion range with significant advances in safety and design including the latest thermal imaging technology. The xrFuse2 is designed with the customer in mind.

**Proto Manufacturing, Inc.**
**Booth(s): 43, 44**
Website: www.protoxrd.com
Email: info@protoxrd.com
Phone: 734-946-0974

PROTO is a leading manufacturer of x-ray diffraction systems. Our product line includes residual stress & retained austenite measurement systems, Laue single-crystal orientation, x-ray tubes, custom XRD systems, and an expanded powder diffraction line. The AXRD Benchtop powder diffraction system provides excellent value, now with even more options for unique experimental needs. This compact, easy-to-maintain system is ideal for phase identification, quantitative or structure analysis. Measurement services are also available through ISO 17025 laboratories in the United States and Canada.

**Rigaku Americas Corporation**
**Booth(s): 39, 40, 41, 42**
Website: www.rigaku.com
Email: info@rigaku.com
Phone: 281-362-2300

Rigaku manufactures a complete range of XRD and XRF instruments and components for research, testing, industrial process control, and products development. Systems include the MiniFlex benchtop XRD and Supermini 200 benchtop WDXRF systems, the Ultima IV and SmartLab® multi-purpose diffractometers with SAXS and in-plane capabilities, D/MAX RAPID II micro-diffraction systems, S-MAX3000 small angle scattering systems, and the ZSX Primus series of high-powered WDXRF spectrometers with mapping capabilities, in either tube-above or tube-below configurations.

**SGX Sensortech (MA) Ltd**
**Booth(s): 30**
Website: www.sgxsensortech.com
Email: sales.ma@sgxsensortech.com
Phone: 44 (0) 1628 533060

SGX Sensortech's (formerly e2v Scientific Instruments) Sirius SDD product line includes specialist EDXRF detectors for the OEM industrial markets and for scientific research (synchrotron, PIXE, laboratory XRF etc). We offer a full range of single and multi-element SDD and Si(Li) detector products with individual sensor active areas ranging from 7mm2 to 170mm2 active area. Additionally, SGX provides a series of digital signal processors which, together with our comprehensive detector range, are designed to satisfy the requirements of today's analytical applications.

**Shimadzu Scientific Instruments, Inc.**
**Booth(s): 27**
Website: www.ssi.shimadzu.com
Phone: 800-477-1227

Shimadzu offers an array of EDXRF spectrometers and X-ray diffractometers for an array of materials science applications. Advanced EDX-7000/8000 spectrometers incorporate a high-performance, electronically cooled semiconductor detector, a high fluorescent X-ray count per unit time, five primary filters, and a sample observation camera. Software features an intuitive user interface, simplifying operation for all operators. A new one-dimensional detector with 1280 channels for XRD provides high-speed quantitative analysis with three types of measurement modes, high sensitivity, and enhanced operational efficiency.

**Sietronics Pty Ltd**
**Booth(s): 35**
Website: www.siroquant.com
Email: spl@sietronics.com.au
Phone: +61 6246 9299

Siroquant is the world's easiest to use Rietveld Refinement package. Developed with the CSIRO for use in both commercial and academic environments, it comes with a ready to use comprehensive phase database as well as the ability to import crystal structure data. The new Phase Observation package will allow users to create phases from powder data where there is no structure data available (such is the case for most clay phases). A complete API allows Siroquant integration with automation software for process control applications.

**Spectro Analytical Instruments**
**Booth(s): 55**
Website: www.spectro.com
Email: info.spectro@ametek.com
Phone: 800-548-5809

Members of the AMETEK Materials Analysis Division, SPECTRO Analytical Instruments and EDAX are worldwide leading suppliers of OES and X-ray fluorescence spectrometry technology, used for the elemental analysis of materials in industry, research and academia. SPECTRO will feature the new XEPOS with breakthrough advances in excitation and detection. EDAX XLNCE XRF analyzers provide non-destructive, composition and coating thickness measurement and analysis on virtually all materials. They are an excellent choice for R&D, process development, process control, and failure analysis.

**SPEX SamplePrep / Katanax**
**Booth(s): 9**
Website: www.spexsampleprep.com/katanax
Email: sampleprep@spex.com
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For over 60 years, SPEX SamplePrep has manufactured superior sample preparation equipment for X-Ray and XRF analysis. The new Katanax X-300 X-Fluxer prepares glass beads for XRF analysis. This automated, heavy-duty, electric fusion machine has a throughput of up to 15 samples per hour. The X-Press is an automated, 35-ton, hydraulic laboratory press that presses sample pellets for XRF, IR in minutes. Stop by our booth to see these innovative products and ask how you can get your tradeshow discount.

**STOE & Cie GmbH**
**Booth(s): 52**
Website: www.stoe.com
Email: info@stoe.com
Phone: +49 6151 9887-10

STOE has been a pioneer in powder and single crystal X-ray diffraction since the 1960's. STOE invented the transmission geometry technique for both Powder XRD and single crystals, and produced the first pixel detector XRD system with an open Eulerian cradle. STOE keeps R&D, software, electrical and mechanical engineering and production all in house, enabling them to provide both standard and individual solutions. Whenever it comes to quality, STOE accepts no compromises. This high-level of detail is what sets STOE apart.

**Thermo Scientific**
**Booth(s): 19, 20**
Website: www.thermofisher.com
Email: analyze@thermofisher.com
Phone: 1 800 532 4752

Thermo Fisher Scientific, the world leader in serving science, offers a large variety of high-end analytical instruments using various techniques, in particular X-ray fluorescence (WDXRF/EDXRF) and X-ray diffraction (XRD) equipment. The Thermo Scientific™ ARL™ QUANT'X EDXRF Spectrometer has become even more powerful thanks to a newly introduced Silicon Drift Detector (SDD) enabling much better performance for both light and heavy elements analysis. Thermo Scientific™ ARL XRD products range from simple benchtop instruments for routine applications to sophisticated platforms for analysis of nano-materials, pharmaceuticals, metallurgical and other advanced materials. Learn more on www.thermoscientific.com/xray

**XGLab**
**Booth(s): 26**
Website: www.xglab.it
Email: info@xglab.it
Phone: 39-02 4966 0460

XGLab is a new Company whose core-business is the development of high-performance electronics and instrumentation for X-ray and Gamma-ray applications.The "X" in the name of the Company refers in fact to X rays, the "G" to Gamma rays, while the "lab" refers to the company attitude to base the innovation of their products on deep scientific and technological researches. XGLab is a spin-off Company of "Politecnico di Milano" the leading Italian technical University. The XGLab founders come from a research group active since several decades in the field of radiation detectors, Silicon Drift Detectors (SDDs) in particular, and of the related electronics. This group is worldwide recognized as a reference one in this field.

**XIA, LLC.**
**Booth(s): 47**
Website: www.xia.com
Email: sales@xia.com
Phone: 510-401-5760

XIA LLC develops and sells advanced signal processing solutions for X-ray and gamma-ray detectors and related instruments, including OEM, for applications in research, industry and homeland security. Our core technology is high-performance digital pulse processors, available in both flexible stand-alone and dedicated embedded configurations, as well as multi-channel configurations. From low power, handheld spectrometry through extremely high count rate applications to integrated multi-element systems, XIA provides solutions that advance the state of the art yet are affordably priced.

**XOS**
**Booth(s): 7**
Website: www.xos.com
Email: info@xos.com
Phone: 518-880-1500

XOS is a provider of mission-critical materials-analysis equipment for industries and regulators that must control material quality and performance, from consumer products (e.g., toys) to electronics to the petroleum industry. XOS leverages its world leadership in X-ray optics to supply application-specific analyzers that measure environmental and product contaminants such as lead, cadmium, chlorine, and sulfur. As a supplier to the analytical-instrument companies, XOS offers X-ray optics and sub-systems to enhance analytical performance in X-ray instruments. XOS's advanced optics and OEM sub-systems can increase precision, speed, and spatial resolution, while decreasing the size, complexity, and cost of the instrument.

# DXC 2016 EXHIBIT PASSPORT

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**Win an Apple iPad! The more exhibit companies you visit the more chances you have to win!**

For every exhibit company you visit, you'll be given a stamp for your passport. Please turn in your stamped passport by Thursday, 3:00pm at the Conference Registration Desk. A member of the Conference Services team will give you chance tickets in exchange for your Exhibit Passport and you will be entered into a drawing to win an Apple iPad. Remember: the more companies you visit the more chances you have to win! The winner will be announced at 5:00pm on Thursday, via Guidebook and a posting at the Conference Registration Desk. The winner will also be contacted by phone at that time. You must be able to pick up the iPad by Friday morning at 10am, or the prize will be forfeited.

**Only registered attendees are eligible to enter the drawing. Exhibit Hall Only attendees, employees of an exhibiting vendor, guests, and members of the DXC Organizing Committee may not participate.*

Please return this page
to the registration desk

# 2016 Denver X-ray Conference Workshops

MORNING WORKSHOPS – 9:00 AM – 12 NOON
AFTERNOON WORKSHOPS – 1:30 PM – 4:30 PM

## MONDAY MORNING WORKSHOPS 9:00 AM – 12:00 NOON

### Basic to Intermediate XRD I — Lasalle C

Organizer & Instructors:
**M. Rodriguez**, Sandia National Laboratory, Albuquerque, NM, USA, marodri@sandia.gov
**T. Blanton**, ICDD, Newtown Square, PA, USA, tblanton@icdd.com
**S.T. Misture**, New York State College of Ceramics at Alfred University, Alfred, NY, USA, misture@alfred.edu

This workshop will discuss the use of XRD for standard qualitative analysis and will detail progressively more challenging means of XRD characterization including: quantitative analysis, profile fitting, lattice parameter refinement, crystallite size and microstrain determination, texture analysis, and structure refinement (Rietveld). Additionally, some discussion shall be dedicated to characterization of nanomaterials and glasses via pair distribution function analysis, as well as thin film techniques such as grazing incidence XRD and X-ray reflectivity (XRR). The workshop is intended to be a survey for the new user of XRD regarding what experiments can be performed and why one would wish to pursue such measurements.

### Diffraction Contrast Imaging — Madison

Organizer & Instructors:
**B. Patterson, D. Brown**, Los Alamos National Laboratory, Los Alamos, NM, bpatterson@lanl.gov; dbrown@lanl.gov
**J.S. Park**, Argonne National Laboratory, Argonne, IL, parkjs@aps.anl.gov
**E. Lauridsen**, Xnovo Technology, Køge, Denmark, info@xnovotech.com

This workshop will focus on using both synchrotron-based and laboratory-based instrumentation to understand the 3D crystallographic structure of materials. In situ measurements of polycrystalline materials, their starting morphologies, and their crystallographic response to stimuli (stress, thermal, radiation) can all be understood. The availability of these techniques in both synchrotron and laboratory based sources opens up a wide variety of X-ray techniques and allows researchers to customize the measurements for the materials of interest.

### Basic XRF — Lasalle A

Organizer & Instructors:
**A.R. Drews**, Ford Motor Company, Dearborn, MI, adrews@ford.com
**G.J. Havrilla**, Los Alamos National Laboratory, Los Alamos, NM, havrilla@lanl.gov

This workshop provides a basic introduction to the principles of XRF specifically aimed at those new to the field. In the first half, there will be a general overview of the XRF technique, including a discussion of the basic principles. The emphasis in the first half will be on understanding the underlying physical phenomena, how the technique is applied, optimization of the signal, and approaches to quantitative analysis. In the second half of the workshop, examples of real-world applications will be presented to illustrate some of the challenges and opportunities that the analyst may face. This half will describe a variety of specimen formats and demonstrate the flexibility of the XRF technique.

### Synergies between Laboratory and Synchrotron X-ray Methods — Lasalle B

Organizer & Instructors:
**G. Seidler**, University of Washington, Seattle, WA, USA, seidler@uw.edu
**U.E.A. Fittschen**, Washington State University, Pullman, WA, USA
**J. Cutler**, Canadian Light Source, Saskatoon, Canada
**S. Lapidus**, Argonne National Laboratory, Argonne, IL, USA
**M. Bedzyk**, Northwestern University, Evanston, IL, USA

Multiple speakers will address important industrial and basic research X-ray applications that span laboratory and synchrotron facilities. This will include XAFS, very high-resolution XRF for speciation, XRF imaging, powder XRD, and the much-improved integration of lab and synchrotron studies thanks to flexible rapid access scheduling, mail-in services, and on-site consultation.

### Fundamentals of X-ray Absorption Spectroscopy — Executive Forum

Organizer & Instructors:
**G. Bunker, C. Segre**, Illinois Institute of Technology Physics Department, Chicago, IL, USA, bunker@iit.edu; segre@iit.edu

This workshop will provide an introductory overview of X-ray Absorption Fine Structure Spectroscopy for the study of the structures of materials. Applications to materials research will be described, and there will be an opportunity for Q&A. The workshop will conclude with an overview of some potential pitfalls and how to avoid them.

## Basic to Intermediate XRD II — Lasalle C

Continued from Monday morning

## Rietveld for Beginners - Introduction to Rietveld fitting with GSAS-II — Executive Forum

Organizers & Instructors:
**B. Toby, R. Von Dreele,** Argonne National Laboratory, Argonne, IL, USA, brian.toby@anl.gov; vondreele@anl.gov

This workshop will introduce basic concepts in Rietveld fitting and show how armed with an approximate crystal structure and a diffractogram, fitting is done with GSAS-II. Attendees will use their own laptops to fit an example set of data. Prerequisite: bring a laptop (Windows, Linux or Mac) with GSAS-II already installed (see http://tinyurl.com/gsasii).

## Energy Dispersive XRF — Lasalle A

Organizer & Instructors:
**P. Lemberge**, Thermo Scientific, Ecublens, Switzerland, pascal.lemberge@thermofisher.com
**R. Phillips**, Thermo Scientific, West Palm Beach, FL, rich.phillips@thermofisher.com

This workshop is designed to provide a discussion of the theoretical and practical aspects of EDXRF spectrometry providing a comprehensive review of the basic fundamentals for both the beginner and experienced X-ray spectroscopist. Topics to be covered include excitation systems; detectors; components and their relation to EDXRF applicability; ease of use; rapid qualitative analysis and material screening; calibration techniques for quantitative analysis; standard-less analysis; sensitivity of EDXRF for a wide variety of elements in various matrices as well as sample preparation. We discuss some real-life application examples where EDXRF is being used to solve complex analytical problems. The major emphases will be on the applicability of EDXRF and the optimal protocol for generating and reporting of reliable experimental results.

## Trace Analysis — Lasalle B

Organizers & Instructors:
**C. Streli, P. Wobrauschek**, Vienna University of Technology, Vienna, Austria, streli@ati.ac.at; wobi@ati.ac.at
**K. Tsuji**, Osaka City University, Osaka, Japan, tsuji@a-chem.eng.osaka-cu.ac.jp
**N. Kawahara**, Rigaku Corporation, Osaka, Japan, kawahara@rigaku.co.jp

Both beginners and experienced X-ray physicists should gain information by attending the Trace Analysis workshop. Presentations of most modern techniques and instrumentation for trace element analysis using EDXRS will be given. Physical methods to improve minimum detection limits in XRF by background reduction will be discussed; special emphasis will be on synchrotron radiation as excitation source. Introduction to total reflection XRF (TXRF) and actual instrumentation will show achievable advantages and results in terms of detection limits, sensitivities and detectable elemental range down to light elements (eg. Carbon). Confocal µ-XRF will be presented as method for 2D and 3D spatial resolved elemental imaging. Applications from interesting scientific fields as environment, microelectronics, forensic, and life science will show the successful use of the various XRF spectrometric techniques. The possibilities of trace analysis using wavelength dispersive XRF will also be covered, showing the benefits and limitations of the technique. A comparison of achievable detection limits with the various techniques on some specific samples will be discussed.

## Structure Solution I — Madison

Organizers & Instructors:
**J. Kaduk**, Poly Crystallography Inc. and Illinois Institute of Technology, Naperville, IL, USA, Kaduk@polycrystallography.com
**R. Papoular**, Saclay Institute for Matter and Radiation (IRAMIS), LLB, CEA-Saclay, France, robert.papoular@cea.fr

This workshop addresses beginners and those of intermediate experience. The background of the principal methodologies for structure solution using powder data (direct methods, charge flipping, and real space methods such as Monte Carlo simulated annealing and parallel tempering) will be discussed, but the main focus of the workshop will be hands-on practice in solving structures using laboratory, synchrotron, and neutron powder data. We encourage the attendees to bring their own computers with EXPO2014, Jana2006, GSAS-II, and FOX already installed.

## Two-dimensional Detectors — Executive Forum

Organizers & Instructors:
**T. Blanton**, ICDD, Newtown Square, PA, USA, tblanton@icdd.com
**B. He**, Bruker AXS, Inc., Madison, WI, USA, bob.he@bruker.com
**J. Ferrara**, Rigaku, The Woodlands, TX, USA, joseph.ferrara@rigaku.com
**S. Speakman**, Panalytical, Westborough, MA, USA, speakman@panalytical.com

Two-dimensional diffraction data contains abundant information about the atomic arrangement, microstructure, and defects of a solid or liquid material. In recent years, the use of two-dimensional detectors has dramatically increased in academic, government and industrial laboratories. This workshop covers recent progress in two-dimensional X-ray diffraction in terms of detector technology, geometry, and configuration of the two-dimensional diffractometer. Various applications such as phase ID, texture, stress, crystallinity, combinational screening, and thin film analysis will be discussed.

## Micro XRF — Lasalle A

Organizer & Instructors:
**G.J. Havrilla**, Los Alamos National Laboratory, Los Alamos, NM, havrilla@lanl.gov
**A. Lanzirotti**, The University of Chicago – CARS, Argonne, IL, USA, lanzirotti@uchicago.edu

The MXRF workshop will provide an overview of micro X-ray fluorescence for solving analytical problems. This overview will include X-ray optics used in MXRF, capabilities, survey of commercial instrumentation, and confocal and monochromatic wavelength dispersive XRF. The workshop will cover "how to" guidelines for applying laboratory-based and synchrotron source MXRF, as well as unique capabilities and applications for each excitation source.

## Quantitative Analysis I — Lasalle B

Organizer & Instructors:
**W.T. Elam**, University of Washington, Seattle, WA, wtelam@apl.washington.edu
**B. Vrebos**, PANalytical B.V., Almelo, The Netherlands, bruno.vrebos@panalytical.com
**K. Kawakyu**, Rigaku Corporation, Osaka, Japan, kawakyu@rigaku.co.jp

- Morning: Source of matrix effects and scatter peaks, compensation methods, semi-quantitative analysis using FP, and fusion
- Afternoon: Introduction to mathematics and physics of XRF quantification

## Amorphous & Disordered Materials I — Lasalle C

Organizer & Instructors:
**T. Fawcett**, ICDD, Newtown Square, PA, USA, fawcett@icdd.com
**S. Bates**, Triclinic Labs, Inc., West Lafayette, IN, USA, sbates@tricliniclabs.com
**M. Leoni**, University di Trento, Trento, Italy, Matteo.Leoni@unitn.it
**A. Newman**, Seventh Street Development Group, Lafayette, IN, USA, ann.newman@seventhstreetdev.com
**V. Petkov**, Central Michigan University, Mt. Pleasant, MI, USA, petko1vg@cmich.edu

### Morning (9:00 am - 12:00 pm)

This workshop will discuss the various methods and techniques used to make amorphous materials. We will then discuss the basics of amorphous materials, solid dispersions, disordered structures, and nanomaterials. Finally, we will cover the structural basis of amorphous materials and the use of diffraction methods for characterization.

Topics include:
- Making amorphous materials
- Amorphous and amorphous solid dispersions
- How are amorphous materials defined
- Amorphous materials: A structural perspective
- The use of powder diffraction

### Afternoon (1:30 pm - 4:30 pm)

In this workshop, we will discuss the various diffraction methods used to elucidate the physical nature of amorphous and disordered materials. This will include overviews of the most frequently used techniques and tools such as full pattern analyses, line profile analyses, and pair distribution functions. The intent is not to cover these subjects in full detail, each could be a separate workshop, but to present a comprehensive look at the available tools.

Topics include:

- The analysis of amorphous and disordered materials by full pattern methods
- The analysis of microstructure by line profile analysis
- The analysis of microstructure by atomic pair distribution analysis

## Tuesday Afternoon Workshops 1:30 pm – 4:30 pm

### Structure Solution II — Madison

Continued from Tuesday morning.

### Advanced Rietveld - Advanced use of GSAS-II — Executive Forum

Organizers & Instructors:

**B. Toby, R. Von Dreele,** Argonne National Laboratory, Argonne, IL, USA, brian.toby@anl.gov; vondreele@anl.gov

This workshop will provide an overview of some of the sophisticated and unique capabilities in GSAS-II such as (1) area detector calibration, integration and automated data reduction, (2) indexing and structure solution from powders, (3) combined refinements and (4) parametric analysis, as well as providing information on what are the latest developments and what is coming soon. Attendees will select a set of tutorials for one of the above topics to complete. Prerequisites: attendees are expected to have attended “Introduction to Rietveld fitting with GSAS-II” or to have already be familiar with basic use of GSAS-II; they are expected to also bring a laptop (Windows, Linux or Mac) with GSAS-II already installed (see http://tinyurl.com/gsasii).

### Sample Preparation of XRF — Lasalle A

Organizer & Instructors:

**J. Anzelmo,** Anzelmo & Associates, Inc., Madison, WI, jaanzelmo@aol.com

**M. Provencher**, Corporation Scientifique Claisse, Quebec City, Quebec, Canada, maprovencher@claisse.com

This workshop will begin with John Anzelmo discussing the fundamental physics of sample preparation, such as infinite thickness and effective layer thickness, particle size effects, mineralogical effects, grinding concepts, and how to make the basic laboratory operations involved in solving these problems for XRF specimen preparation of pressed powders and fusion beads. Marie-Ève Provencher will discuss basic and advanced fusion techniques, such as selection of flux for different applications, conditions that cause cracking in beads, and oxidation techniques for simple and difficult to flux materials.

### Quantitative Analysis II — Lasalle B

Continued from Tuesday morning.

### Amorphous & Disordered Materials II — Lasalle C

Continued from Tuesday morning.

# XRD Poster Session – Monday Evening,
Michigan Room

The Monday Evening XRD Poster Session will be held 5:00 PM – 7:00 PM in the Michigan Room, in conjunction with a Wine & Cheese Reception. Three "Best Poster" awards will be given at the end of the session, including "Best Student Poster".

**Judges: T. Watkins**, Oak Ridge National Laboratory, Oak Ridge, TN, USA and **I.C. Noyan**, Columbia University, New York, NY, USA

**Signifies Presenting Author, when noted*

**D-6** **X-ray Diffraction Study of Nanocellulose II Produced from the Amazonian Seed Coconut (Tucumã)**
**L. Manzato**, IFAM, Manaus, AM, Brazil
**S.M. de Souza**, UFAM, Manaus, AM, Brazil
**J. Simonsen**, OSU, Corvallis, OR, USA

**D-8** **X-ray Analysis for Quantifying Various Components in Poly(vinyl chloride) Plastics**
**P. Ricou, R. Smith**, Arkema Inc., King of Prussia, PA, USA

**D-11** **Structural Investigation of** [illegible] **)($N_{1-x}O_x$) Visible-light Photocatalyst by Neutron and X-ray Diffracti**[illegible]
WITHDRAWN
**D. Chen*, S. Skrabalak**, Indian[illegible], Bloomington, IN, USA

**D-12** **Phase Equilibria in the Co-Fe-Si Ternary System using Synchrotron Powder Diffraction**
**J. Hasier, I.M. Hawgood, P. Nash**, Illinois Institute of Technology, Chicago, IL, USA

**D-16** **What Is the Origin of a Series of Low Angle XRD Peaks Which Appear Following Thermal Cycling of a Gadolinium - Doped Ceria Film – Formation of a Superlattice or Surface Contamination?**
**Y. Feldman*, I. Zon***, Weizmann Institute of Science, Rehovot, Israel
**V. Shelukhin**, Tel-Aviv University, Tel-Aviv, Israel

**D-18** **Operando XRD-DRIFT: Catalyst Characterization by Fisher-Tropsch Process for Clean Fuel Production**
**C. Fontugne**, Thermo Scientific, Artenry, France
**V. Moizan-Basle, L. Braconnier, I. Clemencon, C. Legens, B. Robours, L. Lemaitre**, IFP, Lyon, France

**D-22** **Crystallographic Studies of** [illegible] **ayer Spin Crossover Coordination Polymer**
WITHDRAWN
**Y.-C. Chuang*, C.-K. Chang, J.-**[illegible] Research Center, Hsinchu, Taiwan
**C.-C. Wang**, Soochow Universi[illegible]

**D-23** **Analysis of Steels by Handheld XRD**
**G.M. Hansford,** University of Leicester, Leicester, UK

**D-24** **Synchrotron Powder Diffraction Simplified: The High-Resolution Diffractometer 11-BM at the Advanced Photon Source**
**L. Ribaud*, S. Lapidus, R. Von Dreele, B. Toby**, Argonne National Laboratory, Argonne, IL, USA

**D-26** **Stacking Faults and Phase Transformations Study in Ball Milled Co100-X Crx(x = 0, 20, 50) Alloys**
WITHDRAWN
**S. Louidi,** University 20 Août-1[illegible]
**F.-Z. Bentayeb,** Université Bad[illegible]
**J.J. Sunol,** Universitat de Girona, Girona, Spain

**D-28** **The Mineralogy, Nucleation and Growth of Freshwater Ferromanganese Nodules**
**S. Lee, H. Xu***, NASA Astrobiology Institute, University of Wisconsin –Madison, Madison, WI, USA

**D-29** **The Influence of the Sintering Temperature and Synthesis Method on the Structural Properties of Doped Perovskites Like: $La_{0.75}Sr_{0.25}Cr_{0.5-0.7-}Fe_{0.5-0.3}O_3$ (LSCF) And $BaZr_{0.7}Pr_{0.1}Y_{0.2}O_3$ (BZPY)**
**K. Küçük*, A. Coskun, A.S. Hock, C.U. Segre**, Illinois Institute of Technology, Chicago, IL, USA

**D-31** **Extended Range Ultra Small-Angle, Small-Angle, and Wide-Angle X-ray Scattering Facility for Materials Development**
**J. Ilavsky*, R. Andrews**, APS, Argonne National Laboratory, Lemont, IL, USA
**G. Muralidharan**, Oak Ridge National Laboratory, Oak Ridge, TN, USA
**F. Zhang, L.E. Levine, A.J. Allen**, National Institute of Standards and Technology, Gaithersburg, MD, USA

**D-36** **A Study on Correlation of Electrochemical Behavior with Structural Defects in Olivine System**
**Y. Kim, J. Yoo, M. Jeong, W.-S. Yoon**, Sungkyunkwan University, Suwon, Gyeonggi-do, South Korea
**N.-H. Lee**, Umicore Korea Limited, Cheonan, Gyeonggi-do, South Korea

**D-38** **STOE InSitu HT2 – A New In Situ Reaction Chamber in Debye-Scherrer Geometry**
**T. Hartmann**, Stoe & Cie GmbH, Darmstadt, Germany

**D-41** **Hydrogen Production from Oxidative Steam Reforming of Eth[illegible]nol on Pyrochlore Phase Materials Contains Nickel**
WITHDRAWN
**H.-C. Hsieh, S.-F. Weng, C.-S. Lee** [illegible]chu, Taiwan
**J.-F. Lee, H.-S. Sheu,** National Sy[illegible] Radiation Research Center, Hsinchu, Taiwan

**D-42** **Crystal Structures and Properties of New Compounds in Mgo-$In_2O_3$-$P_2O_5$ Ternary Systems**
**J. Zhang, G. Cai, Z. Jin**, Central South University, Changsha, China

**D-43** **Structural Characterization of** [illegible] **y X-ray Diffraction Analysis**
WITHDRAWN
**H.F. Garces, Y. Zhou, N.P. Padtur** [illegible]SA

**D-46** **Recent Developments on Incoatec's Microfocus Source IµS**
**B. Hasse, A. Kleine, J. Graf, C. Michaelsen**, Incoatec GmbH, Geesthacht, Germany

**D-47** **Crystal Structures of Large-Volume Commercial Pharmaceuticals**
**J.A. Kaduk**, Illinois Institute of Technology, Chicago, IL, USA and North Central College, Naperville, IL, USA
**R.J. Papoular**, IRAMIS/CEA - Saclay, Gif-sur-Yvette Cedes, FRANCE
**A.M. Gindhart, T.N. Blanton**, ICDD, Newtown Square, PA, USA

**D-49** **The Use of '*a*'-Reflections in Determining the Dolomite Ordering State**
**F. Hobbs*, H. Xu**, University of Wisconsin-Madison, Madison, WI, USA

**D-51** **X-ray Analysis of Size and Size Distribution of $Fe_3O_4$ Magnetic Nano-Particles**
**J. Li**, Rice University, Houston, TX, USA

**D-53** **Quartz: Structural and Thermodynamic Analyses Across the α ↔ ß Transition with Origin of Negative Thermal Expansion (NTE) in ß Quartz and Calcite**
**S.M. Antao**, University of Calgary, Calgary, Alberta, Canada

**D-56** **USAXS-SAXS-WAXS Characterization of Coarsening in Nickel Alloys**
**R. Andrews, J. Ilavsky**, Argonne National Laboratory, Lemont, IL, USA
**G. Muralidharan**, Oak Ridge National Laboratory, Oak Ridge, TN, USA

**D-58** **XRD Characterization of Luminescent and Magnetic Nanoparticles Synthesized by Sol-Gel Proteic and Starch-Gel Methods**
**G. Lopes, M. Santos, J. Nascimento, F. Costa, A. Souza, S. Batista, T. Souza**, State University of Amapá, Macapá, AP, Brazil

**D-64** **Powder XRD and TEM Study on Structures, Stacking Faults, and Interstratification in Cu-Chlorite and Zn-Chlorite (Baileychlore)**
**H. Xu**, University of Wisconsin-Madison, Madison, WI, USA

**D-69** **Further Results of X-ray Diffraction of Nuclear Forensic Samples**
**S. Roberts**, Lawrence Livermore National Laboratory, Livermore, CA, USA

**D-72** **Synthesis of MnO2 Nanomaterials with Fine Control of Morphology and Crystalline Phase Composition**
**E. Moazzen, E. Timofeeva, C. Segre**, Illinois Institute of Technology, Chicago, IL, USA

**D-75** **Optimization of Temperature Measurement in the TTK 600 Low-Temperature Chamber and BTS 150/500 Benchtop Heating Stage**
**B. Puhr*, A. Pein**, Anton Paar GmbH, Graz, Austria

**D-76** **Local Structure of Amor**[illegible] **X-ray Total Scattering Analysis using Bench-Top Diffractometer**
WITHDRAWN
**J. Rantanen*, V-P Lehto,** [illegible]o, Finland

**D-77** **Fe-Treated Heteroatom-Doped Graphene as New Catalysts for Water Oxidation**
**F. Razmjooei, K.P. Singh, J.-S. Yu**, DGIST, Daegu, Korea

**D-78** **Structural Study in $Cu_xCo_{1-x}Fe_2O_4$ And $Cu_xMg_{1-x}Fe_2O_4$ Spinnels**
**S. Ouyahia, K. Taibi, A. Rais**, USTHB, Algiers, Algeria

**D-80** **JATOBÁ Beamline - High Energy In Situ X-ray Diffraction**
**L. Wu, E.B. Fonseca, A.P. Tschiptschin**, Brazilian Nanotechnology National Laboratory, Campinas, SP, Brazil
**H. Westfahl Jr**, Brazilian Synchrotron Light Laboratory, Campinas, SP, Brazil
**G. Faria**, Ohio State University, Columbus, OH, USA

**D-83** **Reciprocal Space Mapping Study of CdTe Epilayer Grown by Molecular Beam Epitaxy on (211)B GaAs Substrate**
**M. Polat*, O. Ari, O. Öztürk, Y. Selamet**, Izmir Institute of Technology, Izmir, Turkey

**D-87** **Complementary SAXS, PDF, and XRD Analysis of Quantum Dots**
**S. Speakman**, PANalytical, Westborough, MA, USA

**D-91** **Certification of SRM 1979; Li[illegible] Crystallite Size**
WITHDRAWN
**J.P. Cline, M.H. Mendenhall, J.J.**[illegible]**ich,** NIST, Gaithersburg, MD, USA
**P. Whitfield,** Oak Ridge National [illegible], TN, USA

**D-92** **A High-Precision Measurement of the Cu Kα Emission Spectrum**
**M.H. Mendenhall, J.P. Cline, A. Henins, L.T. Hudson, C.I. Szabo, D. Windover**, NIST, Gaithersburg, MD, USA

**D-94** **ICDD Full Diffraction Pattern Polymer Project – New Entries for PDF-4+ 2016 and PDF-4 Organics 2017**
**T. Blanton, S. Gates**, ICDD, Newtown Square, PA, USA
**S. Misture**, Alfred University, Alfred, NY, USA

**D-95** **Improvements in Benchtop Powder Diffraction Utilizing PROTO's AXRD Diffractometer**
**N. Vukotic*, M. Belassel**,PROTO, Oldcastle, ON, Canada
**W. Boyer**, PROTO, Taylor, MI, USA

**D-97** **Characterization of NiAl Thin Films Using SmartLab Diffractometer**
**N. Anibou**, Rigaku Americas, The Woodlands, TX, USA
**W. Donner**, Technische Universitat Darmstädt, Darmstädt, Germany

**D-102** **Computer Simulation for the Lattice Expansion In Delta Plutonium**
**C. Saw**, Lawrence Livermore National Lab, Livermore, CA, USA

**D-105** **Microstructural Characterization of Fly Ash-based Geopolymer**
**Y. Ling*, K. Wang**, Iowa State University, Ames, IA, USA
**S. Hua**, Nanjing Technology University, Nanjing, Jiangsu, China
**J. Liu**, Jiangsu Research Institute of Building Science, Nanjing, Jiangsu, China

**D-108** **Simultaneous Texture and Strain Analysis of Additive Manufactured Parts Via Tilt-A-Whirl Software**
**M.A. Rodriguez*, B.H. Jared, J.J.M. Griego, L.A. Deibler, R.L. Johnson,** Sandia National Laboratories, Albuquerque, NM, USA

**S-11** **Using Radial Distribution Function to Analyze the Structure of Indium Oxide**
**T. Bsaibes**, DePaul University, Chicago, IL, USA
**G.B. Gonzalez Aviles**, DePaul University, Chicago, IL, USA

**S-16** **Characterization of Thin Diamond Crystals for X-ray Split and Delay Line**
**P. Vodnala*, L.B. Lurio**, Northern Illinois University, Aurora, IL, USA
**T. Kolodziej, S. Stoupin, Y.V. Shyvd'ko**, Argonne National Laboratory, Argonne, IL, USA
**S. Terentyev, V. Blank**, Technological Institute for Superhard and Novel Carbon Materials, Troitsk, Russian Federation

**S-17** **Effect of Zinc and Strontium Dopants on the Structure and Stability of Hydroxyapatite at High Temperatures**
**D. Smith*, G. Gonzalez Aviles**, DePaul University, Chicago, IL, USA

**S-35** **In Situ EXAFS Studies of MoS2 for Li-ion Batteries**
**N. Beaver, S. Aryal, J. Katsoudas, E. Timofeeva, C. Segre**, Illinois Institute of Technology, Chicago, IL, USA

**S-36** **XRD and In Situ XAS Study of Cycled Core/Shell $Ni(OH)_2/Co(OH)_2$ Nanoparticles for Battery Cathodes**
**E. Moazzen, E. Timofeeva, C. Segre**, Illinois Institute of Technology, Chicago, IL, USA

**Post Deadline:**

**D-52** **Effect of Fluorescence on Quantitative X-ray Diffraction Estimates of Crystalline and Amorphous Phases in Fe-Rich Geologic Samples Using Co And Cu Radiations**
**N.M. Piatak*, C.J. Green,** U.S. Geological Survey, Reston, VA, USA

**D-111** **Empyrean Nano: A Versatile X-ray Scattering Instrument Enabling USAXS, SAXS, WAXS and PDF Measurements within a q-range of Almost Five Decades**
**J. Bolze, D. Beckers, M. Gateshki, F. Masiello, M. Fransen*,** PANalytical B.V., Almelo, The Netherlands
**V. Kogan**, DANNALAB, Enschede, The Netherlands

**D-112** **Unlimited Potential: Large Area Reciprocal Space Mapping with 2D Detectors**
**J. Giencke, B. Jones,** Bruker AXS, Inc., Madison, WI, USA

**D-113** **PAINEIRA Beamline: High Resolution Powder X-ray Diffraction Beamline**
**C.B. Rodella, D.H. Barrett*, A.M. Carvalho, M.M. Soares, D.H.C. de Araújo, A. Fontoura, D.R. Santos, H. Westfahl, Jr.,** Brazilian Synchrotron Light Laboratory, Campinas, SP, Brazil

**D-114** **Strain in Cubic $Li_7La_3Zr_2O_{12}$ Solid-state Electrolyte during Cycling and Failure**
**W.A. Paxton*, V. Anandan, A. Drews,** Ford Motor Company, Dearborn, MI, USA

**D-115** **Analysis of Clay Minerals and Amorphous Phases with Dynamic Beam Optimization**
**N.L. Henderson*,** Bruker AXS, Inc., Madison, WI, USA

**D-116** **Pressure-dependent Phase Transitions and Thermal Expansion of $ZrV_2O_7$**
**L.C. Gallington*,** APS, Argonne National Laboratory, Argonne, IL, USA. **A.P. Wilkinson**, Georgia Institute of Technology, Atlanta, GA, USA

**D-117** **Mechanistic Insights into Risperidone –Pregelatinized Starch Binary Dispersions**
WITHDRAWN
**V. Krishnamoorthy*, S. Para**[illegible], Malaysia**, R. Gunasunderi,** Universiti Sains Malaysia, Penang, Malaysia, [illegible]rmacy, Coimbatore, India**, S.A.A. Shah,** Universiti Teknologi Mara (Ui[illegible]), Selangor,, Malaysia

**D-118** **Temperature Dependency of Conventional Thermoplastic Polyurethanes and Lignin-based PUR Using WAXS**
**K.Walbrueck*, S. Klein, J. Rumpf, M. Schulze, S. Witzleben,** Bonn-Rhein-Sieg University of Applied Sciences, Rheinbach, Germany

**D-119** **The Influence of Trace Elements (In, Sn) on the Hardenin[illegible] Process in AlCu-Alloys by Small Angle X-Ray Scattering in Correlation w**[illegible]
WITHDRAWN
**F. Lotter*, D. Petschke,** T.E.M[illegible]burg, Germany T. Schubert, Fraunhofer IFAM-DD, Dresden, Germany

**D-121** **Effects of Ag-embedment on Electronic and Ionic Conductivities of LiMnPO4 and Performances as a Cathode for Lithium-ion Batteries**
**D. Ahn*,** Pohang Accelerator Laboratory, Pohang, South Korea
**S.J. Yoo,** Korea Institute of Science and Technology, Seoul, South Korea
**I.K. Park,** Seoul National University of Science and Technology, Seoul, South Korea

**D-122** **Optimization and Characterization of Nano-crystalline Niobium Carbide via Carbo-thermal Route**
**A. Gupta, O.P. Pandey,** Thapar University, Patiala, India

**D-123** **High Temperature Phase Transformation of Iron Sulfide**
**S. Mlowe*, N. Revaprasadu,** University of Zululand, kwa zulu natal, South Africa
**S.S. Garje,** University of Mumbai, Mumbai, India

**D-124** **Nuclear Forensic Science Developments Using X-ray Diffraction Analysis**
**L.E. Sweet*, V.V. Joshi, S. Jana, A.J. Casella, M. McCoy, S.I. Sinkov, C.H. Delegard, J.M. Tingey, G.J. Lumetta, D. Meier,** Pacific Northwest National Laboratory, Richland, WA, USA

**D-125** **The New MicroMax-003F Microfocus Source for X-ray Analysis**
**L. Jiang, B. Verman, B. Ehlers, B. Kim, M. Degen,** Rigaku Innovative Technologies, Inc., Auburn Hills, MI, USA

**D-126** **Humidity Induced Phase Transitions of HEW Lysozyme Investigated on a Laboratory XRD system**
**T. Degen, D. Beckers, G. Nénert,** PANalytical B.V, Almelo, The Netherlands
**S. Saslis, S. Logotheti, F. Karavassili, A.Valmas, I. Margiolaki,** University of Patras, Patras, Greece
**S. Trampari,** Kapodistrian University of Athens, Athens, Greece

### D-127 Multiphase Samples Built by Additive Manufacturing

**T.R. Watkins, A. Shyam, Y. Yamamoto, E. Cakmak, K. Unocic, R. Dehoff, S. Gorti, S. Simunovic, S.S. Babu,** Oak Ridge National Laboratory, Oak Ridge, TN, USA

### D-130 Semi-Automated Mineral Classification in the Powder Diffraction File™

**S. Kabekkodu*,** ICDD, Newtown Square, PA, USA
**L. Bernstein,** Terrametrix, Menlo Park, CA, USA
**A. McDonald,** Laurentian University, Sudbury, Ontario, Canada
**A. Roberts,** Geological Survey of Canada, Ottawa, Ontario, Canada

# XRF Poster Session – Tuesday Evening,
Michigan Room

The Tuesday Evening XRF Poster Session will be held 5:00 PM – 7:00 PM in the Michigan Room, in conjunction with a Wine & Cheese Reception. Three "Best Poster" awards will be given at the end of the session, including "Best Student Poster".

**Judges: L. Brehm**, Dow Chemical Company, Midland, MI, USA, **U.E.A. Fittschen**, Washington State University, Pullman, WA, USA and **M. Loubser**, GeoMag GeoChem, Johannesburg, South Africa

**Signifies Presenting Author, when noted*

**F-2** **Archaeological Characterization of Ancient Pottery from Izu Islands (Tokyo, Japan) by Chemical Compositions Obtained from XRF**
**S. Ichikawa*, T. Nakamura**, Meiji University, Kawasaki, Kanagawa, Japan
**T. Matsumoto**, Tokai University, Hiratsuka, Kanagawa, Japan

**F-6** **Method Development for the Quantification of Dissolved Major Components of Radioactive Liquid Waste**
**T. Ely, G. Cooke**, Washington River Protection Solutions LLC, Richland, WA, USA

**F-7** **Laboratory-typed Polychromatic XRF for Chemical State Analysis using Silicon Strip Detector and Laboratory X-ray Source**
**K. Sato*, A. Nishimura, M. Kaino, S. Adachi**, Shimadzu Corporation, Kyoto, Japan

**F-8** **Content Distribution Analysis of Nb, Ti, Mo, W in Superalloys by High-resolution XRF Scanning Method**
**D.L. Li, L. Zhao, L.X. Yang, H.Z. Wang**, Central Iron & Steel Research Institute, Beijing, China

**F-11** **Multiscale Analysis of Cu in 9Cr-3W-3Co Martensitic Heat Resistant Steels for Ultra-supercritical Power Plants by Micro-XRF/ EDS on SEM**
**L.X. Yang, L. Zhao, D.L. Li, X.J. Li, H.Z. Wang**,China Iron & Steel Research Institute, Beijing, China

**F-18** **X-ray Reflectometry Study of the Structures of Langmuir-Schaeffer Films of Encapsulated Nanoparticles**
**N. Al-Senany**, King Abdulaziz University, Jeddah, Saudi Arabia
**T. Richardson, N. Cowlam**, University of Sheffield, Sheffield, UK

**F-19** **Comparison Between Different Quantification Methods in the EDXRF Analysis of Precious Alloys**
**F. Niccolai, A. Amato, J. Ravagli**, Sinerlab S.r.l., Quarrata (PT), Italy
**S. Gonzi**, University of Florence, Firenze, Italy
**D.M. Musale**, Quantum Equipment Co. Pvt. Ltd., Mumbay, India
**S. Ridolfi***, Ars Mensurae, Roma, Italy

**F-20** **On-Site Determination of Heavy Metals in Water Using Handheld X-ray Fluorescence Spectrometer**
**K. Hagiwara, S. Kai, Y. Koike, M. Aizawa, T. Nakamura**, Meiji University, Kawasaki, Kanagawa, Japan

**F-21** **Safety Handling of Handheld X-ray Fluorescence Spectrometer Based on Determination of Two-dimensional Imaging of Scattering Radiation**
**K. Fujii, K. Hagiwara, W. Matsuda, T. Nakamura, Y. Koike**, Meiji University, Kawasaki, Kanagawa, Japan

**F-22** **The Synchrotron X-ray Study on the Reaction Mechanism of Metal Oxide Based Anode Materials with High Abnormal Capacity for Lithium-Ion Batteries**
**H. Kim, J. Yoo, Y. Kim, W.-S.Yoon**, Sungkyunkwan University, Suwon, Gyeonggi-do, South Korea
**M. Balasubramanian**, Argonne National Laboratory, Lemont, IL, USA

**F-23** **Large Area 7-Channel Silicon Drift Detector Array**
**A. Pahlke, R. Fojt, M. Fraczek, M. Hofmann, L. Hoellt, J. Knobloch, E. Lechner, N. Miyakawa, S. Pahlke, J. Rumpff, O. Scheid, A. Simsek, R. Stoetter**, KETEK GmbH, Munich, Germany

**F-24** **Calculation of Fluorescent X-ray Intensity Calculation for Confocal Micro-XRF Analysis of Inhomogenious Samples**
**N. Kawahara*, T. Matsuno, K. Tsuji**, Osaka City University, Osaka, Japan

**F-27** **Application of Metal Impurity Trace Analysis in Pharmaceutical Materials Using Unique FP Method for Assessment Elements Based on ICH Q3D**
**H. Furukawa, N. Ichimaru, H. Ochi**, Shimadzu Corporation, Kyoto, Japan
**D. Davis**, Shimadzu Scientific Instruments, Inc., MD, USA
**C. Yomota**, Pharmaceutical and Medical Device Regulatory Science Society of Japan, Osaka, Japan

**F-36** **Environmental Sample Examp** WITHDRAWN **luorescence Spectrometer**

**J. Kawai***, Kyoto University, Kyot
**H. Nagai, Y. Nakajima**, Ourstex,

**F-39** **Analyzing Absorption of Wood Preservatives Using Micro-X-ray Fluorescence**

**A. Lee, B. Scruggs**, Edax, Mahwah, NJ, USA

**F-47** **The Development of TXRF Method and its Application on the Study of Trace Elements in Water at SSRF**

**L. Wang, H. Yu, L. Li, X. Wei*, Y. Huang***, Chinese Academy of Sciences, Shanghai, China

**F-56** **Multi-Element Silicon Drift Detectors for High Speed X-ray Spectroscopy and Mapping Applications**

**M. Zhang, S. Barkan, V.D. Saveliev, Y. Wang, L. Feng, B. Goolsby, E.V. Damron, Y. Tomimatsu**, Hitachi High-Technologies Science America, Inc., Northridge, CA, USA
**R. Goldsbrough**, Quantum Detectors Ltd., Harwell, Oxford, UK

**F-57** **Elemental Characterization of Airborne Particulate Matter Collected within IMPROVE and CSN Networks**

**K. Trzepla *, S. Yatkin, W. White, N. Hyslop**, University of California, Davis, CA, USA

**F-58** **X-ray Fluorescence Measurements of Pharmaceutical Sprays**

**D. Duke*, A. Kastengren**, Argonne National Laboratory, Lemont, IL, USA
**N. Mason-Smith, D. Edgington-Mitchell, D. Honnery**, Monash University, Melbourne, VIC, Australia

**F-59** **Investigation of Heavy Metal Deposition in Zebrafish by Total Reflection X-ray Fluorescence**

**M. Schmeling, J. Arroyo, R. Dale, E. Jamka, K. Niaz**, Loyola University Chicago, Chicago, IL, USA

**F-60** **Quantification of Nanoparticles Used in Biomedical Applications via Total Reflection X-ray Fluorescence**

**G. Mankovskii *, E. Da Silva, J. Grafe, A. Pejovic-Milic**,Ryerson University, Toronto, Ontario, Canada

**F-62** **Increased Zinc Accumulation in Mineralized Osteosarcoma Tissue Measured by SR-µXRF Analysis**

**M. Rauwolf, B. Pemmer, A. Turyanskaya, S. Smolek, A. Maderitsch, P. Hischenhuber, C. Weixelbaumer, M. Foelser, P. Wobrauschek, C. Streli***, Atominstitut TU Wien, Vienna, Austria
**A. Roschger, K. Klaushofer, P. Roschger, J.G. Hofstaetter**, Hanusch Hospital of WGKK and AUVA Trauma Centre Meidling, Vienna, Austria
**R. Simon**, Karlsruhe Institute of Technology (KIT), ANKA synchrotron radiation source, Karlsruhe, Germany
**S. Lang, S. E. Puchner, R. Windhager**, Vienna General Hospital, Medical University of Vienna, Vienna, Austria

**F-63** **Zn Distribution in Healing Osteoporotic Fractures Measured by SR-µXRF Analysis**

**M. Rauwolf, A. Turyanskaya, B. Pemmer, J. Prost, P. Wobrauschek, C. Streli***, Atominstitut TU Wien, Vienna, Austria
**A. Roschger, K. Klaushofer, P. Roschger, J.G. Hofstaetter**, Hanusch Hospital of WGKK and AUVA Trauma Centre Meidling, Vienna, Austria
**R. Simon**, Karlsruhe Institute of Technology (KIT), ANKA synchrotron radiation source, Karlsruhe, Germany
**I. Pape**, Diamond Light Source Ltd, Oxfordshire, UK

**F-64** **SR-TXRF-XANES of Indoor Aerosol Samples at BESSYII and ELETTRA**

**J. Prost, A. Windbichler, P. Wobrauschek, C. Streli,** Atominstitut, TU Wien, Vienna, Austria
**A. Guilherme Buzanich, U. Reinholz, H. Riesemeier, M. Radtke**, Institute for Materials Research and Testing (BAM), Berlin, Germany
**G. Pepponi**, MiNaLab, CMM-irst, Fondazione Bruno Kessler, Trento, Italy
**A. Migliori, A.G. Karydas, M. Czyzycki**, IAEA, Seibersdorf, Austria
**D.M. Eichert, W.H. Jark**, ELETTRA - Sincrotrone Trieste, Trieste, Italy

**F-65** **Total Reflection X-ray Fluorescence Analysis of Indoor Aerosol Samples – Influence of Sampling Time and Comparison of Different Direct Sampling Methods**

**J. Prost, A. Windbichler, A. Zinkl, A. Hable, J.H. Sterba, P. Wobrauschek, C. Streli**, Atominstitut, TU Wien, Vienna, Austria
**A.G. Karydas**, IAEA, Seibersdorf, Austria

**F-66** **Manganese Distribution in Healthy and Osteoporotic Human Bone**

**A. Turyanskaya, M. Rauwolf, J. Prost, P. Hischenhuber, P. Wobrauschek, C. Streli**, TU Wien, Atominstitut, Vienna, Austria
**A. Roschger**, Max Planck Institute of Colloids and Interfaces, Potsdam, Germany
**A. Roschger, P. Roschger, J.G. Hofstaetter, K. Klaushofer**, Hanusch Hospital of WGKK and AUVA Trauma Centre Meidling, Vienna, Austria
**J.G. Hofstaetter**, Orthopaedic Hospital Vienna-Speising, Vienna, Austria
**R. Simon**, Karlsruher Institute for Technology (KIT), ANKA Synchrotron Radiation Source, Karlsruhe, Germany

**F-67** **Elemental Imaging on Biodegradable Orthopedic Implants by µXRF**

**A. Turyanskaya, M. Rauwolf, J. Prost, L. Perneczky, P. Wobrauschek, C. Streli,** TU Wien, Atominstitut, Vienna, Austria
**T.A. Gruenewald, M. Meischel, H. Lichtenegger, S.E. Stanzl-Tschegg**, University of Natural Resources and Life Sciences (BOKU), Vienna, Austria
**A.M. Weinberg**, Medical University Graz, Graz, Austria

**S-14** **Capping Layer Effects of Au and Al On Fe/(Ga,Mn) as Bilayers Studied by X-ray Absorption Spectroscopy**

**A.M. Alsmadi***, Kuwait University, Kuwait, Kuwait
**Y. Choi, D.J. Keavney**, Argonne National Laboratory, Argonne, IL, USA
**X. Liu, M. Dobrowolska, J.K. Furdyna**, University of Notre Dame, Notre Dame, IN, USA
**K. Tivakornsasithorn**, Mahidol University, Bangkok, Thailand

**S-15** **Micro-Computed Tomography for Morphometry of Non-Mineralized Fresh and Plastic Embedded Biological Tissues Subjected to Laser Ablation**

**A. Robinson, S. Stock, C. Richter**, Northwestern University, Chicago, IL, USA
**C. Soriano, X. Xiao**, Argonne National Laboratory, Argonne, IL, USA

**S-20** **Using Statistical and Geostatistical Information to Identify Soil Particulate Organic Matter on X-ray Computed Micro-Tomography Images**

**A. Kravchenko, A. Guber, D. Colbry**, Michigan State University, East Lansing, MI, USA

**S-22** **EDX, Raman, Optical Microscopy and Multivariate Statistics Analysis of Archaeological Pottery from São Luiz, MA, Brazil**

**R. Ikeoka, C. Appoloni, O.H. Marcori**, State University of Londrina - UEL, Londrina, PR, Brazil
**A.M. Bandeira**, Universidade de São Paulo, São Paulo, SP, Brazil

**S-33** **Time-Lapse Micro X-ray Computed Tomography Study of Moisture- and Mechanically-Induced Twisting of Wood Slivers**

WITHDRAWN

**X. Arzola, R. Lakes**, University o
**X. Xiao**, APS, Argonne National Laboratory, Argonne, IL, USA
**J. O´Dell, J. Jakes**, USDA Forest Service, Madison, WI, USA

**S-41** **$CaCO_3$: Probing the Complex Chemistry of a Simple and Ubiquitous Material with X-ray Absorption Spectroscopy**

**E.A. Willneff*, T. Kathyola, P. Mougkogiannis**, University of Leeds, Leeds, UK
**S.Y. Chang**, Diamond Light Source, Oxford, UK

**S-42** **Developments in Equilibrium and Time-Resolved Small Angle X-ray Scattering**

**S. Chakravarthy, T. Irving**, BioCAT/Illinois Institute of Technology, Chicago, IL, USA
**S. Kathuria, O. Bilsel**, U Mass. Medical School, Worcester, MA, USA

**S-44** **Measuring Crystal Characteristics of Intact Archeological Human Second Metacarpal Bones as a Function of Individuals' Age at Death**

**S.R. Stock***, Northwestern University, Chicago, IL, USA
**J.S. Park, J.D. Almer**, Argonne National Laboratory, Argonne, IL, USA
**I.G. Nielsen, H. Birkedal**, Aarhus University, Aarhus, DK
**S. Mays**, English Heritage, Portsmouth, UK

**S-51** **Synchrotron Radiation Studies of Multilayered ZrC/SiC Thin Films for Advanced Nuclear Fuel Cladding Applications**

**D. Velazquez*, R. Seibert, W. Limestall, Z. Lee, J. Terry**, Illinois Institute of Technology, Chicago, IL, USA

**S-52** **Synchrotron Characterization of Fission Products in the SiC Containment Layer in High Burnup TRISO Fuel**

**R.L. Seibert*, J. Terry**, Illinois Institute of Technology, Chicago, IL, USA
**K. Terrani, F. Montgomery, C. Baldwin, K. Leonard**, Oak Ridge National Laboratory, Oak Ridge, TN, USA

**S-59** **Development of Low Cast X-ray Imaging for Solidification of Cast Steels**

**C. Chuang, D. Singh, P. Kenesei, J. Almer, J. Hryn**, Argonne National Laboratory, Lemont, IL, USA

**S-61** **Semi-empirical Modeling of the Influence of the Microphonic and Electrical Periodic Interference On the Energy Resolution of the Semiconductor Detectors**

**A. Stratilatov*, S. Cornaby**, Moxtek, Inc., Orem, Utah, USA

**Post Deadline:**

**F-70** **Optimization-Based Approach for Joint X-ray Fluorescence and Transmission Tomographic Inversion**
**Z. Di, S. Leyffer, S. Wild**, Argonne National Lab, Lemont, IL, USA

**F-71** **Combined Synchrotron X-ray Microprobe Analysis of Corrosion Deposits in Fuel Rods of Pressurized Water Reactors**
**V.A. Samson*, D. Grolimund**, Swiss Light Source (SLS) Paul Scherrer Insitute, Villigen, Switzerland
**M. Martin, H.D. Potthast**, Nuclear Energy and Safety Department (NES) Paul Scherrer Insitute, Villigen, Switzerland

**S-62** **MicroXAS Beamline of the Swiss Light Source – A Bright, Multi-modal Microscopic Chemical Imaging Beamline**
**D. Grolimund, V.A. Samson*, D. Ferreira-Sanchez, M. Birri, B. Meyer**, Swiss Light Source (SLS), Paul Scherrer Insitute, Villigen, PSI, Switzerland

**F-73** **Ultralight Elements Analysis in EDXRF**
**T. Omori, K. Tantrakarn, K. Nishihagi, K. Taniguchi**, Techno X Co., Ltd., Osaka, Japan

**F-74** **High Temperature Beryllium Window Replacement for XRF Detectors**
**J. Abbott, K. Black, J. Wong, M. Harker**, Moxtek, Inc., Orem, Utah, USA

**F-75** **The Use of X-ray Optics Made Easy – Introducing the fleX-Beam**
**N. Gao*, D. Dunham, J.P. Camardo**, XOS, East Greenbush, NY, USA

**F-76** **Materials Assurance Through Orthogonal Materials Measurements**
**M.H. Van Benthem, D.F. Susan, M.A. Rodriguez*, J.J.M. Griego**, Sandia National Laboratories, Albuquerque, NM, USA

## Plenary Session – Wednesday Morning, 8:30 AM – 12:00 PM
Lasalle Ballroom

**Signifies Presenting Author, when noted*

### Plenary Session: Imaging at Current and Next Generation Synchrotrons
Chair: **Brian Toby**, Argonne National Laboratory, Advanced Photon Source, Argonne, IL, USA

**8:30** **Opening Remarks & Awards:**
Chairman of the Denver X-ray Conference, **W. Tim Elam**, University of Washington APL, Seattle, WA, USA

**Presentation of Awards:**
2016 Birks Award presented to **Alan C. Huber**, Amptek, Inc., Bedford, MA, USA and **Jacob (Nate) Sherman** (awarded posthumously).

2016 Jerome B. Cohen Student Award to be announced.

2016 Robert L. Snyder Student Travel Awards to be announced.

2016 Hanawalt Award presented to **Matteo Leoni** and **Paolo Scardi**, University di Trento, Trento, Italy
Presented by **Scott Misture**, New York State College of Ceramics at Alfred University, Alfred, NY, USA

Plenary Session remarks by the Session Chair, **Brian Toby.**

**9:00** **D-106** 100 Years of Powder Diffraction
**Tim Fawcett***, International Centre for Diffraction Data, Newtown Square, PA, USA

**9:30** **S-13** X-ray Imaging at the Advanced Photon Source (APS) from Data Intensive to Data Driven: Opportunities with the APS Upgrade
**Francesco De Carlo*, V. De Andrade, K. Fezzaa, T. Sun, X. Xiao**, Argonne National Laboratory, Argonne, IL, USA

**10:15** **Break**

**10:45** **F-69** X-ray Fluorescence Microscopy: Advances and Unique Opportunities
**Stefan Vogt*, S-C. Gleber, D. Vine, S. Chen, L. Finney, O. Antipova, L.X. Li, B. Lai**, APS, Argonne National Laboratory, Argonne, IL, USA
**B. Twining**, Bigelow Laboratory, East Boothbay, USA
**S. Baines**, Stony Brook University, Stony Brook, NY, USA
**C. Fahrni, D. Bourassa, E. Ingall**, Georgia Institute of Technology, Atlanta, GA, USA
**J. Deng**, Northwestern University, Chicago, IL, USA
**C. Jacobsen**, APS, Argonne National Laboratory, Argonne, IL, USA and Northwestern University, Chicago, IL, USA
**J.E. Jakes, C.G. Hunt, D.J. Yelle, C. Preissner**, Forest Products Laboratory, Madison, WI, USA

**11:30** Hanawalt Award Lecture: Detailed Microstructure Information from Powder Data: A Maze or Amazing?
**Matteo Leoni**, University di Trento, Trento, Italy

Note: **Paolo Scardi** will present his Hanawalt Award Lecture at **XTOP 2016 – 13th Biennial Conference on High-Resolution X-Ray Diffraction and Imaging**, scheduled 4-8 September 2016 in Brno, Czech Republic.

# Oral Sessions – Wednesday Afternoon

**Signifies Presenting Author, when noted*

**High Energy X-ray Microscopy** **Lasalle B**

Chair: **J. Almer**, APS - Argonne National Laboratory, Argonne, IL, USA, almer@anl.gov
Co-Chair: **S. Stock,** Feinberg School of Medicine, Northwestern University, Chicago, IL, USA, s-stock@northwestern.edu

| | | |
|---|---|---|
| **1:30** | **S-45** | Invited - X-ray Diffraction Tomography of Polycrystalline Materials: Present and Future<br>**S.R. Stock***, Northwestern University, Chicago, IL, USA<br>**J.D. Almer**, Argonne National Laboratory, Argonne, IL, USA<br>**H. Birkedal**, Aarhus University, Aarhus, DK |
| **2:00** | **D-48** | Using Far Field High Energy Diffraction Microscopy to Characterize the State of Polycrystalline Material<br>**J.-S. Park**, Argonne National Laboratory, Lemont, IL, US |
| **2:20** | **D-60** | Diffraction Scattering Computed Tomography: 3D Imaging of Complex Nanomaterials<br>**M. E. Birkbak*, S. Frølich, S. Siddiqui, H. Birkedal**, Aarhus University, Aarhus, Denmark<br>**J. D. Almer**, Argonne National Laboratory, Argonne, IL, USA<br>**S. R. Stock,** Northwestern University, Chicago, IL, USA |
| **2:40** | **S-31** | Optimized Information Extraction from Near-field High Energy Diffraction Microscopy Data Sets<br>**R. Suter, D. Mensasche, H. Liu**, Carnegie Mellon University, Pittsburgh, PA, USA |
| **3:00** | | **Break** |
| **3:30** | **S-48** | Invited - Multi-scale and Multi-informative Imaging of Structural Materials<br>**M. Kimura*, Y. Takeichi, Y. Niwa, H. Nitani**, High Energy Accelerator Res. Org. (KEK), Tsukuba, Ibaraki, Japan<br>**M. Tomita, T. Inaguma, R. Murao**, Nippon Steel & Sumitomo Metal Co., Futtsu, Chiba, Japan<br>**I. Obayashi, Y. Hiraoka**, Tohoku Univ., Sendai, Miyagi, Japan<br>**Y. Liu**, Stanford Synchrotron Radiation Lightsource, Menlo Park, CA, USA<br>**C. Holzner**, Carl Zeiss X-ray Microscopy, Pleasanton, CA, USA |
| **4:00** | **D-55** | 3D Study of Deformation Behavior in Neutron Irradiated Fe 9Cr Alloy<br>**X. Zhang*, J.S. Park, C. Xu, H. Sharma, J. Almer, M. Li**, Argonne National Laboratory, Lemont, IL, USA |
| **4:20** | **D-96** | High-energy X-ray Microscopy and Computed Tomography of Nuclear Fuels and Materials<br>**M.A. Okuniewski*, F. Zhang, V. Ganapathy, P. Cassutt, B. Hamilton**, Purdue University, West Lafayette, IN, USA<br>**H. Sharma, P. Kenesei, J. Almer**, Argonne National Laboratory, Argonne, IL, USA<br>**J. Hunter, R. Pokharel, D. Brown**, Los Alamos National Laboratory, Los Alamos, NM, USA<br>**A. Aitkaliyeva, J. Harp, B. Miller**, Idaho National Laboratory, Idaho Falls, ID, USA |
| **4:40** | **D-128** | Invited - HEDM Analysis using the HEXRD Software Package: Benchmarks and Examples<br>**J.V. Bernier*, D.C. Pagan,** Lawrence Livermore National Laboratory, Livermore, CA, US<br>**D.E. Boyce, D. Dale,** Cornell High Energy Synchrotron Source, Cornell University, Ithaca, NY, USA<br>**P.A. Shade, T.J. Turner,** Air Force Research Laboratory, Wright-Patterson AFB, Dayton, OH, USA |
| **5:10** | **D-109** | Advanced In Situ Loading Environments for Synchrotron X-ray Diffraction Experiments<br>**P.A. Shade*, T.J. Turner, J.C. Schuren**, Air Force Research Laboratory, Wright-Patterson AFB, OH, USA<br>**B. Blank**, PulseRay, Beaver Dams, NY, USA<br>**J.V. Bernier, S.F. Li**, LLNL, Livermore, CA, USA<br>**J. Lind**, LLNL, Livermore, CA, USA and Carnegie Mellon University, Pittsburgh, PA, USA<br>**D.B. Menasche, R.M. Suter**, Carnegie Mellon University, Pittsburgh, PA, USA<br>**U. Lienert**, DESY-Petra III, Hamburg, Germany<br>**P. Kenesei, J.S. Park, J. Almer,** APS, Argonne National Laboratory, Argonne, IL, USA<br>**D.S. Dale, E. Fontes, M.P. Miller**, Cornell University, Ithaca, NY, USA |

## Trace Analysis — Lasalle C

Chair: **M.A. Zaitz**, IBM, Hopewell Junction, NY, USA, zaitz@us.ibm.com
Co-Chair: **R. Phillips,** Thermo Fisher Scientific, West Palm Beach, FL, USA, rich.phillips@thermofisher.com

**1:30** **F-53** Invited - Analytical Options for Trace Anal
**A. Martin,** Thermo
**A. McWilliams,** Re ... USA
**WITHDRAWN**

**1:30** **F-77** Invited - A Modern Multi-excitation for TXRF and Its Application to Environmental Samples
**M. Beauchaine*, A. Gross, H. Stosnach**, Bruker AXS Inc., Madison, WI, USA

**2:00** **F-35** Micro-XRF Spectroscopy in Fossil Samples Providing Information about Preservation, Paleoecology and Evolution of Specimens
**L. Maldanis*, D. Galante, C. A. Perez**, Brazilian Synchrotron Light Laboratory, Campinas, Brazil
**J. Xavier-Neto**, Brazilian Biosciences National Laboratory, Campinas, Brazil
F**. Rodrigues**, University of Sao Paulo, São Paulo, Brazil

**2:20** **S-47** Chemical Shift Measurements for Elemental Oxidation State Determination using a Cryogen-Free Microcalorimeter X-ray Spectrometer
**G. Havrilla*, K. McIntosh, M. Croce, M. Rabin, S. Kosimor**, Los Alamos National Laboratory, Los Alamos, NM, USA
**R. Cantor, M. Carpenter, A. Hall**, Star Cryoelectronics, Santa Fe, NM, USA
**D. Schmidt, D. Sweta, J. Ullom**, National Institute of Standards and Technology, Boulder, CO, USA
**H. Naito**, H.K.N. Inc, San Jose, CA, USA

**2:40** **F-46** Discriminating Window and Bottle Glass Fragments Based on Trace Elements
**B. Scruggs**, EDAX Inc., Mahwah, NJ, USA

**3:00** **Break**

**3:30** **S-46** Invited - Outstanding and Environmentally-Friendly Tool for Trace Analysis: Benchtop TXRF
**R. Ayala**, Fisichem Inc., Miami, Fl, USA and Fisichem, Guatemala, Guatemala

**4:00** **F-3** An Energy-Dispersive XRF Analyser with X-ray Optics for Analysis of Heavy Elements in Water and Food at Parts-Per-Billion Concentrations
**Y. Van Haarlem, E. Jager, P. Hodgins, J. Tickner**, CSIRO, Sydney, NSW, Australia

**4:20** **F-13** Optimization of X-ray Band-Pass-Filter to Analyze Traces in Organic or Inorganic Samples
**J. Heckel**, SPECTRO Analytical Instruments GmbH, Kleve, Germany

## Biological Applications of X-ray Fluorescence Microscopy – Biomedical Applications — Executive Forum

Chair: **G. Woloschak**, Northwestern University, Feinberg School of Medicine, Chicago, IL, USA, g-woloschak@northwestern.edu

**1:30** **B-26** Invited - The Role of Copper in Neurodegenerative Diseases
**L.M. Miller**, Brookhaven National Laboratory, Upton, NY

**2:00** **B-21** Invited - Quantitative Subcellular Mapping of Metals Fluxes Reveals New Pathways in Microbial Physiology and Mammalian Development
**T.V. O'Halloran*, A. Bayer, H. Chen, S. Garwin, A. Mendoza, A. Nowakowski, S. Wang, J. Deng, C. Jacobsen, N. Zhang, T.K. Wookruff**, Northwestern University, Evanston, IL, USA
**S. Chen, S. Vogt**, APS, Argonne National Laboratory, Lemont, IL, USA

**2:30** **B-5** Permeability of Mammary Ductal Lumens to MRI Contrast Agents may be a New Marker for In Situ Mammary Cancer: An X-ray Fluorescence Microscopy Study
**D. Mustafi*, E. Markiewicz, U. Dougherty, M. Zamora, J. Mueller, S.D. Conzen, G.S. Karczmar**, The University of Chicago, Chicago, IL, USA
**S.-C. Gleber, S. Vogt**, APS, Argonne National Laboratory, Lemont, IL, USA

**2:50** **B-20** X-ray Fluorescence Imaging of Chemical Warfare in the Immune System Response: The Battle between Monocytes and Cryptoccocus Neoformans
**P.A. Lay,* R. Mak, J. Lee, P.-G. Juillard, T.C. Sorrell, G.E.R. Grau**, The University of Sydney, Sydney, Australia
**S. Chen, J. Den, S. Vogt**, Argonne National Laboratory, Argonne, IL, USA

**3:10** **Break**

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| **3:40** | **B-19** | Invited - XFM and XAS Combined Yield Insight on Mammalian Selenium Biochemistry<br>**H. Harris, C. Weekley, M. Ceko, R. Rodgers**, The University of Adelaide, Adelaide, Australia<br>**P. Witting**, The University of Sydney, Sydney, Australia |
| **4:10** | **B-9** | The Role of Storage Vesicles in Mammalian Copper Homeostasis<br>**M. Ralle, T.R. Capps, M.E. Duffy**, Oregon Health and Sciences University, Portland, OR, USA<br>**D. Vine, S. Vogt**, APS, Argonne National Laboratory, Argonne, IL, USA |
| **4:30** | **B-18** | Zinc Dynamics Regulate Germline Development in Caenorhabditis Elegans<br>**A. Mendoza*, C. Schiffer, S. Cheung, S. Wignall, T.V. O'Halloran**, Northwestern University, Evanston, IL, USA<br>**S. Vogt**, Argonne National Laboratory, Argonne, IL, USA |
| **4:50** | **B-24** | Investigation of Animal Tissue Samples using X-ray Fluorescence<br>**T. Paunesku, A. Gordon, K. Harris, M.B. Wanzer, A. Larson, G. Woloschak**, Feinberg School of Medicine, Northwestern University, Chicago, IL, USA<br>**O. Antipova, L. Li, S. Chen, S. Vogt**, APS, Argonne National Laboratory, Argonne IL, USA |

## New Developments in XRD & XRF Instrumentation I — Lasalle A

Chairs: **T. Fawcett, T. Blanton**, International Centre for Diffraction Data, Newtown Square, PA, USA, fawcett@icdd.com; tblanton@icdd.com

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| **1:30** | **D-50** | Feasibility Study of "1 Minute" Reciprocal Space Mapping<br>**M. Hawkridge***, PANalytical, Westborough, MA, USA<br>**L. Grieger, J. Woitok**, PANalytical, B.V., Almelo, The Netherlands |
| **1:45** | **D-40** | The STOE STADI P with Ag $K\alpha_1$-Radiation – Highest Versatility for XRD and PDF<br>**T. Hartmann**, Stoe & Cie GmbH, Darmstadt, Germany |
| **2:00** | **D-98** | Subfiles and Classifications in the Powder Diffraction File™<br>**S. Kabekkodu, S. Gates-Rector, A. Gindhart, T. Blanton, T. Fawcett**, ICDD, Newtown Square, PA, USA |
| **2:15** | **D-89** | A Powerful Update: HighScore(Plus) v.4.5<br>**T. Degen, E. Bron, M. Gateshki, M. Sadki**, PANalytical B.V., Almelo, Netherlands |
| **2:30** | **D-37** | Sample Temperature Accuracy of the Novel TTK 600 Low-Temperature Chamber<br>**B. Puhr*, A. Pein**, Anton Paar GmbH, Graz, Austria |
| **2:45** | **S-12** | Novel, High Brightness X-ray Source and High Efficiency X-ray Optics for a New Generation of X-ray Instrumentation<br>**W. Yun*, B. Stripe, J. Kirz, A. Lyon, D. Reynolds, S.J.Y. Lewis, S. Chen, V. Semenov, R.I. Spink, S.H. Lau**, Sigray, Concord, CA, USA |
| **3:00** | **F-50** | The Quantum Leap in ED-XRF - How Advanced Technologies Have Changed the Game<br>**D. Sachtler, D. Wissmann**, SPECTRO Analytical Instruments GmbH, Kleve, Germany<br>**M. Daniel-Prowse***, SPECTRO Analytical Instruments Inc., Mahwah, NJ, USA |
| **3:15** | | **Break** |
| **3:45** | **D-45** | Bright. Brighter. Unique - The New Incoatec Microfocus X-ray Source IµS 3.0 for Crystallography<br>**B. Hasse, A. Stricker, J. Graf, A. Kleine, J. Wiesmann, C. Michaelsen**, Incoatec GmbH, Geesthacht, Germany |
| **4:00** | **F-42** | Newly Developed Compact Sized X-ray Sources<br>**S. Cornaby***, **T. Parker, R. Steck, B. Harris, K. Kozaczek, C. Smith, E. Miller, S. Kamtekar**, Moxtek Inc., Orem, UT, USA |
| **4:15** | **S-19** | Analysis of Hermetically Closed Detector Modules for X-ray Detection<br>**H. Soltau, A. Niculae*, H. Schmidt, R. Lackner, B. Talbi**, PNDetector GmbH, Munich, Germany |
| **4:30** | **F-28** | Hybrid Pixel Detector for XRF<br>**E. Nygård, N. Malakhov**, Enxense AS, Asker, Norway<br>**P. Weilhammer**, CERN, Geneva, Switzerland<br>**O. Dorholt, O.M. Røhne**, University of Oslo, Norway<br>**K. Yamamoto, T. Nagano**, Hamamatsu Photonics, Hamamatsu City, Japan |
| **4:45** | **D-39** | PILATUS3 R CdTe Large-Area Detectors for Laboratory Applications<br>**M. Mueller*, T. Donath, M. Rissi, C. Schulze-Briese**, DECTRIS Ltd, Baden, Switzerland |

**5:00** **F-25** New Developments in the Field of Silicon Drift Detectors and Digital Signal Processing
**A. Pahlke, R. Fojt, M. Fraczek, J. Knobloch, E. Lechner, N. Miyakawa, J. Rumpff, O. Scheid, A. Simsek, C. Zacher**, KETEK GmbH, Munich, Germany

**5:15** **D-110** The D8 ADVANCE for 2016: New Components for Extended Capabilities
**B. Jones, J. Giencke, N. Henderson**, Bruker AXS, Inc., Madison, WI, USA
**G. Vanhoyland**, Bruker AXS GmbH, Karlsruhe, Germany

## X-ray Imaging I — Madison

Co-Chairs: **M. Behr**, The Dow Chemical Company – MIOPS, Midland, MI, USA, mjbehr@dow.com
**M. Denecke**, Dalton Nuclear Institute, The University of Manchester, Manchester, United Kingdom, melissa.denecke@manchester.ac.uk
**G. Havrilla**, Los Alamos National Laboratory, Los Alamos, NM, USA, havrilla@lanl.gov

**1:30** **S60** Invited - High Resolution Microscopy with Coherent X-rays
**C. Schroer**, DESY/PETRAIII, Hamburg, Germany

**2:00** **S-29** Use of Energy Scanned Beams for Coherent X-ray Diffraction Imaging
**W. Cha, S. Hruszkewycz, A. Ulvestad, R. Sichel-Tissot, M. J. Highland, P. H. Fuoss, R. Harder, W. Liu, J. Maser**, Argonne National Laboratory, Argonne, IL, USA
**M. Allain, V. Chamard**, Aix-Marseille University, CNRS, Marseille, France

**2:20** **D-70** Applications of Full Field X-ray Diffraction Microscopy in the Heteroepitaxial Thin Film Materials
**Z. Zhang*, S. Chang, J.W. Freeland, H. Liu, H. Zhou, D. Fong**, Argonne National Laboratory, Argonne, IL, USA
**N. Laanait**, Oak Ridge National Laboratory, Oak Ridge, TN, USA

**2:40** **S-25** Imaging Lateral Inhomogeneity in Ingan Heterostructures with X-ray Microdiffraction
**R. Sichel-Tissot*, S.O. Hruskewycz, M.V. Holt, W. Cha, M. Highland, E. Karapetrova, P.H. Fuoss**, Argonne National Laboratory, Argonne, IL, USA
**S.R. Lee, D.D. Koleske**, Sandia National Laboratories, Albuquerque, NM, USA

**3:00** **Break**

**3:30** **D-59** Invited - X-ray Physicochemical Imaging of Working Catalysts
**WITHDRAWN**
**A.M. Beale* A. Vamvakeros,** [illegible]
**S.D.M. Jacques,** UoM, Manch[illegible]
**M. Di Michiel**, ESRF, Grenobl[illegible]
**J.F.W. Mosselmans, S.W.T. Price**, Diamond Light Source, Didcot, UK

**3:30** **S-63** Invited - Advances in X-ray Diffraction Computed Tomography: Removing Single Crystal Artefacts and Bridging the Gap Between Spatial and Temporal Resolution
**A. Vamvakeros*, A.M. Beale,** University College London, London, UK and Research Complex at Harwell, Didcot, Oxon, UK
**S.D.M. Jacques,** Research Complex at Harwell, Didcot, Oxon UK and University of Manchester, Manchester, Lancashire, UK
**V. Middelkoop,** Flemish Institute for Technological Research, Mol, Belgium
**M. Di Michiel,** ESRF, Grenoble, France

**4:00** **D-19** Operando Microdiffraction Mapping of Single Particle Cathode Materials
**M. Wolf*, B.M. May, J. Cabana**, University of Illinois at Chicago, Chicago, IL, USA
**K. Wiaderek, O. Borkiewicz, R. Xu, P. Chupas, K. Chapman**, APS, Argonne National Laboratory, Argonne, IL, USA
**N. Faenza, N. Pereira, G.G. Amatucci**, Rutgers University, North Brunswick, NJ, USA

**4:20** **S-3** Progress of Analytical Imaging with High-energy X-ray Compton Scattering
**Y. Sakurai*, M. Itou, M. Brancewicz**, Japan Synchrotron Radiation Research Institute, Sayo, Hyogo, Japan
**H. Sakurai, K. Suzuki**, Gunma University, Kiryu, Gunma, Japan
**B. Berbiellini, A. Bansil**, Northeastern University, Boston, MA, USA
**Y. Orikasa, Y. Uchimoto**, Kyoto University, Kyoto, Japan

**4:40** **S-21** Advances in X-ray Diffraction Computed Tomography: Removing Single Crystal Artefacts and Bridging the Gap Between Spatial and Temporal Resolution
**WITHDRAWN**
**A. Vamvakeros, A.M. Beale**, [illegible] Complex at Harwell, London, UK
**S.D.M. Jacques**, University o[illegible]versity College London & Research Complex at Harwell, London, [illegible]
**M. Di Michiel**, ESRF, Grenoble, France
**V. Middelkoop**, Flemish Institute for Technological Research (VITO), Mol, Belgium

# Oral Sessions – Thursday Morning

**Signifies Presenting Author, when noted*

## Rietveld — Lasalle B

Chair: **S. Lapidus**, APS - Argonne National Laboratory, Argonne, IL, USA, slapidus@aps.anl.gov

**8:30** **D-67** Invited - Unraveling Structural Details in Negative Thermal Expansion Materials
**C. Lind-Kovacs*, T.I. Baiz, A. Gindhart, J. Gadient, L. Lovings, L. Young**, The University of Toledo, Toledo, OH, USA
**J.S. O. Evans**, Durham University, Durham, UK

**9:00** **D-2** Nitrogen Doping: A Universal Method to Tune the Electronic Structure and Enhance Luminescent Performance of Intrinsic Scintillator
**G.M. Cai, Z.X. Wang, Z.P. Jin**, Central South University, Changsha,Hunan, China

**9:20** **D-32** In Situ Crystallographic Thermal Expansion Measurements of Compounds in the $HfO_2$-$Ta_2O_5$-$TiO_2$ Ternary System Using CTEAS
**S.J. McCormack*, K.C. Seymour, W.M. Kriven**, University of Illinois at Urbana-Champaign, Champaign, IL, USA

**9:40** **D-74** Invited - Structure Solution from Powder Data Using a Symmetry-Mode Parameter Set
**B.J. Campbell**, Brigham Young University, Provo, Utah, USA

**10:10** **Break**

**10:40** **D-34** Invited - Manifestation of Itinerant Magnetism in Hole-Doped Iron Arsenide Superconductors
**J.M. Allred***, University of Alabama, Tuscaloosa, AL, USA
**K.M. Taddei, M.J. Krogstad, D.E. Brown, O. Chmaissem**, Northern Illinois University, De Kalb, Il, USA
**D.E. Bugaris, S.H. Lapidus, D.Y Chung, H. Claus, M.G. Kanatzidis, S. Rosenkranz, R. Osborn**, Argonne National Lab, Lemont, USA
**J. Kang and R.M. Fernandes**, University of Minnesota, Minneapolis, MN, USA
**I. Eremin**, Ruhr-Universität Bochum, Bochum, Germany

**11:10** **D-33** Subsolidus Phase Relations and Crystal Structures of New Compounds in $Li_2O$/$WO_3$-$In_2O_3$-$TiO_2$ Ternary Systems
**L.M. Su, G.M. Cai*, X. Fan, Z.P. Jin***, Central South University, Changsha, Hunan, China

**11:30** **D-52** Effect of Fluorescence on Qu[illegible] of Crystalline and Amorphous Phases in Fe-Rich Geologic Samples
**N.M. Piatak*, C.J. Green**, U.[illegible], Reston, VA, USA

**Moved to Monday Poster**

**11:30** **D-120** Solution Processing of High Temperature Materials: A Biomineralization Approach
**M. Whittaker, D. Joester**, Northwestern University, Evanston, IL, USA

**11:50** **D-90** Rietveld Amorphous Quantification, Now Even More Painless
**A. Adibhatla**, PANalytical Inc., Westborough, USA
**T. Degen, U. König, N. Norberg**, PANalytical B.V., Almelo, Netherlands

## Industrial Applications of XRF — Lasalle C

Chair: **D. Broton**, Construction Technology Labs, Skokie, IL, USA, dbroton@ctlgroup.com

**9:00** **S-54** Invited - X-rays in Cement Production
**E. Watson**, Holcim (US) Inc., Bloomsdale, MO, USA

**9:30** **F-48** Re-Melting Tin-Bismuth and Tin-Indium Solder Samples for XRF Analysis in Order to Eliminate Microstructural Effects
**T. Gorewoda, J. Anyszkiewicz, Z. Mzyk, S. Malara, K. Bilewska, A. Cybulski, J. Golebiowska – Kurzawska, M. Knapik, M. Grzegorczyk and J. Kostrzewa**, Institute of Non-Ferrous Metals, Gliwice, Poland

**9:50** **F-49** The Development of a New Sample Preparation Procedure for the Analysis of CuAgP Solder by XRF Spectrometry
**J. Anyszkiewicz, T. Gorewoda, Z. Mzyk, S. Malara, K. Bilewska, A. Cybulski, J. Golebiowska-Kurzawska, M. Knapik, M. Grzegorczyk, J. Kostrzewa**, Institute of Non-Ferrous Metals, Gliwice, Poland

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| 10:10 | F-16 | Coating Thickness by XRF – How to Decide if Microspot, Benchtop or Handheld Instrumentation is Right for You<br>**M. Kreiner,** Oxford Instruments, Concord, MA, USA |
| 10:30 | | **Break** |
| 10:50 | F-51 | Analysis of Light Elements by Benchtop EDXRF<br>**D. Pecard*, K. Odegaard, A. Buman**, Bruker AXS, Madison, WI, USA |
| 11:10 | F-38 | Nutrients in Biomass – Benefits of Using WD-XRF<br>**J. Sedlmair**, Bruker AXS Inc., Madison, WI, USA<br>**A. Roa-Espinosa,** Soil Net LLC, Madison, WI, USA<br>**T. Vu**, University Wisconsin-Madison, Madison, WI, USA |
| 11:30 | F-30 | DANTE, A Compact and Low-Power Digital Pulse Processor to Exploit CUBE Preamplifier Ultimate Energy Resolution and High-Count Rate Capability<br>**L. Bombelli*, M. Manotti, R. Alberti, T. Frizzi**, XGLab SRL, Milano, Italy |
| 11:50 | F-55 | SDD X-ray Spectrometer with Improved High Energy Response and Counting Rate Performance<br>**Y. Wang, S. Barkan, V.D. Saveliev, L. Feng, M. Zhang, B. Goolsby, Y. Tomimatsu, E.V. Damron**, Hitachi High-Technologies Science America, Inc., Northridge, USA |
| 12:10 | F-15 | Electronically Fused Beads & the Reliable Measurement of F, S and Cl in Cement<br>**B. Werner,** Apex Marketing, Brighton, MI, United States<br>**R. Schramm,** Fluxana GmBH, Bedburg-Hau, Germany |

## Biological Applications of X-ray Fluorescence Microscopy –Plant/Environmental/Microbial Science — Executive Forum

Chair: **T. Lanzirotti**, GSECARS, The University of Chicago and Argonne National Laboratory, Chicago, IL, USA, lanzirotti@uchicago.edu

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| 8:30 | B-25 | Invited - Synchrotron Based Exploration of Aerosol Phosphorus and Iron Composition: Implications for Ocean Productivity<br>**E. Ingall**, Georgia Institute of Technology, Atlanta, GA, USA |
| 9:00 | B-22 | Invited - Plant and Soil Sciences Research Cultivated by X-ray Fluorescence Microscopy<br>**R. Tappero**, Brookhaven National Laboratory, Upton, NY, USA |
| 9:30 | B-23 | Invited - Marriage of X-ray Spectroscopy and Microscopy for Trace Element Analysis in Environmental and Biological Systems<br>**B. Mishra**, Illinois Institute of Technology, Chicago, IL, USA and Argonne National Laboratory, Lemont, IL, USA |
| 10:00 | | **Break** |
| 10:30 | B-4 | X-ray Fluorescence Tomographic Imaging of Bacteria within Soil Aggregates<br>**K.M. Kemner*, S.L. O'Brien, D. Sholto Douglas, D. Gursory, B. Lai, C. Roehrig, S. Sullivan, S. Vogt**, Argonne National Laboratory, Argonne, IL, USA<br>**M.D. Whiteside, Vrije Universiteit**, Amsterdam, Holland<br>**A. Dohnalkova, L. Kovarik**, Pacific Northwest National Laboratory, Richland, Washington, USA<br>**D.M. Durall, M.D. Jones**, University of British Columbia, Okanagan, Canada |
| 10:50 | B-6 | K And Ca in Leaves of Arabidopsis Thaliana: An Approach Using Total Reflection X-ray Fluorescence and Micro X-ray Fluorescence<br>**U. Fittschen, R. Hoehener, S. Tabatabaei, H.-H. Kunz**, Washington State University, Pullman, WA, USA<br>**M. Radtke**, BAM – Federal Institute for Materials Research and Testing, Berlin, Germany |
| 11:10 | B-8 | Evaluation of Ti Levels in Water Samples Exposed to Different Concentrations of $TiO_2$ Nanoparticles by Portable XRF and TXRF<br>**T. Galvão, C. Appoloni**, State University of Londrina - UEL, Londrina, PR, Brazil<br>**T. do Carmo, M. Fernandes**, Federal University of São Carlos, São Carlos, SP, Brazil |
| 11:30 | B-13 | X-ray Fluorescence Microscopy as a Tool to Study the Effects of Moisture on Ion Transport in Wood Cell Walls<br>**J.E. Jakes*, S.L. Zelinka, C.G. Hunt, C.R Frihart, D.J. Yelle, L. Lorenz, G.T. Kirker**, USDA Forest Service, Forest Products Laboratory, Madison, WI, USA<br>**S. Vogt, D. Vine, S.C. Gleber, S. Chen**, Argonne National Laboratory, Argonne, IL, USA |

## New Developments in XRD & XRF Instrumentation II — Lasalle A

Chairs: **T. Fawcett, T. Blanton**, International Centre for Diffraction Data, Newtown Square, PA, USA, fawcett@icdd.com; tblanton@icdd.com

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| **8:30** | **D-91** | Certification of SRM 1979; Line Profile Standard for Analysis of Crystallite Size<br>**J.P. Cline, M.H. Mendenhall, J.J. Ritter, D. Black, A. Henins, J.E. Bonevich**, NIST, Gaithersburg, MD, USA<br>**P. Whitfield**, Oak Ridge National Laboratory, Oak Ridge, TN, USA |
| **8:50** | **S-26** | ADIS, A New X-ray Diffraction & X-ray Fluorescence System for In Situ Material Characterization for Cultural Heritage<br>**V. Aguilar*, J.L. Ruvalcaba, L. Bucio**, Instituto de Fisica, Universidad Nacional Autonoma de Mexico, Mexico City, Mexico |
| **9:10** | **D-20** | New Neutron Time-of-Flight (TOF) Capability in PDF-4+ Relational Databases: Digitized Diffraction Patterns and I/Ic for Quantitative Phase Analysis<br>**J. Faber**, Faber Consulting, Thornton, PA, USA<br>**S. Kabekkodu, J. Blanton, T. Blanton, T. Fawcett**, ICDD, Newtown Square, PA, USA |
| **9:30** | **D-99** | Enhanced Ab Initio Indexing of TOF Neutron Powder Diffraction Data using Maximum Entropy<br>**R.J. Papoular**, IRAMIS / LLB / CEA-Saclay, Gif-sur-Yvette, France<br>**T.N. Blanton, J.R. Blanton, S.N. Kabbekodu**, ICDD, Newtown Square, PA, USA<br>**J.G. Faber,** Faber Consulting, Inc., Thornton, PA, USA |
| **9:50** | **D-21** | The Commission of Powder X-ray Diffraction at Taiwan Photon Source<br>**H.-S. Sheu, Y.-C. Chuang*, C.-K. Chang, Y.-C. Lai, K.-L. Yu, L. Lee**, National Synchrotron Radiation Research Center, Hsinchu, Taiwan |
| **10:10** | | **Break** |
| **10:40** | **S-30** | Advances and Future Directions in 3D X-ray Microscopy: Orientation and *k*-space<br>**J.Z. Tischler, W. Liu, R. Xu**, Argonne National Lab, Argonne IL, USA |
| **11:00** | **D-15** | Phase-Specific XRD<br>**G. Hansford**, University of Leicester, Leicester, UK |
| **11:20** | **S-6** | First Indirect X-ray Imaging Tests with an 88-mm Diameter Single Crystal<br>**A. Lumpkin**, FNAL, Batavia, IL, USA<br>**A. Macrander**, ANL, Argonne, IL, USA |
| **11:40** | **S-50** | Three Crystals Spectrometer for High Energy Resolution Fluorescence Detected X-ray Absorption Spectroscopy and X-ray Emission Spectroscopy at SSRF<br>**P. Duan, J. Li, S. Gu, H. Cao, X. Wei, Y. Huang***, Shanghai Synchrotron Radiation Facility, Chinese Academy of Sciences, Shanghai, China |

## Cultural Heritage — Madison

Chair: **R. van Grieken**, University of Antwerp, Antwerp, Belgium, rene.vangrieken@uantwerpen.be

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| **8:30** | **S-2** | Invited - Synergy of Nuclear, Atomic and Molecular Methodologies Applied to the Study of Cultural Heritage - The Prominent Role of XRF<br>**C. Appoloni**, State University of Londrina - UEL, Londrina, PR, Brazil |
| **9:00** | **D-82** | Characterization Techniques Used in the Forensic Analysis of a Metal Art Object<br>**K. Cunningham, C. Carta, M. Flores, M. Goorsky*, I. Kakoulli**, University of California, Los Angeles, Los Angeles, CA, USA |
| **9:20** | **S-39** | Depth Profiling of Artists' Acrylic Paint Films with X-ray Absorption Spectroscopy<br>**E.A. Willneff*, S.L.M. Schroeder**, University of Leeds, Leeds, UK<br>**B.A. Ormsby**, Tate, London, UK |
| **9:40** | **F-32** | Visualizing and Analysis of µXRF Scanning Images in Arts and Conservation<br>**M. Buegler, R. Tagle, F. Reinhardt**, Bruker Nano GmbH, Berlin, Berlin, Germany |
| **10:00** | | **Break** |

**10:30** **S-28** Invited - Portable EDXRF for Cultural Heritage: The Need of a Multidisciplinary Approach
**S. Ridolfi**, Ars Mensurae, Rome, Italy

**11:00** **S-27** Non-Destructive XAS Analysis of Pigments Using High-Throughput Gas-Flow Total Electron-Yield Detection
**S. Schroeder, E. Willneff**, University of Leeds, Leeds, UK
**J. Thomas,** University of Goteborg, Goteborg, Sweden
**N. Eastaugh**, Art Analysis & Research, London, UK
**N. Tsapatsaris**, European Spallation Source, Lund, Sweden

**11:20** **F-4** A Novel Mobile MA-XRF Scanner for a (Near) Real-Time Elemental Imaging of Painted Artworks
**F. Paolo Romano**, IBAM-CNR, Catania, Italy
**C. Caliri, H.C. Santos**, INFN-LNS, Catania, Italy
**S. Di Martino, P. Nicotra**, SIATEL, Catania, Italy
**F. Rizzo**, University of Catania, Catania, Italy

**11:40** **F-29** “Crono”: a Reconfigurable MACRO-XRF Scanner for Cultural Heritage Applications
**R. Alberti, T. Frizzi*, L. Bombelli, M. Gironda, N. Aresi**, XGLab SRL, Milano, Italy
**C. Miliani, F. Rosi, L. Cartechini**, CNR-ISTM, Perugia, Italy

**12:00** **S-7** Simultaneous X-ray Diffraction and Fluorescence with the pnCCD: A New Technique for Cultural Heritage Science
**J. Davis*, J. Schmidt, M. Huth, S. Ihle, D. Steigenhöfer, Heike Soltau**, PNDetector, München, Bayern, Deutschland
**R. Hartman, P. Holl, G. Lutz, L. Strüder**, PNSensor, München, Bayern, Deutschland

# Oral Sessions – Thursday Afternoon

**Signifies Presenting Author, when noted*

## Applied Materials I — Lasalle B

Chairs: **T. Fawcett, T. Blanton**, ICDD, Newtown Square, PA, fawcett@icdd.com; tblanton@icdd.com

| Time | ID | Presentation |
|---|---|---|
| **1:30** | **D-71** | Invited - X-ray Diffraction Investigations in the Smithsonian Gem and Mineral Collection<br>**J. Post**, Smithsonian Institution, Washington, DC, USA |
| **2:00** | **D-7** | Phase Relations of Anhydrous and Hydrous Earth Alkali Aluminates with Calcium, Strontium and Barium Solid Solution of Binary Ca-Ba-, Ca-Sr- and Ba-Sr –Aluminates and Their Hydrates<br>**H. Poellmann, R. Kaden**, University of Halle, Halle, Germany |
| **2:20** | **D-3** | Synthesis and Structural Characterization of Oxysilicate Apatite $Ln_8Sr_2(SiO_4)_6O_2$<br>**J.X. Wang, Z. L. Dong***, Nanyang Technological University, Singapore, Singapore |
| **2:40** | **D-44** | X-ray Diffraction Analysis of the Defect Structure of Freestanding Diamond Substrates and Homoepitaxial Diamond Films<br>**L. Kirste, V. Zürbig, C. Schreyvogel, C.J. Widmann, B. Tegetmeyer, M. Prescher, V. Cimalla, C.E. Nebel**, Fraunhofer Institute for Applied Solid State Physics (IAF), Freiburg, Germany |
| **3:00** | | **Break** |
| **3:30** | **D-93** | Invited - X-ray Total Scattering Analysis Electrochemically Active $MnO_2$ Nanosheet Assemblies<br>**S. Misture, P. Metz, P. Gao**, Alfred University, Alfred, NY, USA |
| **4:00** | **D-17** | Rational Design of Catalysts Using In Situ PXRD as a Tool for Understanding Catalytic Deactivation<br>**D.H. Barrett, C.B. Rodella**, Brazilian Synchrotron Light Laboratory (LNLS)/Brazilian Center for Energy and Materials Research (CNPEM), Campinas, Brazil<br>**M.S. Scurrell**, University of South Africa, Johannesburg, South Africa<br>**B. Diaz**, Canadian Light Source, Saskatoon, Canada<br>**P.J. Franklyn**, University of the Witwatersrand, Johannesburg, South Africa |
| **4:20** | **D-84** | In Situ High-Energy X-ray Study of Synthesis and Transformation of Applied Materials<br>**Y. Ren**, Argonne National Laboratory, Argonne, IL, USA |
| **4:40** | **S-40** | In Situ EXAFS Study of Metallic Tin/Graphite Composite Anodes for Lithium-Ion Batteries<br>**Y. Ding*, C. Segre**, Illinois Institute of Technology, Chicago, IL, USA |
| **5:00** | **D-9** | Structural Design and Characterization of Vanadium-Based Phosphates as Cathode Materials for Li-Ion Batteries<br>**Q. Kuang*, Y.M. Zhao**, South China University of Technology, Guangzhou, China |

## General XRD — Lasalle C

Chair: **C. Murray**, IBM T.J. Watson Research Center, Yorktown Heights, NY, conal@us.ibm.com

| Time | ID | Presentation |
|---|---|---|
| **1:40** | **D-66** | X-ray Diffraction Study on AlGaAs/AlAs Distributed Bragg Reflector<br>**C. Li*, M.S. Goorsky**, University of California, Los Angeles, Los Angeles, CA, USA |
| **2:00** | **D-65** | Study on Atomic-Layer-Deposited $Al_2O_3$ Dielectric Films with a New Small Angle X-ray Scattering (SAXS) Method<br>**C. Li*, F. Shahriarian, M.S. Goorsky**, University of California, Los Angeles, Los Angeles, CA, USA |
| **2:20** | **D-27** | Mapping of Spatial Inhomogeneities with Laboratory X-ray Diffraction<br>**M. Wolf*, S. Khawaja, J. Cabana**, University of Illinois Chicago, Chicago, IL, USA |
| **2:40** | **S-32** | Side-coated TAGwoods and the Formation of Dense Aggregates of Intertwined TAGwood Snakes<br>**F. Peyronel, A. Marangoni**, University of Guelph, Guelph, Ontario, Canada<br>**B. Quinn, D. Pink**, St. Francis Xavier University, Antigonish, Nova Scotia, Canada |

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| **3:00** | | **Break** |
| **3:30** | **D-103** | A Rigorous Analysis of the Scherrer Equation<br>**S.-Y. Lee, I.C. Noyan**, Columbia University, New York, NY, USA |
| **3:50** | **D-85** | Improved Diffraction Analysis of Mesoporous Materials Using an Evacuated Beampath<br>**S.A. Speakman**, PANalytical, Westborough, MA, USA<br>**L. Bromberg**, MIT, Cambridge, MA, USA |
| **4:10** | **D-30** | A New Method for the Quantitative Phase Analysis Using Integrated Intensities and Chemical Compositions of Individual Crystalline Phases<br>**H. Toraya,** Rigaku Corporation, Akishima, Tokyo, Japan |
| **4:30** | **D-73** | X-ray Diffraction Reveals Structural Aspects of Protein Assemblies in Connective Tissues<br>**O. Antipova***, XSD, Argonne National Laboratory, Lemont, IL, USA<br>**T. Irving**, BioCAT, Illinois Institute of Technology, Chicago, IL, USA<br>**B. Sullivan**, Purdue University, West Lafayette, IN, USA |
| **4:50** | **D-104** | The Relation between Sampling and Intensity Statistics of Diffraction from Nanocrystalline Powders<br>**H. Öztürk, I.C. Noyan**, Columbia University, New York, NY, USA<br>**H. Yan, J.P. Hill**, NSLS, Brookhaven National Laboratory, Upton, NY, USA |

## General XRF — Lasalle A

Chair: **M. Schmeling**, Loyola University Chicago, Chicago, IL, USA, mschmel@luc.edu

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|---|---|---|
| **2:00** | **F-78** | Invited - Particle Induced X-ray Screening of Consumer Products for Flame Retardants<br>**G. Peaslee**, Hope College, Holland, MI, USA |
| **2:30** | **F-43** | Invited - XRS of Atmospheric Aerosols for Preventive Conservation and Climate Change Research<br>**R. van Grieken**, University of Antwerp, Antwerp, Belgium |
| **3:00** | **F-45** | New Developments in Real-Time Processing and Display of Spectra from a Multipixel Microcal X-ray Detector<br>**T. Jach***, NIST, Gaithersburg, MD, USA<br>**S. Thurgate**, Murdoch University, Perth, WA, Australia<br>**R. Cantor,** Star Cryoelectronics, Santa Fe, NM, USA<br>**J. Ullom**, NIST, Boulder, CO, USA |
| **3:20** | **F-61** | Compact Scanning Device with Variable Spot Size in the mm Range for Large Area Macro-Scans<br>**P. Wobrauschek, P. Allinger, A. Utz, S. Smolek, D. Ingerle,** TU Wien, Atominstitut, Vienna, Austria |
| **3:40** | | **Break** |
| **4:00** | **F-34** | Invited - Using Energy Dispersive X-ray Fluorescence to Determine Trace and Toxic Elements in Human Tissues, In Vivo and Ex Vivo<br>**A. Pejovic-Milic, E. Da Silva**, Ryerson University, Toronto, ON,, Canada |
| **4:30** | **F-33** | The Development of a Tomographic X-ray Fluorescence Microscopy at the 2-ID-E Beamline<br>**L. Li, O. Antipova, S. Chen, D. Gursoy, S. Vogt**, Argonne National Laboratory, Lemont, IL, USA |
| **4:50** | **S-38** | In situ XAS Study of Structural Changes and Degradation Mechanisms in Li Rich Cathode Materials<br>**S. Aryal, E. Temofeeva, C. Segre**, Illinois Institute of Technology, Chicago, IL, USA |
| **5:10** | **S-5** | XAFS Observation of Nucleation Mechanism in Deposition of $WS_2$<br>**H. Zhang, A. Hock**, Illinois Institute of Technology, Chicago, IL, USA |

## Biological Applications of X-ray Fluorescence Microscopy – Related Technique and Methods Development — Executive Forum

Chair: **S. Vogt**, APS, Argonne National Laboratory, Argonne, IL, USA, svogt@aps.anl.gov

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| **1:30** | **B-14** | Invited - High-Resolution Trace Element Studies of Biological Tissues and Cells Using the Bionanoprobe at the Advanced Photon Source<br>**S. Chen, S. Vogt, C. Jacobsen**, APS, Argonne National Laboratory, Argonne, IL, USA<br>**T. Paunesku, G. Woloschak**, Feinberg School of Medicine, Northwestern University, Chicago, IL, USA<br>**Q. Jin, Y. Hong, J. Deng**, Northwestern University, Evanston, IL, USA<br>**K. Brister**, Northwestern Synchrotron Research Center, Northwestern University, Argonne, IL, USA |

**2:00** **B-7** Invited - Illuminating the Redistribution Dynamics of Trace Metals During Cell Proliferation and Embryonic Development
**C.J. Fahrni**, Georgia Institute of Technology, Atlanta, GA

**2:30** **B-15** APS 2-ID-D X-ray Flu... ...on Advances
**B. Lai*, C. Roehrig, S... ...leber, S. Vogt,** APS**,** Argonne National Laboratory, Argonne...

WITHDRAWN

**2:50** **Break**

**3:30** **B-17** Invited - Applications of X-ray Tomography Across Multiple Length Scales
**P. Pianetta**, Stanford University, Menlo Park, CA, USA

**4:00** **F-54** Evaluation of Contemporary Data Acquisition Schemes for X-ray Fluorescence Tomography
**D. Gursoy*, S. Sullivan, S. Vogt**, Argonne National Laboratory, Lemont, IL, USA

**4:20** **B-16** Breakthrough Developments in Laboratory MicroXRF to Enable Trace-Level Mapping and Femtogram Detection Sensitivity in Biological Specimens
**B. Stripe, W. Yun, A. Lyon, D. Reynolds, S.J.Y. Lewis, S. Chen, V. Semenov, R.I. Spink, S.H. Lau**, Sigray, Concord, CA, USA

## X-ray Imaging II — Madison

Co-Chairs: **M. Behr**, The Dow Chemical Company – MIOPS, Midland, MI, USA, mjbehr@dow.com
**M. Denecke**, Dalton Nuclear Institute, The University of Manchester, Manchester, United Kingdom, melissa.denecke@manchester.ac.uk
**G. Havrilla**, Los Alamos National Laboratory, Los Alamos, NM, USA, havrilla@lanl.gov

**1:30** **S-55** Invited - Spectroscopic X-ray Imaging for Studying Alterations at and Below the Surface of Fine Art Paintings, Stained Glass Windows and Illuminated Manuscripts
**K. Janssens*, F. Vanmeert, G. Van der Snickt, S. Legrand**, University of Antwerp, Antwerp, Belgium

**2:00** **S-34** Soft X-ray Imaging of Modern and Contemporary Artists' Materials
**E.A. Willneff*, S.L.M. Schroeder**, University of Leeds, Leeds, UK
**B.A. Ormsby**, Tate, London, UK

**2:20** **S-10** Comparison of Wavelength-Dispersive and Energy-Dispersive XRF Imaging Methods
**K. Tsuji*, Y. Takimoto, M. Yamanashi**, Osaka City University, Osaka, Japan
**S. Kato, T. Yamada, T. Shoji, N. Kawahara**, Rigaku Co., Osaka, Japan

**2:40** **F-52** Increased XFI Fitting Turn-Over Rates via Abridged Spectral Matrix Inversion
**A. Crawford, O. Ponomarenko, C. Simoens, G. George, I. Pickering**, University of Saskatchewan, Saskatoon, SK, Canada

**3:00** **Break**

**3:30** **S-64** Invited - X-ray Imaging, Spectroscopy, and Diffraction at the GSECARS X-ray Microprobe, APS 13-ID-E
**M. Newville*, A. Lanzirotti,** University of Chicago, Chicago, IL, USA

**4:00** **S-4** Pore Network Analysis of Carbonate Rocks by Tomographic Images Taken at Multiple Spatial Resolutions
**R. Nagata, C. Appoloni**, State University of Londrina - UEL, Londrina, PR, Brazil
**P. dos Reis**, Midwestern State University, Guarapuava, PR, Brazil

**4:20** **S-9** Quantitative Analysis of Calcium Oxide in Desiccant and Human Body
**H. Tanioka**, Tanioka Clinic, Tokyo, Japan
**K. Kaga**, National Institute of Sensory Organs, Tokyo, Japan

**4:40** **S-18** Alloy Solidification Under External Fields via Time-Resolved Synchrotron Tomographic Quantification
**B. Cai*, P.D. Lee**, University of Manchester, Manchester, UK

**5:00** **F-68** In situ Loading of Hyper Elastic Materials during Synchrotron 3D Tomographic Imaging
**B. Patterson, K. Henderson, R. Pacheco, N.L. Cordes, J.C.E. Mertens**, Los Alamos National Laboratory, Los Alamos, NM, USA
**N. Chawla, S. Singh, A.R. Ovehero, J. Williams**, Arizona State University, Tempe, AZ, USA
**X. Xiao**, Argonne National Laboratory, Argonne, IL, USA

# Oral Sessions – Friday Morning

**Signifies Presenting Author, when noted*

## Stress Analysis — Lasalle A

Chair: **T.R. Watkins**, Oak Ridge National Laboratory, Oak Ridge, TN, watkinstr@ornl.gov

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| **8:30** | **D-62** | Invited - New Multi-axial Straining Devices for Neutron Diffraction<br>**T. Gnäupel-Herold*, J. Milner**, NIST Center for Neutron Research, Gaithersburg, MD, USA |
| **9:00** | **D-61** | Internal Stresses and High Temperature Plasticity of a Single Crystal Superalloy: Real Time In Situ Experiments with Synchrotron X-ray Diffraction<br>**T. Schenk, R. Trehorel, A. Jacques**, CNRS – Université de Lorraine, Nancy, France<br>**J.B. Le Graverend**, Texas A&M University, Texas, TX, USA<br>**J. Cormier**, CNRS-ENSMA-Université de Poitiers, Poitiers, France |
| **9:20** | **D-68** | Characterization of Residual Stress in Polycrystalline Diamond Composites Using Energy Dispersive Diffraction<br>**J. Okasinski*, J.-S. Park**, APS, Argonne National Laboratory, Argonne, IL, USA<br>**R.K. Viswanadham, S. Alkhalaileh**, IDS Group, Houston, TX, USA |
| **9:40** | **D-25** | Calculation of XRD Spectra of N-H Extended Solids Under High Pressure<br>**I.G. Batyrev*, S.P. Coleman, J.P. Larentzos**, US Army Research Laboratory, Aberdeen Proving Ground, MD, USA |
| **10:00** | | **Break** |
| **10:20** | **D-10** | Through Thickness Texture Gradient Prediction of 5XXX Series Aluminum After Sheet Rolling Operations<br>**J. Ho*, S. Dennis**, Novelis, Inc., Kennesaw, GA, USA<br>**H. Garmestani**, Georgia Institute of Technology, Atlanta, GA, USA |
| **10:40** | **S-8** | Coherent X-ray Imaging of 3D Dislocation Networks in Battery and Palladium Nanoparticles<br>**A. Ulvestad, B. Stephenson**, Argonne National Laboratory, Lemont, IL, USA |
| **11:00** | **D-14** | Fundamental Understanding of the Stress-induced Transformation Behavior of Advanced High Strength Steel with Two-dimensional X-ray Diffraction (2D XRD)<br>**B.M. Hance, A.A. Hall**, United States Steel Corporation-Automotive Center, Troy, MI, USA<br>**D.P. Hoydick, L.D. Martin, B.R. Strohmeier**, United States Steel Corporation-Research and Technology Center, Munhall, PA, USA |
| **11:20** | **D-81** | MYTHEN2 R 2D Detector for Residual Stress Applications Using Laboratory Robots and Diffractometers<br>**D. Murer*, Ch. Hörmann, D. Šišak Jung,** DECTRIS Ltd, Baden, Switzerland<br>**L. Suominen, H. Larjosuo, J. Wartiainen**, Stresstech Oy, Jyväskylä, Finland |

## Applied Materials II — Lasalle B

Chairs: **T. Fawcett, T. Blanton**, ICDD, Newtown Square, PA, fawcett@icdd.com; tblanton@icdd.com

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| **8:30** | **D-79** | Invited - Single Crystal Structure Analysis of Designer Drugs Circulating in the Japanese Drug Market by the Synchrotron Radiation X-ray Diffraction<br>**T. Hashimoto*,** Japan Synchrotron Radiation Research Institute/SPring-8, Hyogo, Japan and RIKEN SPring-8 Center, Hyogo, Japan<br>**N. Yasuda, N. Mizuno, S. Honda, S. Kimura**, Japan Synchrotron Radiation Research Institute/SPring-8, Hyogo, Japan<br>**R. Hanajiri**, National Institute of Health Sciences, Japan<br>**S. Hayakawa**, SPring-8 and Hiroshima University, Japan<br>**Y. Nishiwaki**, SPring-8 and Kochi University, Japan |
| **9:00** | **D-88** | Linear Diblock Copolymer Micellization Kinetics Probed by Integrated Microfluidic Device and Small-angle X-ray Scattering<br>**J. Kalkowski*, C. Liu, P. Leon-Plata, M. Szymusiak, Y. Liu**, University of Illinois at Chicago, Chicago, IL, USA<br>**W. Shang, S. Chakravarthy, T.C. Irving**, Illinois Institute of Technology, Chicago, IL, USA<br>**S.V. Kathuria, O. Bilsel**, University of Massachusetts Medical School, Worcester, MA, USA |

**9:20** **D-35** Investigating Crystal Structure, Preferred Orientation, and Disorder in Poly(Ethylene Furanoate) Using X-ray Fiber Diffraction
**Y. Mao**, University of Maryland and National Institute of Standards and Technology, College Park, MD, USA
**D. Bucknall**, Heriot-Watt University, Edinburgh, UK
**R. Kriegel**, The Coca-Cola Company, Atlanta, Georgia, USA

**9:40** **D-13** Temperature Dependency of Morphological Structure of Thermoplastic Polyurethane using WAXS and SAXS
**S.Witzleben, K.Walbrück**, Bonn-Rhein-Sieg University of Applied Sciences, Rheinbach, Germany

**10:00** **Break**

**10:20** **D-57** Evolution of Carbon Fiber Microstructure During Carbonization and High-Temperature Graphitization Measured In Situ Using Synchrotron Wide-Angle X-ray Diffraction
**M.J. Behr, B.G. Landes, B.E. Barton, G.F. Billovits, E.J. Hukkanen, J.T. Patton**, The Dow Chemical Company, Midland, MI, USA
**J.E. Rix, D.T. Keane, S.J. Weigand**, Northwestern University, Argonne, IL, USA

**10:40** **D-86** X-ray Quantification of Phospholipid Monolayer Structural Changes
**P. Zhang*, A.Donovan, J. Kalkowski, C. Liu, Y.Liu, M. Schlossman**, University of Illinois at Chicago, Chicago, IL, USA
**W. Bu, B. Lin**, University of Chicago, Chicago, IL, USA

**11:00** **S-43** Fluorescence Plus Diffraction Mapping of Tooth Tissues
**S.R. Stock*, A. Telser**, Northwestern University, Chicago, IL, USA
**L.F. Finney, E. Maxey, S. Vogt, J.S. Okasinski**, Argonne National Laboratory, Argonne, IL, USA

## Quantitative Analysis — Lasalle C

Chair: **L.L. Brehm**, Dow Chemical Company, Midland, MI, USA, llbrehm@dow.com

**8:30** **F-40** Invited - Rapid and Accurate Determination of Iron in Vitamins and Supplements via XRF
**P. Palmer, S. Chew, J. Castillo, A. Lam**,San Francisco State University, San Francisco, CA, USA

**9:00** **F-26** Invited - When is Accreditation and Quality Assurance Systems Not Enough to Guarantee Accurate Analysis?
**M. Loubser**, GeoMag GeoChem, Johannesburg, South Africa

**9:30** **F-5** Combining Specimen Preconcentration and Ion Exchange Chromatography to Quantify Gallium and Trace Uranium in Plutonium Using WDXRF and Polarized EDXRF
**C.G. Worley**, Los Alamos National Laboratory, Los Alamos, NM, USA

**9:50** **F-44** Analysis of Nanocone Arrays by Total Reflection X-ray Fluorescence
**M. Schmeling**, Loyola University Chicago, Chicago, IL, USA
**K. Steeves Lloyd, I.L. Bolotin, L. Hanley, I.V. Veryovkin**, University of Illinois at Chicago, Chicago, IL, USA

**10:10** **Break**

**10:30** **F-14** Invited - Quantitative Analysis for the PIXL Mars2020 Micro-XRF Instrument
**W.T. Elam*, L. O'Neil**, APL, University of Washington, Seattle, WA, USA

**11:00** **F-17** Superconducting Microcalorimeters for X-ray Spectroscopy
**J. Fowler, D. Swetz, J. Ullom**, NIST, Boulder, CO, USA

**11:20** **F-12** Fundamental Parameter Models Encounter the Geometry of an EDXRF Setup
**J. Heckel**, SPECTRO Analytical Instruments GmbH, Kleve, Germany

**11:40** **F-41** hiRX Field Testing Results Demonstrating New Elemental Analysis Capabilities
**K.G. McIntosh*, G.J. Havrilla**, Los Alamos National Laboratory, Los Alamos, NM, USA
**R.F. Gilmore, Jr., M.K. Holland**, Savannah River National Laboratory, Aiken, SC, USA

Chair: **K. Janssens**, University of Antwerp, Antwerp, Belgium, koen.janssens@uantwerpen.be

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| **8:30** | **S-58** | Invited - Spectromicroscopy Instrumentation and Techniques with Synchrotron and Laboratory X-ray Sources<br>**S. Hayakawa**, Hiroshima University, Higashi-hirohsima, Hiroshima, Japan |
| **9:00** | **F-31** | Invited - Three Dimensional Imaging at the P06 Hard X-ray Micro/Nano-Probe<br>**J. Garrevoet, U. Boesenberg, C.G. Schroer, G. Falkenberg**, DESY, Hamburg, Germany |
| **9:30** | **S-53** | Invited - Collimating Channel Arrays for 3D Micro Confocal X-ray Fluorescence<br>**A.R. Woll*** , **D. Agyeman-Budu,** Cornell University, Ithaca, NY, USA<br>**S. Choudhury**, University of Saskatchewan, Saskatoon, SK, CanadaI<br>**I. Coulthard, E. Hallin**, Canadian Light Source, Saskatoon, SK, Canada<br>**R. Gordon**, Simon Fraser University, Burnaby, BC, Canada |
| **10:00** | | **Break** |
| **10:20** | **S-23** | X-ray Polarization Analysis with Gas-Filled Microchannel Plates: GF-MCP<br>**J.B. Wang, A. Mane, S. Liao, R. Wagner, J. Elam, D. Haskel**, Argonne National Laboratory, Lemont, USA |
| **10:40** | **S-56** | Characterization of Reflection Gratings by GIXRF and their Application as Amplitude Beam Splitter for the 4 – 13 keV X-ray Energy Range<br>**D. Eichert, W. Jark,** Elettra - Sincrotrone Trieste, Basovizza, Trieste, Italy |
| **11:00** | **D-63** | Monitoring Performance of X-ray Mirrors and Diffracting Crystals without Detection of the Reflected X-rays<br>**S. Stoupin**, Advanced Photon Source, Lemont, IL, USA |
| **11:20** | **S-57** | The X-ray Fluorescence Beamline at Elettra – Sincrotrone Trieste: New Characterization Opportunities for Nano-Structured Materials<br>**D. Eichert, F. Brigidi, A. Gambitta, W. Jark**, Elettra - Sincrotrone Trieste, Basovizza, Trieste, Italy<br>**L. Luehl**, Technische Universitaet Berlin, IOAP, Berlin, Germany |

# Notes:

# MEETING SPACE
## LOBBY LEVEL

**THE WESTIN**
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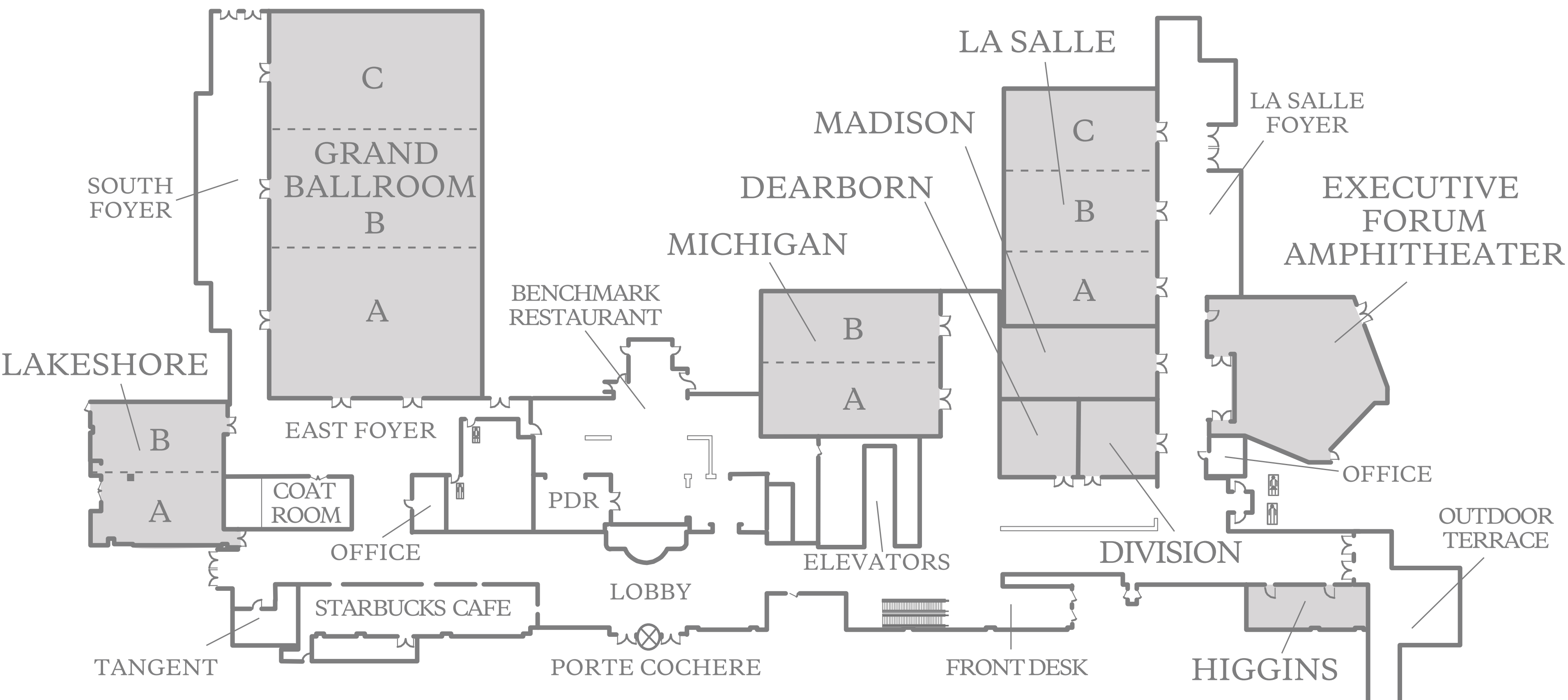

**2016 DXC Program-at-a-Glance**
**1-5 August, Westin O'Hare, Rosemont, IL, USA**

| Rooms | Lasalle A | Lasalle B | Lasalle C | Madison | Executive Forum |
|---|---|---|---|---|---|
| Monday Morning Workshops ♦ 9:00 am – 12:00 Noon | | | | | |
| XRD | | | Basic to Intermediate XRD I (Rodriguez) | Diffraction Contrast Imaging (Patterson) | |
| XRF | Basic XRF (Drews) | | | | |
| Special Topics | | Synergies between Lab. & Synchrotron X-ray Methods (Seidler) | | | Fundamentals of X-ray Absorption Spectroscopy (Bunker) |
| Monday Afternoon Workshops ♦ 1:30 – 4:30 pm | | | | | |
| XRD | | | Basic to Intermediate XRD II (Rodriguez) | | Rietveld for Beginners (Toby/Von Dreele) |
| XRF | Energy Dispersive XRF (Lemberge) | Trace Analysis (Wobrauschek/Streli) | | | |
| Monday Evening XRD Poster Session & Reception 5:00 – 7:00 pm. (Michigan Room) (Watkins/Noyan) | | | | | |
| Tuesday Morning Workshops ♦9:00 am – 12:00 Noon | | | | | |
| XRD | | | | Structure Solution I (Kaduk//Papoular) | Two-dimensional Detectors (Blanton/He) |
| XRF | Micro XRF (Havrilla) | Quantitative Analysis I (Elam) | | | |
| Special Topics | | | Amorphous & Disordered Mats. I (Fawcett) | | |
| Tuesday Afternoon Workshops ♦ 1:30 – 4:30 pm | | | | | |
| XRD | | | | Structure Solution II (Kaduk/Papoular) | Advanced Rietveld (Toby/VonDreele) |
| XRF | Sample Prep of XRF (Anzelmo) | Quantitative Analysis II (Elam) | | | |
| Special Topics | | | Amorphous & Disordered Mats. II (Fawcett) | | |
| Tuesday Evening XRF Poster Session & Reception 5:00 pm – 7:00 pm. (Michigan Room) (Brehm, Fittschen, Loubser) | | | | | |
| Wednesday Morning Plenary Session♦8:30-12:00 Imaging at Current and Next Generation Synchrotrons (Toby) (Lasalle) | | | | | |
| Wednesday Afternoon Sessions | | | | | |
| XRD | | High Energy X-ray Microscopy (Almer/Stock) 1:30-5:30 | | | |
| XRF | | | Trace Analysis (Zaitz/Martin) 1:30-4:40 | | BioXRF: Biomedical Applications (Woloschak)1:30-5:10 |
| Special Topics | New Devel. in XRD/XRF Instr. I (Blanton/Fawcett) 1:30-5:30 | | | X-ray Imaging I (Denecke/ Havrilla/Behr) 1:30-4:40 | |
| Wednesday Evening Vendor Sponsored Reception 5:30 pm – 7:00 pm. (Grand Ballroom – Exhibit Hall) | | | | | |
| Thursday Morning Sessions | | | | | |
| XRD | | Rietveld (Lapidus) 8:30-12:10 | | | |
| XRF | | | Industrial Applications of XRF (Broton) 9:00-12:30 | | BioXRF: Plant/ Environmental/Microbial Science (Lanzirotti) 8:30-11:50 |
| Special Topics | New Devel. in XRD/XRF Instr.II (Blanton/Fawcett) 8:30-12:00 | | | Cultural Heritage (Van Grieken) 8:30-12:20 | |
| Thursday Afternoon Sessions | | | | | |
| XRD | | Applied Materials I (Fawcett/Blanton) 1:30-5:20 | General XRD (Murray) 1:40-5:10 | | |
| XRF | General XRF (Schmeling) 2:00-5:30 | | | | BioXRF: Related Technique & Methods Development (Vogt) 1:30-4:40 |
| Special Topics | | | | X-ray Imaging II (Havrilla/Behr/Denecke) 1:30-5:20 | |
| Friday Morning Sessions | | | | | |
| XRD | Stress (Watkins) 8:30-11:40 | Applied Materials II (Fawcett/Blanton) 8:30-11:20 | | | |
| XRF | | | Quantitative Analysis (Brehm) 8:30-12:00 | | |
| Special Topics | | | | X-ray Optics (Janssens) 8:30-11:40 | |