

2018 Program

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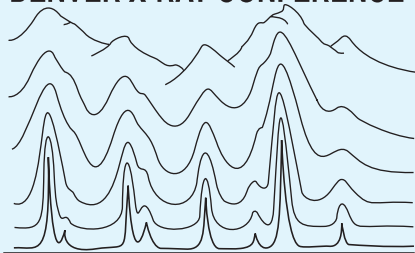
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Future Conference:

DENVER X-RAY CONFERENCE®



5-9 August 2019

***The Westin Lombard Yorktown
Center, Lombard, IL, USA***

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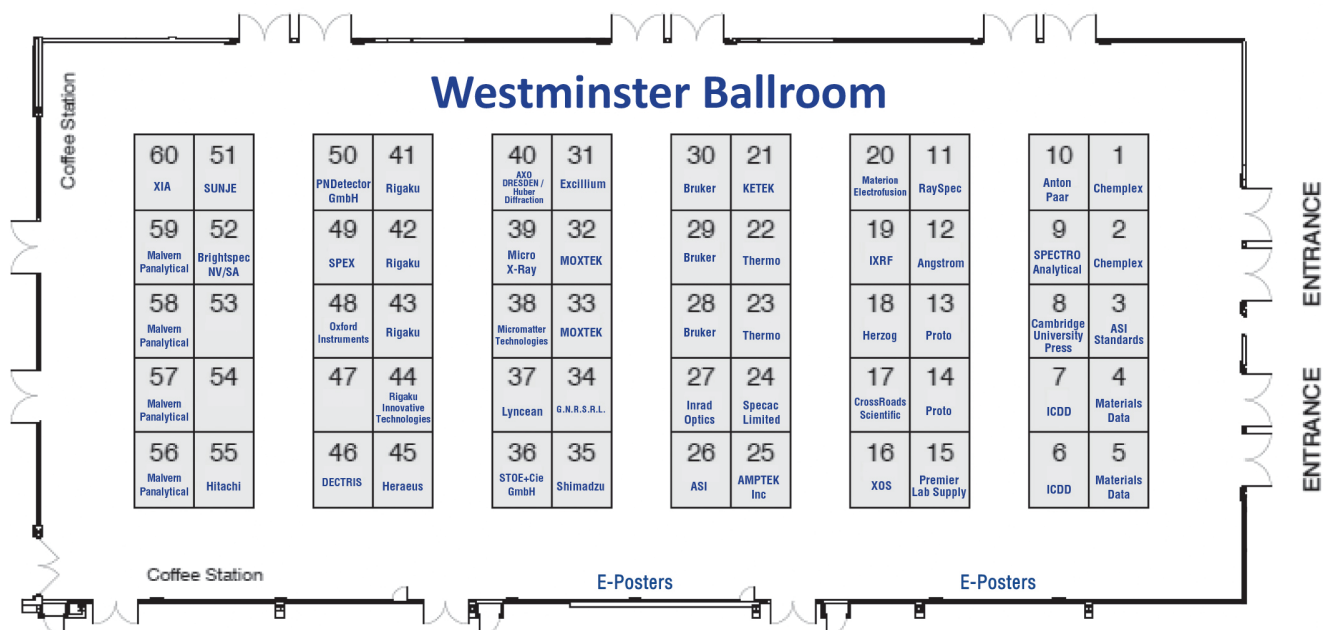
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2018 Denver X-ray Conference Exhibitors

Exhibits will be held in the Westminster Ballroom.

Exhibit Hours

Tuesday, 7 August 10:00 am - 5:00 pm
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Exhibitors

AMPTEK, Inc.

Booth: 25

Website: www.amptek.com

Email: amptek.sales@ametek.com

Amptek's newly acquired in-house manufacturing brings you the highest performing detectors available. This new family of detectors have lower noise, lower leakage current, better charge collection, and uniformity from detector to detector. This results in superior peak-to-background, peak-to-tail, resolution and a more Gaussian spectrum. See our new line of ultra-high performance FAST SDD®, large area FAST SDD®, improved SDD and our newest Si-PIN detectors. For over 40 years, Amptek has defined the true state-of-the-art. Amptek.com

Angstrom, Inc.

Booth: 12

Website: www.angstrom-inc.com

Email: sales@angstrom-inc.com

Angstrom manufactures the highly regarded TE250 Laboratory Ring Pulverizer and 4451AE Laboratory Briquet Press for preparation of various types of samples for X-ray analysis. Since 1962, we have providing rugged and long lasting sample preparation equipment at a surprisingly low price point. A complete line of aluminum sample cups are offered to complement the 4451AE Briquet Press and a programmable version of the 4451AE Press is available and on display at the Angstrom booth.

Anton Paar

Booth: 10

Website: www.anton-paar.com

Email: info.us@anton-paar.com

With more than 2,900 employees worldwide, Anton Paar provides a dense customer support network. The company offers the most comprehensive range of attachments for non-ambient XRD and is a major supplier of small-angle X-ray equipment worldwide. The SAXSpoint system is the most versatile small-and-wide-angle X-ray scattering set-up on the market.

ASI

Booth: 26

Website: www.amscins.com

Email: info@amscins.com

Amsterdam Scientific Instruments (ASI) markets hybrid pixel detectors which are developed in collaboration with CERN. Visit our booth to get an in-depth view of how our technology which can excel your X ray experiments.

ASI Standards

Booth: 3

Website: www.asistandards.com

Email: info@asistandards.com

ASI Standards provides custom reference materials for elemental analysis across a number of industries. Our focus is to provide high-quality products and services, responsible guidance, and thought leadership that empowers our customers to live happier lives inside the lab and out. ASI provides materials and expertise for metals valuation, validation and testing; crude oil, fuels, lubricating oil, and wear metals analysis; EPA ULSD, Tier 3 Gasoline, and MARPOL standards; and ROHS plastics.

AXO DRESDEN/Huber Diffraction Equipment

Booth: 40

Website: www.axo-dresden.de

Email: contact@axo-dresden.de

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.

Brightspec NV/SA
Booth: 52
Website: www.brightspec.be
Email: sales@brightspec.be

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
Booths: 28, 29, 30
Website: www.bruker.com
Email: info.baxs@bruker.com

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. Stop by our booth to see the latest innovations in diffraction and fluorescence systems, including our D8 DISCOVER, D8 ADVANCE, D8 ENDEAVOR, 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
Booths: 8
Website: www.cambridge.org/academic
Email: customer_service@cambridge.org

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.
Booths: 1, 2
Website: www.chemplex.com
Email: sales@chemplex.com

Chemplex® is proud to introduce our new semi-automatic 25-ton Pellet Press. This compact unit joins our complete line of Pellet Presses and Grinding machines. For over 45 years we have continued to bring innovative ideas to the XRF/XRD community. Chemplex® manufactures an extensive line of consumables and equipment including Pellet Cups, Grinding Vials, FusionFlux® formulations, Sample Cups available in a variety of styles and sizes, Thin-film Sample Support, and our exclusive SpectroMembrane® thin-film carrier frames. We now offer a full line of gas and electric Fluxers and Platinum ware. Chemplex is committed to providing our worldwide users with the highest quality products to achieve consistent results.

CrossRoads Scientific, LLC
Booth: 17
Website: www.crossroadsscientific.com
Email: info@crossroadsscientific.com

CrossRoads Scientific is a leading developer of XRF analysis software for OEMs and end users, for energy-dispersive x-ray spectrometers. We customize our software for applications in XRF and SEM-EDS. With 40 years of experience in x-ray analysis, we have supplied our software and consulting services for 25 years, providing quality solutions to over 3,000 end users. Our latest software, XRS-FP2, provides FP analysis for bulk and thin-film samples, for XRF or SEM-EDS applications, using an integrated framework and workflow-based design.

DECTRIS Ltd.
Booth: 46
Website: www.dectris.com
Email: info@dectris.com

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.

Excillum
Booth: 31
Website: www.excillum.com
Email: info@excillum.com

Excillum AB designs, develops and manufactures high-brightness, microfocus X-ray sources based on MetalJet technology. Excillum also develops extreme resolution nanofocus X-ray sources based on advanced electron beam technologies and diamond transmission targets. The second generation MetalJet X-ray sources are now available for a wide range of applications ranging from scientific to production control in areas such as diffraction/scattering (XRD, SAXS), Spectroscopy (XRF, XPS), Imaging (NDT, CT, XRM, phase contrast) etc.

G.N.R.S.R.L.
Booth: 34
Website: www.gnr.it
Email: gnrcomm@gnr.it

G.N.R.S.R.L. Analytical Instruments design and produce X-Ray Diffractometers (XRD) Total Reflection X-Ray Fluorescence instruments (TXRF) and Optical Emission Spectrometers (OES) since 1984, with a special attention to XRD industrial application for Residual Stress and Retained Austenite measurements. Thanks to its innovative and dynamic research and sales team, G.N.R.S.R.L. can offer complete solutions for structural and elemental testing with thousands of machines installed and operative all over the world.

Heraeus
Booth: 45
Website: www.heraeus.com
Email: aaron.macon@heraeus.com

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 # 45 to learn more.

Herzog Automation Corp.
Booth: 18
Website: www.herzogautomation.com
Email: info@herzogautomation.com

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-Tech Science America, Inc.
Booth: 55
Website: www.hitachi-hightech.com/hhs-us/
Email: sales@hitachi-hitec-science.us

Hitachi High Tech Science America Inc. designs and manufactures the Vortex line of Silicon Drift Detectors (SDDs) for applications ranging from benchtop instrumentation to the most demanding synchrotron spectroscopy and mapping installations. HHS-US takes pride in working with end-users on custom designs suited to their exact needs. In 2018, we will deliver the Vortex ME-7, a 7 element detector with the tightest spacing configuration available (probe diameter <39mm!!). Stop by to see how we can help you meet your X-ray detector needs.

Inrad Optics**Booth: 27****Website: www.inradoptics.com****Email: sales@inradoptics.com**

Inrad Optics uses state-of-the-art optical manufacturing and testing methods to produce bent-crystal monochromators made from quartz, silicon, germanium, and KAP crystalline material. These crystal devices are opening new doors in analytical chemistry micro-probes, hot plasma diagnostics, black-lighter imaging – and more. Crystals are bent then affixed to conform to toroidal, spherical, cylindrical, and aspherical shapes. Grown from high quality crystalline material, our analyzers are designed to optimize the diffraction efficiency of your imaging system. Learn more at <http://inradoptics.com/products/x-ray-imaging-crystals>

International Centre for Diffraction Data**Booths: 6, 7****Website: www.icdd.com****Email: sales@icdd.com**

For over 75 years, our mission has focused on meeting the needs of the scientific community through the publication of the Powder Diffraction File™ (PDF®) and providing forums for the exchange of ideas and information. The 2019 Powder Diffraction File™ product line will be released September 2018 with many new entries and features. These material identification databases are interfaced with diffractometers and data analysis systems of the world's leading software developers and manufacturers of X-ray equipment.

IXRF Systems, Inc.**Booth: 19****Website: www.ixrfsystems.com****Email: sales@ixrfsystems.com**

IXRF Systems manufactures industry-leading microanalysis systems and x-ray fluorescence (XRF) analyzers for bulk and micro applications. The IXRF software platform is high-powered and fully-featured yet easy-to-use and intuitive. IXRF offers free software upgrades on all of its products as well unrivaled service and support.

KETEK GmbH**Booth: 21****Website: www.ketek.net****Email: info@ketek.net**

The leading manufacturer of Silicon Drift Detectors presents the newest VITUS SDD generation with KETEK's proprietary Graphene window. It offers a significantly higher x-ray transmission below 3keV and boosts the LOD of lighter elements like fluorine or magnesium. The best-in-class cooling performance allows a stable chip temperature down to -60°C at up to +65°C heat sink ($\Delta T > 125K$) at 50% lower power consumption. Together with energy resolutions $< 123eV$ ($MnK\alpha$), P/B ratios above 25,000 and peaking times down to 50ns supporting very high count rates this marks the real state-of-the-art performance.

Lyncean Technologies, Inc.**Booth: 37****Website: www.lynceantech.com****Email: info@lynceantech.com**

The Lyncean Compact Light Source (CLS) is a high flux, quasi-monochromatic, continuously energy tunable mini-synchrotron that is designed to be the cornerstone of a multi-disciplined small x-ray facility. Based on research performed at the SLAC National Accelerator Laboratory and Stanford University, the CLS replaces conventional undulator magnetics found at the large synchrotron with a laser "undulator", scaling down the entire device by a factor of 200.

Malvern Panalytical**Booths: 56, 57, 58, 59****Website: www.malvernpanalytical.com****Email: ask@panalytical.com**

Malvern Panalytical's chemical, physical and structural analysis technologies are used by scientists/engineers in many industries to solve challenges with maximizing productivity, developing better products and getting them to market faster. We are excited to unveil a revolution in X-ray diffraction - please join our Food for Thought luncheon on Tuesday August 7 where we will present on the next generation Empyrean. Our booths 56-59 will feature X-ray analysis systems, sample prep equipment, and application scientists to discuss your analytical challenges.

Materials Data, Inc.
Booths: 4, 5
Website: www.materialsdata.com
Email: mdi@materialsdata.com

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: 20
Website: www.materion.com
mail: electrofusion-sales@materion.com

Beryllium and beryllium oxide (BeO) windows and assemblies for X-ray tubes and detectors – high purity (99.8%), vacuum tight, as thin as 8µm. Artifact-free IS-50M® grade beryllium for use in mammography and other sensitive oncology applications. Corrosion-resistant protective coatings. Thin film metallic target coatings for transmission X-ray tubes. High temperature (960° C) brazing and rapid prototyping service available.

Micro X-Ray, Inc.
Booth: 39
Website: www.microxray.com
Email: gblair@microxray.com

Micro X-Ray, Inc. (www.microxray.com) designs and manufactures low power x-ray tubes for many applications including XRF, XRD, Medical Imaging, and Thickness Gauging. We specialize in small focal spots and high stability. Our tubes are engineered to meet our customers' requirements. Micro X-Ray tubes are designed and manufactured in California and well-regarded globally.

Micromatter Technologies, Inc.
Booth: 38
Website: www.micromatter.com
Email: info@micromatter.com

MICROMATTER has provided XRF calibration materials for more than 50 years. With Micromatter and Calmetrics joining forces, we now offer the world's largest selection of certified coating thickness and material composition reference XRF standards. Our products include ultra-light standards for air quality monitoring, thick (rolled) foil standards for metallurgical applications, standards for RoHS detection and multi-element samples. We also provide metallic, semiconductor, polymer, insulator and exotic thin films. Micromatter supplies customized composite SiN windows for low-energy X-ray detectors. Furthermore, Micromatter is the leading manufacturer of beam stripping foils, with specialization on diamond-like carbon, DLC-Boron hybrid, pure boron and graphene based materials.

MOXTEK, Inc.
Booths: 32, 33
Website: www.moxtek.com
Email: info@moxtek.com

Moxtek is a major supplier of miniature x-ray components (Sources, Detectors, Windows, and DPPs) and advanced nano-optic components used in display electronics, imaging and analytical instrumentation. Moxtek is a leader in x-ray technology with recent developments including: the Mox HPC family of air-cooled, 75kV x-ray tubes with power ratings from 100W to 350W; MAGPRO 70kV, 12W x-ray source for benchtop XRF/XRD; MoxMicro tube with a <80µm focal spot at 50W; and Mox120kV, 5W source for high energy XRF.

Oxford Instruments X-Ray Technology, Inc.

Booth: 48

Website: <https://xray.oxinst.com>

Email: xray-sales@oxinst.com

Oxford Instruments X-Ray Technology, Inc is a leading global supplier of x-ray sources and power supplies for analytical, medical imaging, and industrial imaging applications. By focusing on our customers' Job to be Done we capitalize on our +30 years of x-ray design, high volume manufacturing, sales and service, by offering industry leading sources such as Apogee gridded packaged sources, Shasta power suppliers, Ultrabright and Pinnacles microfocus sources, and Trinity integrated sources. Located near Silicon Valley in California, US, and with sales representatives around the world, Oxford Instruments X-Ray Technology, Inc is uniquely positioned to deliver value through our close working customer partnerships.

PNDetector GmbH

Booth: 50

Website: www.pndetector.de

Email: sales@pndetector.de

PNDetector is developing and manufacturing advanced radiation detectors for material analysis in a wide range of applications such as microanalysis, quality assurance and materials science.

The silicon sensors are fabricated in PNDetector's own cleanroom facilities in Munich. The cleanroom is dedicated to an ultra-pure fabrication with a high level of contamination control, insuring very low dark-current levels. The emphasis in production and development is on Silicon Drift Detectors (SDDs) Backscattered Electron Detectors (BSE) and Charged Coupled Devices (pnCCDs).

PREMIER Lab Supply, Inc.

Booth: 15

Website: www.premierlabsupply.com

Email: info.premierlabsupply.com

PREMIER manufactures and distributes XRF sample preparation consumables, equipment and platinum ware items. PREMIER's consumables include XRF liquid sample cells and thin film sample support materials, along with products and accessories for press pelletizing, fusion and platinum labware items. Presenting xrFuse series electric fusion machines engineered to prepare permanent and homogeneous fused beads under accurate reproducible conditions. The system brings 25 years of fusion technology to deliver contamination free performance. Available in one, two and six position units.

PROTO

Booths: 13, 14

Website: www.protoxrd.com

Email: info@protoxrd.com

PROTO is one of the fastest growing x-ray diffraction companies in the world. Our team of application scientists and engineers ensure that you get the correct system and support for all of your applications. We are excited to introduce our new AXRD-LPD full-sized laboratory powder diffractometer at this year's DXC. This is now the third instrument in our powder diffraction line-up, in addition to our extensive range of residual stress, single crystal orientation systems, and x-ray tubes. At PROTO we believe in customizing our products to provide you with the best possible systems for your application.

RaySpec Ltd

Booth: 11

Website: www.rayspec.co.uk

Email: sales@rayspec.co.uk

RaySpec Ltd is a specialist manufacturer of customized Silicon Drift Detectors (SDD) and signal processing electronics for X-ray Fluorescence applications. Detectors are available with a wide range of active areas in single and multi-sensor designs. RaySpec supplies original equipment manufacturers and specialist end users in beam-line and research facilities all over the world. Please come and meet us at our booth to see how our unique capabilities could satisfy the most demanding of specialized requirements.

Rigaku Americas
Booths: 41, 42, 43
Website: www.rigaku.com
Email: info@rigaku.com

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.

Rigaku Innovative Technologies
Booth: 44
Website: www.rigaku.com
Email: info@rigaku.com

Rigaku Innovative Technologies: multilayer optics for all applications. Osmic™ CMF Optics with Arc)Sec® technology provide higher flux and smaller spots than Montel optics. MicroMax® microfocus X-ray generators offer the most brilliance. Max-Flux® optics provide lower divergence than “Gobel” mirrors. Ovonyx™ multilayer analyzers bring top performance and lifetime for WDXRF spectrometry.

Shimadzu Scientific Instruments, Inc.
Booth: 35
Website: www.shimadzu.com
Email: maquaranta@shimadzu.com

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.

Specac Limited
Booth: 24
Website: www.specac.com
Email: richard.flynn@specac.com

Specac is major supplier of FT-IR, Polarizer, Transmission, Reflectance sampling accessories, across the globe, and specializes in XRF Sample preparation products. The XRF sample preparation products include Atlas presses that range from 8 to 40 ton with manual and power assisted or fully programmable options. The Atlas dies have a full range from 20mm to 40mm. New to the XRF sample preparation line is the Apex Quick Release Die featured at Denver X-ray. Visit us at www.specac.com.

SPECTRO Analytical Instruments
Booth: 9
Website: www.spectro.com
Email: info.spectro@ametech.com

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: 49
Website: www.spexsampleprep.com
Email: sampleprep@spex.com

SPEX SamplePrep/Katanax manufactures mills, fusion fluxers and pellet presses that prepare samples for XRF analysis. Our Katanax line of automated electric fluxers are safe and reliable and can prepare soil, cement and minerals. Our X-300 three position fluxer has a throughput of up to 15 samples per hour producing fused beads or solutions. The X-Press is an automated, 35-ton, hydraulic laboratory press. It is ideal for the repetitive pressing of cement and rock sample into pellets.

STOE + Cie GmbH
Booth: 36
Website: www.stoe.com
Email: info@stoe.com

STOE, originally founded in 1887, to manufacture equipment for the optical analysis of crystals, has been a pioneer in powder and single crystal X-ray diffraction since the 1960's, e.g. STOE invented and patented the transmission geometry technique for Powder XRD as well as, for single crystals, produced the first pixel detector XRD system with an open Eulerian cradle. STOE is based in Darmstadt, Germany, and keeps the R&D, software programming, electrical and mechanical engineering and production all in house, allowing STOE to provide customers with standard as well as individual solutions. Whenever it comes to quality, STOE accepts no compromises. This high-level of detail is what sets STOE apart. STOE is the partner in X-Ray Diffraction to crystallographers, chemists, material scientists and pharmacists all over the world.

SUNJE
Booth: 51
Website: www.sunstat.com
Email: aidensunje@gmail.com

X-Ray Tube - Able to manufacture based on customer needs (e.g. thermal shock proof, thermostability enhanced, miniaturized, or high voltage durable discharging tube).

X-Ray Tube System - X-ray Tube System is designed for the portable and benchtop XRF instruments. Small spot size makes it a good choice for x-ray imaging and analysis applications.

Thermo Fisher Scientific
Booths: 22, 23
Website: www.thermofisher.com
Email: caroline.mack@thermofisher.com

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, for spectrochemical/phase analysis of all types of materials (solids, liquids, powders). The Thermo Scientific™ ARL PERFORM'X sequential WDXRF can analyze samples from 35mm diameter down to 0.5mm spots and perform elemental cartography as well allowing analysis of non homogeneous samples. The Thermo Scientific™ ARL™ QUANT'X EDXRF Spectrometer has been redesigned to improve efficiency, ease operation and lower cost of ownership, giving manufacturers and researchers a tool to solve their most challenging analytical tasks. Learn more on www.thermofisher.com/xray

XIA LLC
Booth: 60
Website: www.xia.com
Email: sales@xia.com

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.

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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. The flex-Beam™ is a unique, compact X-ray generator that combines a low-powered X-ray source and precisely aligned polycapillary optic to deliver a bright X-ray beam for advanced material analysis. The innovative optic mounting and alignment design enables an easy X-ray tube and/or optic replacement, making it a user-friendly tool for both OEMs and end users. flex-Beam™ is available in several standard focused or collimated beam configurations and can be customized for specific applications.

DXC 2018 EXHIBIT PASSPORT

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Lyncean Tech., Inc.	Malvern Panalytical	MDI	Materion	Micro X-Ray, Inc.	Micromatter	MOXTEK, Inc.
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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 4:00pm on Thursday, via Guidebook and a posting at the Conference Registration Desk. The winner will also be contacted by phone or email 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.

2018 Denver X-ray Conference Workshops

Morning Workshops – 9:00 am – 12:00 Noon

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

Monday Morning Workshops 9:00 am – 12:00 Noon

Material Identification – The good, bad and ugly

Standley I

Organizers & Instructors:

T. Fawcett, Emeritus ICDD, USA, dxcfawcett@outlook.com

J. Blanton, ICDD, USA, jblanton@icdd.com

All automated search match algorithms and applications are based on sound fundamental assumptions about how the specimen is prepared, and the influence of several instrumental parameters used in your experiment. However, in practice, there are numerous cases where these assumptions are not met, many times for perfectly good reasons, leading to inaccuracies and false identifications. We will use dozens of case histories to show how various problems can be identified with practical solutions to these problems.

Selecting Software for Rietveld Refinement I

Meadowbrook

Organizer & Instructors

A.A. Yakovenko, L.C. Gallington, Argonne National Laboratory, USA, ayakovenko@anl.gov; gallington@anl.gov

A.F.M. Dos Santos, Oak Ridge National Laboratory, USA, dossantosam@ornl.gov

S.N. Rodesney, Bruker AXS, Inc., USA, steven.rodesney@bruker.com

N. Anibou, Rigaku Americas, USA, noureddine.anibou@rigaku.com

Introduction to the Structure Determination and Structure Analysis from Powder Diffraction often starts with the selection of Rietveld refinement software. Different groups are usually selecting software for several reasons. One of the major reasons, is that such particular software is better suited and have tools which allow “simple” process of powder diffraction data from the materials which are being studied, or from instrument where this data have been collected. However, for a person who has just been introduced to the Powder Diffraction Science, such diversity of the software might be confusing. Very often students and early career scientists do not know where to start, and which software to use for their particular problems.

The 2018 Rietveld Refinement workshop will show a variety of Rietveld refinement software, highlighting the tools, methods which are suited for particular types of refinement and/or classes of materials. This would allow students to choose the software for their need or discover new functions and routes of refinements.

Basic XRF

Standley II

Organizer & Instructors:

J.A. Anzelmo, Anzelmo & Associates, Inc., USA, jaanzelmo@aol.com

M.A. Zaitz, IBM, USA, zaitz@us.ibm.com

This workshop provides a basic introduction to the principles of XRF and is specifically aimed at those new to the field. It begins with a general overview of the technique and the various instrumentation configurations including their main applications. This is followed by more specific details of XRF Physics. Basic WDX instrumentation will be described with its use and applications. In the second half of the workshop, basic EDX instrumentation including general purpose bulk analyzers (benchtop EDX), TXRF, Micro analyzers, and Handheld analyzers will be reviewed. Capabilities and applications in actual practice will be described.

Quantitative Analysis of XRF I

Cotton Creek I

Organizer & Instructors:

W.T. Elam, University of Washington, USA, wtelam@apl.washington.edu

B. Vrebos, Malvern Panalytical, The Netherlands, bruno.vrebos@panalytical.com

K. Kawakyu, Rigaku Corporation, Japan, kawakyu@rigaku.co.jp

Part I: Matrix effects and how to compensate for them: scatter peaks, compensation methods, semi-quantitative analysis using FP, and fusion.

Part II: Walkthrough of quantitative analysis for a few XRF spectra.

Monday Afternoon Workshops 1:30 pm – 4:30 pm

Quantitative Phase Analysis

Standley I

Organizer & Instructors:

E. Ryba, Penn State University, USA, rx7@psu.edu

J. Kaduk, Poly Crystallography, Inc. and Illinois Institute of Technology, USA, kaduk@polycrystallography.com

N. Henderson, Bruker AXS, Inc., USA, nathan.henderson@bruker.com

This workshop on X-ray diffraction methods for quantitative phase analyses begins with a series of examples of manual single-peak analyses using standards and reference intensity ratios. An introduction to full-pattern methods is next, followed by discussions of things that can go wrong (e. g., instrument aberrations, absorption, surface roughness, microabsorption, preferred orientation) and the accuracy attainable. The approaches for the quantification of amorphous content will be addressed, including the use of calibration curves, internal standards, total integrated intensities, and the 'Partial or No Known Crystal Structure' method. Interesting examples for a wide variety of materials throughout.

Two-Dimensional Detectors

Standley II

Organizers & Instructors:

T.N. Blanton, ICDD, USA, tblanton@icdd.com

B.B. He, Bruker AXS, Inc., USA, bob.he@bruker.com

M. Mueller, DECTRIS, Switzerland, marcus.mueller@dectris.com

J. Ferrara, Rigaku, USA, Joseph.Ferrara@rigaku.com

S. Speakman, Malvern Panalytical, USA, scott.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.

Selecting Software for Rietveld Refinement II

Meadowbrook

Organizer & Instructors:

A.A. Yakovenko, L.C. Gallington, Argonne National Laboratory, USA, ayakovenko@anl.gov; gallington@anl.gov

A.F.M. Dos Santos, Oak Ridge National Laboratory, USA, dossantosam@ornl.gov

S.N. Rodesney, Bruker AXS, Inc., USA, steven.rodesney@bruker.com

N. Anibou, Rigaku Americas, USA, noureddine.anibou@rigaku.com

Continuation from the morning workshop, Selecting Software for Rietveld Refinement I (see description on page 11).

Quantitative Analysis of XRF II

Cotton Creek I

Organizer & Instructors:

W.T. Elam, University of Washington, USA, wtelam@apl.washington.edu

B. Vrebos, Malvern Panalytical, The Netherlands, bruno.vrebos@panalytical.com

K. Kawakyu, Rigaku Corporation, Japan, kawakyu@rigaku.co.jp

Continuation from the morning workshop, Quantitative Analysis of XRF I (see description on page 11).

Energy Dispersive XRF

Cotton Creek II

Organizer & Instructors:

P. Lemberge, Thermo Fisher Scientific, Switzerland, pascal.lemberge@thermofisher.com

W.D. Watson, Thermo Fisher Scientific, USA, wayne.watson@thermofisher.com

V. Osorio, Brightspec NV/SA, Belgium, vicente.osorio@brightspec.be

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; spectrum fitting; rapid qualitative analysis; 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.

Tuesday Morning Workshops 9:00 am – 12:00 Noon

Characterization of Thin Films

Standley I

Organizer & Instructors:

K. Hradil, W. Artner, TU Wien, Austria, kladia.hradil@tuwien.ac.at; werner.artner@tuwien.ac.at

The workshop will include the theoretical background and experimental techniques of thin film analysis by X-ray diffraction methods. This will include the experimental techniques and the analysis of data for grazing incidence diffraction and reflectivity investigations and also high resolution methods. The possibilities for the microstructure properties analysis of thin films like stress/strain and texture analysis, classical phase analysis and thin film crystallinity properties with lab methods will be introduced for selected examples. Furthermore, we will discuss measurement techniques for beam sizes in the micro- (lab) and nano-scale (synchrotron).

Line Profile Analysis

Standley II

Organizer & Instructors:

M. Leoni, University of Trento, Italy, matteo.leoni@unitn.it

J. Cline, M. Mendenhall, NIST, USA, james.cline@nist.gov; marcus.mendenhall@nist.gov

L. Sweet, PNNL, USA, lucas.sweet@pnnl.gov

The determination of microstructure parameters (such as size of the domains or type and quantity of lattice defects) is still one of the most frequent applications of powder diffraction. In the last 100 years we moved from single peak to full pattern analysis and from qualitative to quantitative results. Several standards have been specifically developed by the NIST to address the issues of characterizing the instrumental contribution and validating the analysis techniques. An historical overview of the available techniques and assessment of the state of the art will be made, providing some practical examples of application and advices on the meaning of the results. BYOD (Bring Your Own Data) for a more active discussion!

Micro XRF

Cotton Creek

Organizer & Instructors:

M.A. Zaitz, IBM, USA, zaitz@us.ibm.com

N. Gao, XOS, USA, ngao@xos.com

K. Tsuji, Osaka City University, Japan, tsuji@a-chem.eng.osaka-cu.ac.jp

Micro XRF analysis has become an integral part of the lab analysis and is used in a wide variety of fields, such as: art and archeology, bioengineering, semiconductor, environmental, criminal forensics or industrial quality control work. The strength of micro XRF is multi element energy dispersive XRF analysis which is relatively fast analysis, may require little or no sample prep, and combined with elemental mapping provides another depth of information. The Micro XRF workshop will provide an overview of micro X-ray fluorescence (MXRF) including brief review of the basics of ED-XRF analysis, a status of current instrumentation, an introduction of the physics of capillary optics and a current state of the art micro optic systems. Various types of applications including qualitative and quantitative with calibration options such as basic empirical, standardless FP and semiquant FP. The workshop will explore elemental imaging (mapping/scanning) as well as their particularities. An update on 3D confocal micro XRF analysis will be presented.

Sample Preparation of XRF

Meadowbrook

Organizer & Instructors:

J.A. Anzelmo, Anzelmo & Associates, Inc., USA, jaanzelmo@aol.com

C. Audet, Claisse, Canada, caudet@claisses.com

This workshop will focus more on the different aspects of fusion for both simple and difficult samples. It will begin with borate fusion preparation, but for the first time in this workshop, we will also discuss the chemistry of peroxide fusions and its applications. The Physics of XRF sample preparation will also be discussed as usual, as well as pressed powder preparation. These techniques and methods are essential in today's modern laboratory.

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

Imaging

Standley I

Organizer & Instructor:

S. Vogt, Argonne National Laboratory, USA, svogt@anl.gov

X-ray imaging and microscopy as had tremendous impact over the past decade, addressing extremely broad and highly relevant scientific and industrial questions. It is particularly well suited to visualizing materials across numerous lengthscales, in depth, and in situ/operando. Application areas are as broad as high-speed imaging of laser fusion processes in additive manufacturing, mapping trace elements in biological systems to better understand their impact on human health both in their natural occurrence and via therapeutic drugs, or nanoscale imaging of integrated circuitry with the goal of process verification and failure analysis. We will discuss methods and techniques in areas of full-field imaging, tomography, scanning probe techniques, as well as lensless imaging approaches. In addition to instrumentation related topics, we will discuss computational approaches.

Non-Ambient

Standley II

Organizer & Instructors:

S.T. Mixture, New York State College of Ceramics at Alfred University, USA, mixture@alfred.edu

E.A. Payzant, Oak Ridge National Laboratory, USA, payzanta@ornl.gov

A. Jones, Anton Paar GmbH, Austria, andrew.jones@anton-paar.com

H. zur Loye, University of South Carolina, USA, zurloye@mailbox.sc.edu

This half-day workshop will focus on high temperature XRD in laboratory instruments and will include an overview of the capabilities of the various commercially-available non-ambient stages. Pitfalls, tips and tricks for using non-ambient stages for controlled temperature, gaseous atmosphere, and applied electric fields will be covered with brief examples. Topics will include temperature calibration, accuracy of the XRD patterns (instrument optics, calibration and/or corrections for specimen displacement) and handling the resulting large datasets to obtain phase ID, cluster analysis, and (automated) Rietveld full-pattern fitting.

Trace Analysis

Cotton Creek

Organizers & Instructors:

C. Streli, P. Wobrauschek, TU Wien, Atominstitut, Austria, streli@ati.ac.at; wobi@ati.ac.at

K. Tsuji, Osaka City University, Japan, tsuji@a-chem.eng.osaka-cu.ac.jp

N. Kawahara, Rigaku, Japan, kawahara@rigaku.co.jp

Both beginners and experienced X-ray scientists and applicants, physicists and chemists, should gain information by attending the Trace Analysis Workshop. Presentations of most modern techniques and instrumentation for trace element analysis using EDXRS and 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 importance 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.

Handheld XRF – The Silver Bullet or Fools Gold?

Meadowbrook

M. Loubser, GeoMagGeoChem, South Africa, maggi.loubser@gmail.com

A. Seyfarth, SGS North America, Canada, alexander.seyfarth@sgs.com

L. Lee, The Getty Conservation Institute, USA, lylee@getty.edu

X-ray fluorescence spectroscopy is a mature technique with the theory well described and routinely applied in process control, exploration, mining and manufacturing, apart from research and development applications. The “big shrink” as in most analytical technologies was the result of improved electronics and computer chips, and together with the advance of the SDD detector Energy Dispersive XRF was ready to enter the playground. Handheld XRF moved from a metal sorting scanner to an actual quantitative analytical tool. But here lies the biggest challenge, because of reduced cost and ease of operation, this tool is now more accessible to people who often do not have the insight in the limitations.

In this workshop, firstly the differences between analysis in the field vs. the laboratory would be explained, and methods to improve accuracy or interpret the data based on the known inaccuracies. Then some specific Geology case studies will be presented, and lastly we will introduce some case studies in the field of art and conservation where the ability to bring a non-destructive technique to the actual object probably had the biggest impact, but again, not without pitfalls.

XRD Poster Session – Monday Evening

Westminster Foyer

(outside exhibit hall/Westminster Ballroom)

The Monday evening XRD poster session will be held 5:00 pm – 7:00 pm in the Westminster foyer, in conjunction with a wine and cheese reception. Three “Best Poster” awards will be given at the end of the session, including “Best Student Poster”.

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

**Signifies presenting author, when noted*

- D-3** **Relative Stability of Anhydrous Products of Calcium Chloride during Complete Dehydration as Examined by X-ray Diffraction**
K.S.P. Karunaratne, Industrial Technology Institute, Sri Lanka
H.M.T.G.A. Rajapakse, University of Peradeniya, Sri Lanka
- D-6** **Latest Developments in Non-ambient XRD Attachments from Anton Paar**
A.O.F. Jones*, A. Pein, Anton Paar GmbH, Austria
- D-9** **Crystal Structural Analysis of $\text{InAs}_x\text{P}_{1-x}$ Nanowire Exploiting High Resolution X-ray Diffraction**
S. Song*, C.S. Kim, Korea Research Institute of Standards and Science, Korea
- D-11** **Structural Investigation of Plutonium Oxalate Species and Comparison of Their Oxide Products**
J. Corbey*, L. Sweet, D. Meier, A. Casella, PNNL, USA
- D-12** **Observation of Crystal Structure Changes with Full Field X-ray Diffraction Imaging Instrument**
M. Yamanashi, Kyoto Municipal Institute of Industrial Technology and Culture, Japan
K. Tsuji, Osaka City University, Japan
- D-14** **Fretting Corrosion of Wind Turbine Drivetrains: Causes to Cures using XRD**
J. Brum, Olympus, USA
- D-15** **Crystal Structures of Large-Volume Commercial Pharmaceuticals**
J.A. Kaduk*, North Central College, Illinois Institute of Technology and Poly Crystallography, Inc., USA
A.M. Wheatley, North Central College, USA
A.M. Gindhart, T.N. Blanton, ICDD, USA
- D-16** **Crystal Structures of Ammonium Citrates**
A.M. Wheatley, J.A. Kaduk*, North Central College, USA
- D-23** **Development and Performance Test of X-ray Source for Industrial Benchtop & Handheld XRF**
J.D. Kim*, S.H. Kim, SUNJE R&D Center, Korea
D.H. Lee, Pukyong National University, Korea
- D-24** **Prediction of a KIST PIXE/PIGE Facility Based on Design and Simulations**
S.M.T. Hoang, H.N. Tran, Duy Tan University, Vietnam
G.M. Sun, Korea Atomic Energy Research Institute, Korea
- D-25** **Validation of the McStas-MCNPX Interface Features in Calculation of Shielding and Gamma/Neutron Backgrounds**
S.M.T. Hoang, H.N. Tran, Duy Tan University, Vietnam
G.M. Sun, Korea Atomic Energy Research Institute, Korea
- D-27** **Mineral Analysis of River Sand around Mt. Tsukuba for Provenance Estimation of Atamadai Type Pottery (2500-1500 BC) From Hinoki Site (Tochigi Japan)**
S. Ichikawa*, Y. Sakito, T. Kurisaki, Fukuoka University, Japan
- D-29** **Geochemical Analysis of Iron Enriched Soil of Meherrin Virginia**
J. Brum, Olympus, USA
S.I. Chojna, A.M. Sikder, X.C. Liu, L. Kelly, Virginia Commonwealth University, USA
- D-30** **BM: a Python Code for Modelling Physically Based Background for XRD**
B. Ramírez, S. García, L. Bucio, Universidad Nacional Autónoma de México, México

- D-31 New Stage of Benchtop X-ray Diffractometer MiniFlex with New Two-dimensional Detector and Temperature-Control Attachment**
T. Kuzumaki, K. Nagao, A. Yamano, Rigaku Corporation, Japan
- D-32 Evaluation of Physicochemical Properties of ^{137}Cs in Geological Materials by X-ray Diffractometry**
T. Mizunuma*, K. Fujii, M. Kasari, Meiji University, Japan
A. Ohbuchi, Y. Koike, Applied Rigaku Technologies, USA
- D-34 Characterization of Ceramic Metal Cutting Tools**
T. Shibata, Kennametal, Inc., USA
- D-40 Multi-dimensional Analysis of Advanced Manufacturing Metals Using Diffractometer Automation**
S. Speakman, Malvern Panalytical, USA
F. Masiello, D. Beckers, Malvern Panalytical, The Netherlands
- D-43 Luminescent Properties, X-ray Photoelectron and X-ray Absorption Spectroscopy Study of Antimony Doped P-type ZnO Nanowires**
A.M. Alsmadi*, B. Salameh*, Kuwait University, Kuwait
- D-45 Assessment on Digital Imaging Enhancement for Radiographic Interpretation**
B. Adenle, Creative Research Network Technology, Nigeria
- D-49 Deposition and Structural Characterization of Ti/Si Thin Films**
Q. Lin, University of California Irvine, USA
- D-51 Combined Microdiffraction and Micro-XRF Analysis of Geological Specimens**
S.N. Rodesney*, T. Hill, N. Henderson, J. Giencke, B. Jones, Bruker AXS, Inc., USA
- D-52 Rapid Analysis of Pharmaceuticals with EIGER2 R 500K Multimode Detector**
N. Henderson*, S.N. Rodesney, J. Giencke, B. Jones, Bruker AXS, Inc., USA
- D-58 NIST Standard Reference Materials for X-ray Metrology**
J.P. Cline*, M. Mendenhall, D. Black, A. Henins, NIST, USA
- D-66 Solidification Kinetics and X-ray Spectroscopy Analysis of Al-Ce Based Phases**
J. Stroh, University of Alberta, Canada
- D-67 Implementation of Machine Learning for Crystal Structure Prediction**
K.A. Thasree, University of Alberta, Canada
- D-69 Tuning the Adsorption of Aromatic Hydrocarbons by Cobalt and Zinc Zeolitic Imidazolate Frameworks**
R. Cabrera, J. L. Rodríguez, J. M. Rodríguez, Instituto Politécnico Nacional, México
- D-72 X-ray Diffraction in the 25 T Florida Split Coil Magnet at the National High Magnetic Field Laboratory**
D.J. Rebar*, K. Wei, J.H. Smith, A. Kovalev, A. Suslov, National High Magnetic Field Laboratory, USA
J. Cochran, D. Mann, M. Shatruk, Florida State University, USA
T. Siegrist, Florida State University, USA and National High Magnetic Field Laboratory, USA
- D-74 X-ray Diffraction Analysis of Magnetosomes from Magnetotactic Bacteria**
M. Zhang, Y. Li, W. Wu, Z. Chen*, China Agricultural University, China

Post Deadline:

- D-77 Synthesis and Luminescence Properties of Er^{3+} doped and $\text{Er}^{3+}/\text{Yb}^{3+}$ codoped $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$**
M. He*, Y. Li, Dalian Jiaotong University, China
- D-78 Electric Field Induced Domain Evolutions in BaTiO_3 Single Crystal**
Z. Zhang*, Y. Wang, Dalian Jiaotong University, China
- D-79 Development of a Multiwavelength XRD Combined with EDXRF for Cultural Heritage *in-situ* Analysis**
H.C. Santos*, R.F. Assis, A.R. Leite, M.A. Rizzutto, T.F. Silva, M.H. Tabacniks, University of São Paulo, Brazil
P.H.O.V. Campos, Universidade de Londrina, Brazil
- D-80 A Straightforward Program Written in Octave and Julia for X-ray Diffraction Line Profile Analysis: A Study in Gold Thin Films**
A. Pérez-Casanova, H. Medel-Cobaxin, F.F. Contreras-Torres*, Tecnológico de Monterrey, Mexico

- D-81** **3D Immersive Visualization of Micro-Computed Tomography and XRD Texture Datasets**
M.A. Rodriguez, T.T. Amon, J.J.M. Griego, D. Adams, H.J. Brown-Shaklee, Sandia National Laboratory, USA
N. Green, Department of Energy's Kansas City National Security Campus, USA
- D-82** **The Role of Lattice Disorder in Water Mediated Dissociation of Co-crystals**
N. Kaur*, N. Duggirala, R. Suryanarayanan, University of Minnesota, USA
- D-83** **Effect of Process Variables on Physical State of Mannitol in Tert-Butyl Alcohol - Water Systems**
J. Sonje*, S. Thakral, R. Suryanarayanan, University of Minnesota, USA
- D-84** **In Situ Monitoring of the Crystallization of Amorphous Solid Dispersions in Aqueous Solution, using Synchrotron Radiation**
K.K. Amponsah-Efah*, R. Suryanarayanan, University of Minnesota, USA
- D-86** **Determination of Parameters of X-ray Source Based on Single Bounce Ellipsoidal Monocapillary X-ray Condenser**
Y.B. Wang, X.Y. Zhang, T.X. Sun, Beijing Normal University, China
X.P. Sun, Beijing Radiation Center, China
- D-87** **Round Robin Test (RRT) of the Thickness of Nano-scale HfO₂ Thin Film using XRR (X-ray Reflectometry)**
C.S. Kim*, M. Choi, I.Y. Jung, S. Song, Korea Research Institute of Standards and Science (KRISS), Korea
Y. Azuma, National Institute of Advanced Industrial Science & Technology and National Metrology Institute of Japan, Japan
Y. Chien, Center for Measurement Standards/Industrial Technology Research Institute, Taiwan
L. Ren, National Institute of Metrology, China
- D-88** **Monitoring of FeS₂ Reactions using High Temperature XRD Coupled with Gas Chromatography (GC)**
K.M. Stirrup*, M.A. Rodriguez, J.J.M. Griego, E.N. Coker, T.M. Anderson, Sandia National Laboratory, USA

XRF Poster Session – Tuesday Evening Westminster Foyer

(outside exhibit hall/Westminster Ballroom)

The Tuesday evening XRF poster session will be held 5:00 pm – 7:00 pm in the Westminster foyer, in conjunction with a wine and cheese reception. Three “Best Poster” awards will be given at the end of the session, including “Best Student Poster”.

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

**Signifies presenting author, when noted*

- F-5** **The Development of Grazing Incidence XAFS and TXRF Method at SSRF XAFS Beamline**
Y. Huang, Shanghai Synchrotron Radiation Facility, Chinese Academy of Sciences, China
- F-6** **Potential Environmental Applications by Medium Energy Micro-probe Beamline Proposed in SSRF Phase-II Project**
L. Li, Shanghai Synchrotron Radiation Facility, Chinese Academy of Sciences, China
- F-11** **A Novel Approach to the Analysis of Glass Components used in Portable Electronic Devices by Micro-XRF**
J. Vargeson*, K. Eckart, A. Nached, Corning Incorporated, USA
- F-16** **Polychromatic Simultaneous WDXRF for Valence Evaluation of Cathode Active Materials in Lithium-ion Batteries**
T. Yoneda*, T. Izumi, S. Tokuda, S. Adachi, K. Sato, Shimadzu Corporation, Japan
M. Kobayashi, T. Mukai, H. Tanaka, M. Yanagida, National Institute of Advanced Industrial Science and Technology, Japan
- F-19** **New and Current USGS Shale Reference Materials for Shale Analysis by Energy Dispersive X-ray Fluorescence**
A.R. Orkild-Norton*, S. Wilson, USGS, USA
- F-20** **Trace Element Analysis of Waste Water and Eluate Samples by Total Reflection X-ray Fluorescence Spectrometry**
A. Ohbuchi*, Applied Rigaku Technologies, USA; Rigaku Corporation, Japan and Meiji University, Japan
W. Matsuda, H. Takahara, S. Ikeda, Rigaku Corporation, Japan
K. Fujii, Y. Koike, Meiji University, Japan

- F-23 Novel X-ray Detector Window for Microanalysis Applications**
J. Abbott, J. Sommer, J. Wong, Moxtek, Inc., USA
- S-13 X-ray Tomography Using Thin Scintillator Films**
K.E. Kuper, Budker Institute of Nuclear Physics, Russia
- F-29 Silicon Drift Detectors with Improved High Throughput Performance**
M. Zhang*, S. Barkan, J. Wang, V.D. Saveliev, L. Feng, B. Goolsby, E.V. Damron, Hitachi High-Technologies Science America, USA
- F-33 Optimizing X-ray Small Compact X-ray Sources for Handheld XRF**
S. Cornaby, K. Kozaczek, S. Kamtekar, Moxtek, Inc., USA
- F-34 Verification of Wire-Grid Polarizer Coatings Using XRF**
R. Creighton, S. Cornaby, J. Pierce, J. Van Wagoner, S. Kamtekar, J. Rice, B. Naseath, B. Olson, B. Zundel, F. Lane, L. Mounteer, D. Bunting, J. Despain, D. Hammond, Moxtek, Inc., USA
- F-37 Optimization of Background Fitting Using Multi-Elemental Reference Materials for XRF Analysis of Air Samples**
S. Yarkin*, K. Trzepla, W. White, N. Hyslop, University of California, Davis, USA
A. Jonkers, Malvern Panalytical, The Netherlands
- F-38 Determination of EDXRF Detection Limits of Air Samples with Custom Low-Loaded Multi-Elemental Reference Materials**
K. Trzepla*, S. Yarkin, W. White, N. Hyslop, University of California, Davis, USA
- F-40 QSTR Studies of Fo... atives**
F. Mansilla-Koblavi... Félix Houphouët Boigny Cocody Abidjan, Côte d'Ivoire
- F-41 Combined XRR-GIXRF Analysis at SOLEIL**
Y. Ménesguen, M.C. Lépy*, CEA\LNHB, France
W.W. Batista-Pessoa, S. Torrenço, E. Nolot, CEA\LETI, France
- F-43 Determinations of the K and L₃ Fluorescence Yields of Gallium in GaSe with Low Uncertainties**
R. Unterumsberger, P. Hönicke, M. Wansleben, M. Müller, B. Beckhoff, Physikalisch-Technische Bundesanstalt, Germany
- F-47 Polycapillary X-ray Optics with Optimized High Energy Performance for μ XRF Analysis**
J. Sachs*, N. Gao, XOS, USA
J. Choi, R. Magyar, Bowman XRF, USA
- F-49 Measure Low Concentrations of Sulfur and Chlorine by MWDXRF**
X. Zhang, F. Wei, Z.W. Chen, XOS, USA
- F-62 Characterization of Trace Impurities in 3D Printed Recycled ABS Materials**
Y. Schneider, G. Strossman, EAG Laboratories, USA
O. Keles, A. Cress, San Jose State University, San Jose, USA
- F-64 Correlation Between XRD Phase Analysis of EAF Slag and Heavy Elements Releasing in Water**
A. Riboldi, L. Borgese*, L.E. Depero, INSTM and University of Brescia, Italy

Post Deadline:

- F-67 The Submicro-X-ray Fluorescence Setup on the B16 Beamline at Diamond Light Source**
M. Rauwolf, A. Turyanskaya*, D. Ingerle, C. Strelt, Atominstut, TU Wien, Austria
N. Szoboszlai, Eotvos Lorand University, Hungary
I. Pape, A.W. Malandain, O.J.L. Fox, K.J.S. Sawhney, Diamond Light Source Ltd, UK
L. Hahn, Karlsruhe Institute of Technology (KIT), Germany
- F-71 Detection of Gadolinium Accumulation in Bone by XRF**
A. Turyanskaya, M. Rauwolf, V. Pichler, P. Wobrauschek, C. Strelt*, TU Wien, Atominstut, Austria
T. Grünwald, M. Burghammer, European Synchrotron Radiation Facility, France
O.J.L. Fox, I. Pape, K.J.S. Sawhney, Diamond Light Source Ltd, UK
J.G. Hofstaetter, Orthopaedic Hospital Vienna-Speising, Austria
A. Roschger, P. Roschger, Ludwig Boltzmann Institute of Osteology at the Hanusch Hospital of WGKK and AUVA Trauma Centre Meidling, Austria

- F-72** **Dual Energy Band Excitation for High Z and Low Z Elements by one Multilayer as Spectral Modifier**
J. Prost*, P. Wobrauschek, C. Streli, Atominstitut, TU Wien, Austria
- F-73** **Total-Reflection X-ray Fluorescence Analysis (TXRF) of Airborne Particulate Matter at Atominstitut – Overview of Recent Activities**
J. Prost*, P. Kregsamer, P. Wobrauschek, C. Streli, Atominstitut, TU Wien, Austria
- F-74** **Spatially Resolved In Situ Measurements of the Ion Distribution Near the Surface of Electrode with Confocal Micro X-ray Fluorescence**
X. Zhang*, X. Sun, Y. Wang, T. Sun, Beijing Normal University, China and Beijing Radiation Center, China
- F-76** **Variation in the Precipitation of Metal Ions in Standard Water at Different Analytical Conditions**
S. Verma*, B.P. Mohanty, A. Kumar, Panjab University, India
- F-77** **Evaluation Summary of Malvern Panalytical Epsilon EDXRF with Fingerprint Application for Screening Various Sheet Glass Compositions**
E. Fanning*, A. Nached, Corning Research and Development, USA
- F-78** **How Does Homogeneity Affect Micro-XRF on Certified Reference Materials?**
F. Reinhardt*, R. Tagle, Bruker Nano GmbH, Germany
S. Nordstad, µ-Standards, Germany
- F-79** **Green Chemistry with MWDXRF: Np Determination without Chemical Reagents**
K. McIntosh, Los Alamos National Laboratory, USA
- F-80** **Simultaneous Acquisition of Crystal Fabric Orientation and Chemical Distribution with the Bruker M4 Tornado microXRF**
T. Hill*, Bruker AXS, USA
Y. Gao, University of Texas-San Antonio, USA

Plenary Session – Wednesday Morning, 8 August

9:00 am – 11:30 am

Standley I & II

Minerals and Gems

Chair: T. Blanton, International Centre for Diffraction Data, USA

9:00 **T. Fawcett**, Chairman of the Denver X-ray Conference, Emeritus ICDD, USA

2018 Birks Award presented to **Christina Streli**, TU Wien, Atominstitut, Austria. Presented by **M.A. Zaitz**, IBM, USA, Chairman of the Birks Award Selection Committee.

2018 Jerome B. Cohen Student Award winner to be announced by Chairman of the Cohen Award Selection Committee, **I.C. Noyan**, Columbia University, USA

2018 Robert L. Snyder Student Awards to be announced by **T. Blanton**, Executive Director, ICDD, USA

Remarks by the Plenary Session Chair, **T. Blanton**.

Invited Talks

- 9:30 P-1 Using X-ray Diffraction to Elucidate Source Materials and Firing Conditions of Pompeian Ceramics
D. Bish*, Indiana University, USA
M. Mercurio, C. Grifa, C. Germinario, A. Langella, Univ. degli Studi del Sannio, Italy
A. De Bonis, V. Morra, P. Cappelletti, Univ. degli Studi di Napoli Federico II, Italy
- 10:15 Break
- 10:45 P-2 Collaborative Mineralogical Research in Museums
A.J. Celestian, Natural History Museum of LA, USA
- P-3 New XRD **WITHDRAWN** Mineralogy
S. Hillier, Swedish University of Agricultural Sciences, Sweden

Oral Sessions, Wednesday Afternoon, 8 August

**Signifies presenting author, when noted*

New Developments in XRD & XRF Instrumentation I

Standley I

Chairs: **T. Fawcett**, Emeritus, ICDD, USA, dxcfawcett@outlook.com

A. Drews, Ford Motor Company, USA, adrews@ford.com

- | | | |
|------|------|---|
| 1:45 | S-10 | KETEK's New SDD Generation
M. Fraczek* , F. Dams , R. Fojt , L. Höllt , M. Hofmann , J. Knobloch , N. Miyakawa , A. Pahlke , J. Rumpff ,
O. Scheid , KETEK GmbH, Germany |
| 2:00 | S-5 | Laboratory Source Developments for High Resolution X-ray Microscopy for Higher Throughput, Higher Data Quality and Energy Tunability
M. Feser , R. Ruth , R. Loewen , J. Kasahara , M. Gifford , Lyncean Technologies, Inc., USA |
| 2:15 | S-14 | Improved XRF Detector System for High Resolution Spectroscopy in Ambient Air Conditions
H. Schmidt , H. Soltau , A. Niculae , A. Liebel , R. Lackner , D. Steigenhöfer , M. Kopetzky , B. Talbi ,
PNDetector GmbH, Germany |
| 2:30 | S-26 | Claisse® LeDoser-12™ Instrument: How to Save 90% of the Weighing Time in Sample Preparation by Fusion
C. Audet , Claisse, a Malvern Panalytical brand, Canada |
| 2:45 | S-40 | True Submicron Resolution X-ray Microscopy of Soft Materials
A. Takase , T.F. McNulty* , Rigaku Americas Corporation, USA |
| 3:00 | | Break |
| 3:30 | S-9 | DDM, the new RIR?
T. Degen* , E. Bron , M. Sadki , Malvern Panalytical, The Netherlands |
| 3:45 | S-11 | X-ray Nano Computed Tomography Systems and Applications in the Laboratory
D. Murer* , T. Donath , DECTRIS Ltd., Switzerland
E. Espes , T. Tuohimaa , Excillum, Sweden
Ch. Fella , S. Zabler , Fraunhofer IIS, Germany
S. Ferstl , Technical University Munich, Germany |
| 4:00 | S-15 | A New Laboratory Diffractometer for Fast PDF Data Collection
T. Hartmann , Stoe & Cie GmbH, Germany |
| 4:15 | S-29 | EIGER2 R 500K for the D8 Family
J. Giencke* , B. Jones , N. Henderson , S. Rodesney , Bruker AXS, USA |
| 4:30 | S-41 | Product Developments for ICDD® 2019 Powder Diffraction File™ Software
J. Blanton* , R. Vithayathil , C. Karumuhinzi , T. Blanton , S. Kabekkodu , S. Gates-Rector , R. Papoular ,
International Centre for Diffraction Data, USA |

Microcalorimeter Detectors & Applications

Standley II

Chair: **J. Ullom**, National Institute of Standards & Technology, USA, joel.ullom@nist.gov

- | | | |
|------|------|--|
| 1:00 | | Invited - Resonant X-ray Scattering From Stripe Order in $\text{La}_{2-x}\text{Ba}_x\text{CuO}_4$ Using a TES Detector
P. Abbamonte , University of Illinois at Urbana-Champaign, USA |
| 1:30 | S-7 | Invited - Full Chemical Composition Characterization: The Promise of Microcalorimeter Detectors for X-ray Spectroscopy
G.J. Havrilla* , K. McIntosh , M. Croce , M. Rabin , Los Alamos National Laboratory, USA
F. Vila , University of Washington, USA
M. Carpenter , R. Cantor , Star Cryoelectronics, USA |
| 2:00 | S-8 | A General System for Processing X-ray Microcalorimetry Pulses into Spectra
T. Jach , National Institute of Standards & Technology, USA
S. Thurgate , Murdoch University, Perth WA, Australia |
| 2:20 | S-32 | Table-top Ultrafast X-ray Spectroscopies using a Laser Plasma X-ray Source and Microcalorimeter Sensors
L. Miaja-Avila , G. O'Neil , Y. Il-Joe , D. Swetz , R. Jimenez , J. Ullom , NIST, USA |

2:40	S-33	Realizing the Potential of TES Microcalorimeters for X-ray and Gamma Ray Science at Light Sources K. Morgan , National Institute of Standards and Technology, USA
3:00		Break
3:30	S-39	Invited - Ultrasensitive Probing of Local Electronic Structure in the Soft X-ray Regime D. Nordlund , SLAC National Accelerator Laboratory, USA
4:00	S-34	Thermal Kinetic Inductance Detectors: Highly Multiplexible Micro-Calorimetric Detectors Not Only for X-ray Imaging Spectroscopy G. Ulbricht * , Dublin Institute for Advanced Studies, Ireland B.A. Mazin, M. Daal , University of California Santa Barbara, USA
4:20	S-35	A Large-scale Demonstration of TES Microcalorimeters: The SLEDGEHAMMER Gamma-ray Spectrometer D.T. Becker* , J.A.B. Mates, J. D. Gard, A. Wessels, J.N. Ullom , University of Colorado, USA D.A. Bennett, J.W. Fowler, G.C. Hilton, C.D. Reintsema, D.R. Schmidt, P. Szypryt, L.R. Vale, J.N. Ullom , National Institute of Standards and Technology, USA M. Croce, A.S. Hoover, K.E. Koehler, M.W. Rabin , Los Alamos National Laboratory, USA
4:40	S-37	A Cryogen-Free Microcalorimeter Spectrometer for Ultrahigh-Resolution X-ray Microanalysis R. Cantor , STAR Cryoelectronics LLC, USA H. Naito , HKN Inc., USA

Non-Ambient

Cotton Creek

Chair: **S.T. Misture**, NYS College of Ceramics at Alfred University, USA, misture@alfred.edu

1:50	D-54	Invited - Challenges and Rewards Using High-Temperature Diffraction E.A. Payzant , Oak Ridge National Laboratory, USA
2:20	S-24	Oxygen Storage Properties and Structural Evolution of AFe_2O_4 (A= Lu, Y, Yb, In) Under Chemical Looping Conditions R. Jayathilake* , B. Levitas, E. Rodriguez , University of Maryland, USA
2:40	D-57	Influence of Processing Conditions on Dehydration Kinetics - Use of Non-ambient XRD to Monitor <i>in situ</i> Phase Transformations S. Thakral , University of Minnesota, USA J. Garcia-Barriocanal , University of Minnesota, USA
3:00		Break
3:30	D-5	Invited - <i>In situ</i> Neutron Diffraction Studies: Crystal Growth and Ion Exchange H. zur Loye* , D. Abeyasinghe , University of South Carolina, USA A. Huq , Oak Ridge National Laboratory, USA
4:00	D-13	Temperature-dependent X-ray Diffraction of Single-crystal, Epitaxial Films A.M. Kiefer* , C.J. Reyner, B.B. Claflin , Air Force Research Laboratory, USA S.A. Chastang, G.J. Grzybowski , KBRwyle, USA
4:20	D-17	<i>In-situ</i> , Non-ambient Method Development for the Solid State Form Identification of Drug Substance in Drug Product D. Lievano , GSK, USA
4:40	D-63	<i>In-situ</i> XRD and SEM Study of Ni Colloid Formation from Ni Spinel Oxides A.C. Ladonis* , B.E. Hill, M. Hall, R. Koch, S.T. Misture , Alfred University, USA

Industrial Applications of XRF

Meadowbrook

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

1:40	F-25	The Silver Cube Analyser - A High Accuracy On-line Elemental Analyser J. O'Dwyer* , G. Roach, Y. Van Haarlem, J. Masters , CSIRO, Australia J. Tickner , CSIRO, Cryos Corp., Australia
2:00	F-56	Low Cost Online Real Time Metal Analysis during Pharmaceutical Manufacturing M. Garcia, N. Kumar , UHV Technologies, Inc., USA
2:20	F-54	Does Size Matter? Can Portable XRF be used for Process Control? M. Loubser , GeoMag GeoChem, South Africa

2:40	F-42	Using XRF to Analyse Impure Gold and Silver (doré) M. Hinds , Royal Canadian Mint, Canada
3:00		Break
3:30	F-18	Total Quantification of Mg Alloys by X-ray Fluorescence Spectrometry W. Matsuda* , A. Morikawa , T. Moriyama , Rigaku Corporation, Japan A. Ohbuchi , Applied Rigaku Technologies, Inc., USA T. Nakamura , Meiji University, Japan
3:50	F-22	Optimizing the Mineralogy of a Petroleum Reservoir by Combining Mineral and Elemental Measurements M. Ammar* , Y. Rocher , E. Colombel , J. Breviere , Schlumberger Geoservices, France
4:10	F-53	Comparative Study of Chlorine Content Determination in Printed Circuit Boards using a Benchtop XRF and a Handheld XRF F. Bogani* , A.R. Wilson , E.C. Gates , Intel Corporation, USA
4:30	F-35	X-ray Fluorescence and Raman Spectroscopy Data Fusion for Analysis of Duct Tapes: Intra Roll and Inter Product Correlations S. Mamedov , HORIBA Scientific, USA

Oral Sessions, Thursday morning, 9 August

**Signifies presenting author, when noted*

New Developments in XRD/XRF Instrumentation II

Standley I

Chairs: **T. Fawcett**, Emeritus, ICDD, USA, dxcfawcett@outlook.com

A. Drews, Ford Motor Company, USA, adrews@ford.com

9:00	S-30	X-ray Diffraction Beamlines in the Brockhouse Sector at the Canadian Light Source B. Moreno* , N. Appathurai , A. Leontowich , A. Gomez , D. Muir , G. King , B. Yates , Canadian Light Source, Canada B. Meyer , Brazilian Synchrotron Light Laboratory, Brazil A. Gomez , S. Kycia , University of Guelph, Canada
9:15	S-27	Development of a Miniature X-ray Emission Spectrometer (miniXES) for Simultaneous Multi-Color Emission Studies of the Non-Resonant X-ray Emission Spectroscopy (XES) , and Sequential Resonant XES for Multiple Edges/Elements C. Sun* , S. Heald , Argonne National Laboratory, USA R. Gordon , Simon Fraser University, Canada
9:30	S-36	AreX Light: A Benchtop Solution to Retained Austenite Determination G. Siviero* , L. Seralessandri , G.N.R.S.R.L., Italy
9:45	S-21	The Second Generation of the PROTO AXRD Benchtop Diffraction System N. Vukotic* , S. Veinberg , PROTO, Canada
10:00		Break
10:30	S-25	Development of a Large-Format Mapping XRF System A. Drews* , A. Sharafi , W. Paxton , M. Jagner , Ford Motor Company, USA
10:45	S-12	Advanced Pulse Processing Techniques for Energy Dispersive X-ray Photon Science P. Scoullar , Southern Innovation, Australia
11:00	S-16	Improving Detectors for X-ray Spectroscopy R. Redus* , A. Huber , R. Dubay , Amptek, Inc., USA
11:15	S-18	Moxtek's Developments in Compact X-ray Sources S. Cornaby* , T. Parker , R. Steck , B. Harris , K. Kozaczek , C. Smith , E. Miller , S. Kamtekar , Moxtek Inc., USA

Rietveld

Standley II

Chair: **J. Kaduk**, Poly Crystallography, Inc. and Illinois Institute of Technology, USA, kaduk@polycrystallography.com

- 9:00 D-55 Invited - Rebuilding POWGEN: World's Only Third Generation TOF Powder Diffractometer
A. Huq, Oak Ridge National Laboratory, USA
- 9:30 D-47 Quantification of Correlated Disorder in Alloy Systems Through Complex PDF Modelling
R. Koch, Alfred University, USA
- 9:50 D-56 Chemical Short-Range Order in Hollandite Type Phases for Nuclear Waste Form Applications
R. Koch, S.T. Misture, Alfred University, USA
J. Amoroso, Savannah River National Laboratory, USA
K. Brinkman, Clemson University, USA
- 10:10 Break
- 10:40 D-36 Structural and Texture Refinement of XRD Data of Fluid Catalytic Cracking Catalysts: A Prerequisite Results Requirement to Predict the Steaming Effect on Catalytic Performance
H. Sitepu*, **S. Al-Bogami**, **R.A. Al-Ghamdi**, **N.M. Al-Yami**, Research & Development Center, Saudi Aramco, Saudi Arabia
- 11:00 D-61 Comparison of Rietveld-Compatible Structureless Fitting Analysis Methods for Accurate Quantification of Carbon Dioxide Fixation in Ultramafic Mine Tailings
C.C. Turvey*, **S.A. Wilson**, **J.L. Hamilton**, Monash University, Australia
S.A. Wilson, University of Alberta, Canada
J.L. Hamilton, **J. McCutcheon**, **G. Southam**, The University of Queensland, Australia
J. McCutcheon, The University of Leeds, United Kingdom
G.M. Dipple, The University of British Columbia, Canada
- D-18 Qualitative and Quantitative Mineralogical Analysis of Volcanic Ash Blended Cement Using XRF and XRD
A. Joseph*, **S. Al-Bahar**, Kuwait Institute for Scientific Research, Kuwait
- 11:20 D-26 Quantitative Phase Analysis of Samples Containing Low Crystallinity Components by Using the Direct Derivation Method
H. Toraya, Rigaku Corporation, Japan

Trace Analysis Including TXRF

Cotton Creek

Chair: **L. Borgese**, University of Brescia, Italy, laura.borgese@unibs.it

- 9:00 F-30 Invited - Trace Elements Analyses with Synchrotron Radiation Induced X-ray Fluorescence
D. Eichert, Elettra - Sincrotrone Trieste, Italy
- 9:30 F-57 Invited - Determination of Gas-Phase Mercury Using TXRF
U.E.A. Fittschen*, TU Clausthal, Germany
S. Boettger, TU Clausthal and Europa Universität Flensburg, Germany
- 10:00 F-36 TXRF- A Critical Tool to Cleaning Success of NASA Genesis Solar Wind Samples
M. Schmeling*, Loyola University Chicago, USA
J.H. Allton, NASA Johnson Space Center, USA
A.J.G. Jurewicz, Arizona State University, USA
D.S. Burnett, California Institute of Technology, USA
- 10:20 Break
- 10:50 F-12 New Sample Preparation for TXRF Analysis Using Resist Pattern Layer
K. Tsuji*, **T. Furusato**, **N. Yomogita**, Osaka City University, Japan
- 11:10 F-28 X-ray Fluorescence Spectrometry Beamline at Elettra Sincrotrone Trieste: Perspectives for Trace Element Analysis in Material Science and Environmental Applications
M. Czyzycki*, **I. Bozicevic-Mihalic**, **G. Aquilanti**, Elettra-Sincrotrone Trieste, Italy
A.G. Karydas, **J.J. Leani**, **A. Migliori**, **J. Osan**, **M. Bogovac**, **P.M. Wrobel**, **M. Sibilia**, **I. Darby**, **R.B. Kaiser**, International Atomic Energy Agency, Austria
M. Kokkoris, National Technical University of Athens, Greece

Oral Sessions, Thursday afternoon, 9 August

*Signifies presenting author, when noted

Cultural Heritage

Standley I

Chairs: **R. Van Grieken**, University of Antwerp, Belgium, rene.vangrieken@uantwerpen.be
M. Schmeling, Loyola University Chicago, USA, mschmel@luc.edu

- 2:00 F-51 Invited - Scanning X-ray Powder Diffraction Mapping of Painted Works of Art using Cu and Ag Lab Sources: Advantages and Limitations
F. Vanmeert, S. De Meyer, G. Van der Snickt, K. Janssens*, University of Antwerp, Belgium
- 2:30 F-69 Invited – Analysis of Heterogeneous Samples and Simple Stratigraphies using X-ray Fluorescence
S. Pessanha*, Universidade Nova de Lisboa, Portugal
J.M. Sampaio, Laboratory for Instrumentation and Experimental Particle Physics, Portugal
- F-58 Invited - Travelling through Space and Time: A Novel MA-XRF Imaging Method for Separating Sources of Chemical Information in Large Works of Art
G. Pastorelli*, E. Pouyet*, University/Art Institute of Chicago, USA
N. Rohani, O. Cossairon*, University, USA
K. Smith, K. Eremin, Harvard Art Museums/Straus Center for Conservation, USA
- 3:00 Break
- 3:30 F-21 A New Tool for Cultural Heritage: High Speed, Simultaneous XRD-XRF Mapping with the Color X-ray Camera
J. Davis*, J. Schmidt, M. Huth, H. Soltau, PNDetector, GmbH, Germany
R. Hartmann, L. Strüder, PNSensor, GmbH, Germany
- 3:50 D-22 Diffractometric Analysis as a Toll for an Early-Byzantine Stone Tesserae Origin, on the Example of a Mosaic from the Basilica in Chhim (Lebanon)
A. Tomkowska*, Academy of Fine Arts in Warsaw, Poland
M. Ruszkowski, University of Warsaw, Poland

General XRD

Standley II

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

- 2:00 D-20 Invited - Implementation of the Self-consistent Kröner-Eshel by Model for the Calculation of X-ray Elastic Constants for any Crystal Symmetry
A. Vermeulen*, N. Norberg, Malvern Panalytical, Netherlands
C. Kube, Bennett Aerospace, USA
- 2:30 D-4 The Kepler Tiling as the Oldest Complex Surface Structure in History: X-ray Analysis of a Two-Dimensional Oxide Quasicrystal Approximant
H.L. Meyerheim*, S. Roy, K. Mohseni, Max-Planck-Institut fuer Mikrostrukturphysik, Germany
S. Förster, F. Schumann, M. Trautmann, E.M. Zollner, W. Widdra, Martin-Luther-Universität Halle-Wittenberg, Germany
- 2:50 D-37 Crystal Structure, Texture and Phase Composition of Metal Orthovanadates and Nickel Vanadates Investigated by XRD and the Rietveld Method
H. Sitepu*, A. Akah, T. Inan, R.A. Al-Ghamdi, Saudi Aramco, Saudi Arabia
- 3:10 Break
- 3:30 D-62 Machine Learning Tools for Diffraction Data Analysis
M. Ragni, P. Bosetti, M. Leoni*, University of Trento, Italy
- D-19 Synthesis and Characterization of Alloys
J. Menghani*, S. K. Jha, IIT Bombay, India
- 3:50 D-7 Healing X-ray Scattering Images
J. Liu*, J. Lhermitte, Y. Tian, Z. Zhang, K. Yager, Brookhaven National Laboratory, USA
D. Yu, Brookhaven National Laboratory and New Jersey Institute of Technology, USA
- 4:10 D-41 Alternative Concepts for Beam Monochromatization
D. Beckers*, M. Gateshki, D. J. Götz, Malvern Panalytical, The Netherlands

Advanced Fundamental Parameters

Cotton Creek

Chair: **J. Ullom**, National Institute of Standards & Technology, USA, joel.ullom@nist.gov

- 2:00 F-32 Invited - Advances in SI-Traceable Wavelength Metrology
C.I. Szabo*, Theiss Research and NIST, USA
L.T. Hudson, M.H. Mendenhall, A. Henins, J.P. Cline, NIST, USA
- 2:30 F-50 Invited - The Use of Fundamental Parameters in XRF – An Industry Perspective
B. Vrebos*, **P. Brouwer**, Malvern Panalytical, The Netherlands
- 3:00 Break
- 3:30 F-39 New Measurements of X-ray Mass Attenuation Coefficients
Y. Ménesguen, M.-C. Lépy*, CEA, France
B. Beckhoff, PTB, Germany
- 3:50 F-45 Atomic Fundamental Parameter Determinations at PTB using Well-Known Synchrotron Radiation and Calibrated Instrumentation
B. Beckhoff*, **P. Hönicke, I. Holfelder, Y. Kayser, M. Kolbe, J. Lubeck, M. Müller, B. Pollakowski-Herrmann, R. Unterumsberger, J. Weser**, Physikalisch-Technische Bundesanstalt (PTB), Germany
- 4:10 F-52 Superconducting Microcalorimeters for X-ray Spectroscopy
J. Fowler, NIST Boulder Labs, USA
- 4:30 F-65 High-Precision Reference-Free Measurements of Soft X-ray Transitions with a Double Crystal Spectrometer
J. Machado*, Universidade Nova de Lisboa, Portugal and Sorbonne Université, France
J.P. Santos, P. Amaro, M. Guerra, Universidade Nova de Lisboa, Portugal
J.M. Isac, P. Indelicato, Sorbonne Université, France
C.I. Szabo, Theiss Research and NIST, USA
A. Gumberidze, GSI Helmholtzzentrum für Schwerionenforschung, Germany
G. Bian, Sorbonne Université, France and Sichuan University, China

General XRF

Meadowbrook

Chairs: **U.E.A. Fittschen**, TU-Clausthal, Germany, ursula.fittschen@tu-clausthal.de

- 2:00 F-9 Invited - XRF: Capabilities for Analytical Problem Solving
G. Havrilla, Los Alamos National Laboratory, USA
- 2:30 F-13 Invited - Applications of XRF and XRD for the Characterization of Coal Fly Ash for Use in Construction Products
A. Joshi*, **E.I. Diaz-Loya, C. Sieg, R. Minkara**, Boral Resources, USA
- 3:00 Break
- 3:30 F-55 Fast X-ray Sorting for Recycling Light Metals: A Low Cost High Throughput In-Line X-ray Fluorescence Scrap Metal Sorter
M. Garcia*, **N. Kumar**, UHV Technologies, Inc., USA
- 3:50 F-17 Inclusion of the Radiative Auger Effect X-ray Emission Spectra in Fitting K-spectra of Elements in the Range Z = 26-35
B. Ganly*, **S. Peacock, Y. Van Haarlem**, CSIRO, Australia
S. Hughes, University of Wollongong, Australia
- 4:10 F-14 Solid Analysis Techniques to Monitor Metals in Plastic Packaging for Pharmaceuticals
S. Wood*, **L. Breckenridge, N. Lewen**, Bristol-Myers Squibb, USA
- 4:30 F-59 Using Wavelength-Dispersive X-ray Fluorescence (WD-XRF) as a Walkup, High-throughput Alternative to Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES) for R&D Pharmaceutical Elemental Impurity Applications
T.M. Brucker*, **E.J. Borsje, H.T. Rasmussen**, Vertex Pharmaceuticals, Inc., USA
- 4:50 F-70 Elemental Analysis of Inorganic Fertilizers using Portable X-ray Fluorescence (pXRF)
G.E. Acquah*, **C.L. Thomas, J. Hernandez, S.J. Durham, S.M. Haefele, S.P. McGrath**, Rothamsted Research, UK
E. Towett, K. Shepherd, World Agroforestry Centre, Kenya

Oral Sessions, Friday morning, 10 August

**Signifies presenting author, when noted*

Imaging

Meadowbrook

Chairs: **K. Tsuji**, Osaka City University, Japan, tsuji@chem.eng.osaka-cu.ac.jp
F. Meirer, Utrecht University, The Netherlands, f.meirer@uu.nl

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| 8:30 | S-6 | Invited - Novel Reflective Optics and Systems for Hard X-ray Microscopy
K. Yamauchi , Osaka University, Japan |
| 9:00 | S-17 | Liquid-Metal-Jet and High-Resolution X-ray Source Technology for Imaging
J. Hallstedt, O. Hemberg, G. Johansson, B. Hansson , Excillum AB, SWEDEN
A. Adibhatla , Excillum Inc, USA |
| 9:20 | S-19 | 120 kV & 5 Watt Compact X-ray Source
E. Miller, S. Cornaby, G. Smith, R. Steck, B. Harris, K. Kozaczek, S. Kamtekar , Moxtek Inc., USA |
| 9:40 | | Break |
| 10:00 | S-38 | Invited - X-ray Microfluorescence Imaging of Samples from Deep Earth to Interstellar Space
L. Vincze , Ghent University, Belgium |
| 10:30 | S-20 | Invited - Spectro-microscopy and Nano-tomography with Transmission X-ray Microscopy
J. Nelson Weker , SLAC National Accelerator Laboratory, USA |
| 11:00 | S-22 | 3D Imaging of Geological Materials using X-ray Diffraction and Spectroscopy
M.K.A. Koker*, M. Newville, A. Lanzirotti , GSECARS, University of Chicago, USA |

Advanced Methods

Standley I

Chairs: **T.R. Watkins**, Oak Ridge National Laboratory, USA, watkinstr@ornl.gov
M.A. Rodriguez, Sandia National Laboratory, USA, marodri@sandia.gov

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| 8:30 | D-73 | Invited - Residual Stress Measurements in Additively Manufactured Stainless Steel Valve Housing
B. Clausen*, D.W. Brown , Los Alamos National Laboratory, USA
J.E. Bishop, K. Johnson, B. Jared, K. Allen, D. Balch, A. Roach , Sandia National Laboratory, USA |
| 9:00 | D-39 | Invited - Bulk Texture Measurements with the Neutron Time-of-Flight Diffractometer HIPPO
S.C. Vogel , LANL, USA |
| 9:30 | D-33 | Depth-Resolved Monochromatic Nanobeam X-ray Diffraction for Evaluation of Local Strain in Single Crystalline Samples using Differential Aperture Method
Y. Imai*, K. Sumitani, S. Kimura , Japan Synchrotron Radiation Research Institute (JASRI), Japan
K. Shida, S. Takeuchi, A. Sakai , Osaka University, Japan |
| 9:50 | D-21 | The Gandolfi Stage: A Novel Approach for the Analysis of Single Crystals and Small Volume Samples
G. Schmidt , Thermo Scientific, USA |
| 10:10 | | Break |
| 10:30 | S-28 | Invited - Use of XRD and PDF Analysis to Define the Roles of Defects in Electrochemical Charge Storage
S. Misture*, R. Koch, P. Metz, M. Flint, P. Gao , Alfred University, USA |
| 11:00 | S-31 | In Operando Characterization of Li-Ion Battery Materials
S.N. Rodesney*, N. Yang, N. Henderson, J. Giencke, B. Jones , Bruker AXS, Inc., USA |
| 11:20 | D-35 | Microstructural Properties of Plutonium Oxalates and Oxides as a Function of Processing Conditions
L. Sweet*, J. Corbey, A. Casella, M. McCoy, K. Pitts , Pacific Northwest National Laboratory, USA
M. Leoni , University of Trento, Italy |
| 11:40 | D-75 | Atomic-level Perspective on the Functionality of Nanoalloy Catalysts Inside Operating Fuel Cells by Combined in Operando High Energy X-ray Spectroscopy and Total Scattering
Y. Maswadeh , Central Michigan University, USA |

Industrial Applications of XRD

Standley II

Chair: **I.C. Noyan**, Columbia University, USA, icn2@columbia.edu

- 8:30 D-53 Invited - Quantitative XRD & XRF Analyses: Unified and Simplified
F.H. Chung, Sherwin-Williams Research Center, USA
- 9:00 D-38 Quantitative Phase Analysis of XRD Data of Sludge Deposits from Refineries and Gas Plants by Use of the Rietveld Method
R.A. Al-Ghamdi*, **H. Sitepu**, Saudi Aramco, Saudi Arabia
- 9:20 D-28 XRD Analysis of Illite-Smectite Interstratification in Clays from Oil Sands Ores
B. Patarachao*, **D.D. Tyo**, **A. Zborowski**, **J. Kung**, **P.H.J. Mercier**, National Research Council, Canada
S. Ng, Syncrude Canada Ltd., Canada
- 9:40 D-46 Quantification of Cement Phases and Cement Replacement Materials by Rietveld Refinement Starting from Hydrated Cement Phases in Non-Ambient Conditions
S.T. Witzleben*, **K. Walbrück**, Bonn-Rhein-Sieg University, Germany
F. Mundo, University of Palermo, Italy
- 10:00 Break
- 10:20 D-65 Invited - Applications of XRD at Ford Motor Company
W.A. Paxton*, **M. Jagner**, **A. Drews**, Ford Motor Company, USA
- 10:50 D-48 Quantitative Analysis of Pt on Industrially-Relevant Catalyst Supports
E.J. Peterson*, **A. DeLaRiva**, **D. Kunwar**, **G. Canning**, **C.R. Riley**, **A.K. Datye**, The University of New Mexico, USA
- 11:10 D-64 Characterization and Phase Identification of Metals, Alloys, and Corrosion Materials using X-ray Diffraction Techniques and the Powder Diffraction File™
T. Blanton, ICDD, USA
- 11:30 D-68 Characterization of Pharmaceutical Formulations by X-ray Powder Diffraction
T. Fawcett*, Emeritus ICDD, USA
S. Gates-Rector, **A. Gindhart**, **T. Blanton**, **J. Blanton**, ICDD, USA

Quantitative Analysis of XRF

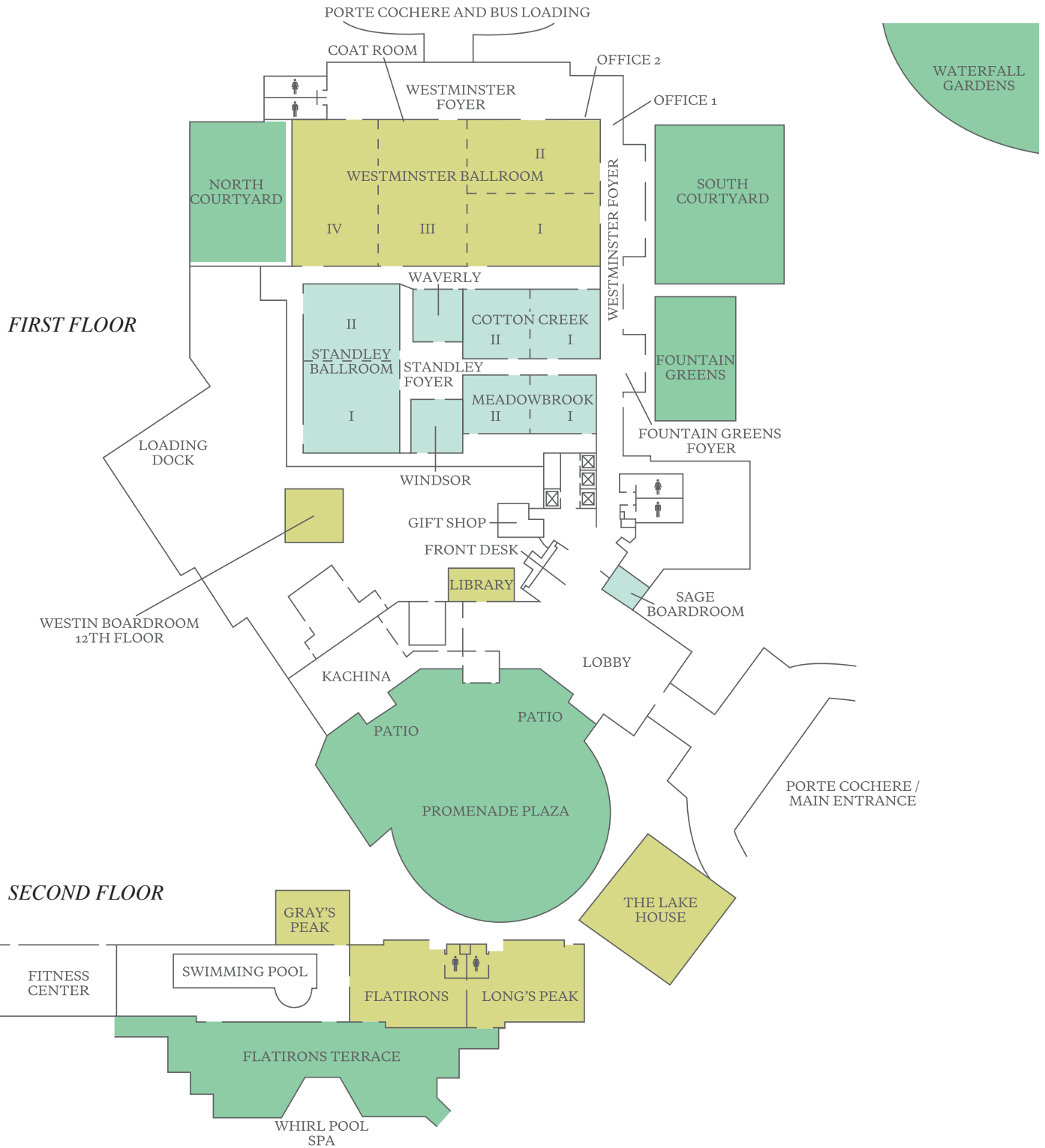
Cotton Creek

Chair: **L. Brehm**, Dow Chemical Company, USA, lbrehm@dow.com

- 8:30 F-63 Invited - A Versatile Fundamental Parameter Software for Quantification in XRF Considering Various Spectral Modification Modes Including X-ray Optics
P. Wobrauschek*, **P. Necker**, **B. Großmayer**, **C. Strelt**, Atominstitut, TU Wien, Austria
- 9:00 F-60 Invited - Evaluating Perspectives from the Past Missions to Shape Future Investigations using the Mars 2020 Planetary Instrument for X-ray Lithochemistry
C.M. Heirwegh*, **A.C. Allwood**, **D.T. Flannery**, **Y. Liu**, Jet Propulsion Laboratory, California Institute of Technology, USA
J.A. Hurowitz, Stony Brook University, USA
B.C. Clark, Space Science Institute, USA
- 9:30 F-44 Hindsight 2020: The Challenges of X-ray Spectroscopy on Mars
R. Gellert, University of Guelph, Canada
- 9:50 F-10 Preparation of Liquid Samples using Nanoimprint Film and Quantitative Analysis of Mineral Component by Fundamental Parameter Method
Y. Konyuba*, **H. Onodera**, JEOL Ltd., Japan
T. Yahagi, Yamagata Research Institute of Technology, Japan
- 10:10 Break
- 10:30 F-27 Invited - Full Spectrum Modeling: Understanding the Matter
T. Wolff*, **F. Reinhardt**, Bruker Nano, Germany
F. Nitsche, Bruker AXS, Germany
D. Docenko, Free consultant, Israel
- 11:00 F-24 Coherent Normalization for *in vivo* Bone Lanthanum XRF Measurements
J. Nguyen, **A. Pejovic-Milic**, **J. Grafe***, Ryerson University, Canada

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| 11:20 | F-31 | <p>Cross and Internal Comparisons: Integrative and Parametric Approaches to X-ray Fluorescence Data Analysis and Processing</p> <p>A.M. Crawford*, G.N. George, I.J. Pickering, University of Saskatchewan, Canada</p> <p>A. Deb, J.E. Penner-Hahn, University of Michigan, USA</p> |
| 11:40 | F-46 | <p>SI Traceable Characterization of Nanomaterials by X-ray Spectrometry</p> <p>B. Beckhoff*, P. Hönicke, I. Holfelder, Y. Kayser, B. Pollakowski-Herrmann, C. Seim, C. Streeck, R. Unterumsberger, M. Wansleben, J. Weser, C. Zech, Physikalisch-Technische Bundesanstalt (PTB), Germany</p> |

FLOOR PLANS



2018 Denver X-ray Conference ♦ Program-at-a-Glance ♦ Monday – Friday ♦ 6 – 10 August

Monday Morning Workshops 9:00 am – 12:00 Noon				
	Meeting Rooms			
	Standley I	Standley II	Cotton Creek (Cotton Creek I & Cotton Creek II when noted)	Meadowbrook
XRD	Material Identification – The good, bad & ugly (Fawcett)			Selecting Software for Rietveld Refinement I (Yakovenko)
XRF		Basic XRF (Anzelmo)	Quantitative Analysis of XRF I (Elam) Cotton Creek I	
Monday Afternoon Workshops 1:30 pm – 4:30 pm				
XRD	Quantitative Phase Analysis (Ryba)	Two-Dimensional Detectors (He/Blanton)		Selecting Software for Rietveld Refinement II (Yakovenko)
XRF			Quantitative Analysis of XRF II (Elam) Cotton Creek I ----- Energy Dispersive XRF (Lemberge) Cotton Creek II	
Monday Evening XRD Poster Session & Reception 5:00 pm – 7:00 pm. (Watkins) Westminster Foyer				
Tuesday Morning Workshops 9:00 am – 12:00 Noon				
Special Topic	Characterization of Thin Films (Hradil)			
XRD		Line Profile Analysis (Leoni)		
XRF			Micro XRF (Zaitz)	Sample Preparation of XRF (Anzelmo)
Tuesday Afternoon Workshops 1:30 pm – 4:30 pm				
Special Topic	Imaging (Vogt)			
XRD		Non-Ambient (Misture)		
XRF			Trace Analysis (Streli/Wobrauschek)	Handheld XRF – The Silver Bullet or Fools Gold? (Loubser)
Tuesday Evening XRF Poster Session & Reception 5:00 pm – 7:00 pm. (Schmeling) Westminster Foyer				
Wednesday Morning Plenary Session, Minerals and Gems Standley I & II, 9:00 am – 11:30 am (Blanton)				
Wednesday Afternoon Sessions				
Special Topic	New Developments in XRD & XRF Instrumentation I (Fawcett)	Microcalorimeter Detectors & Applications (Ullom)		
XRD			Non-Ambient (Misture)	
XRF				Industrial Applications of XRF (Broton)
Wednesday Evening Vendor Sponsored Reception 5:30 pm - 7:00 pm. Exhibit Hall				
Thursday Morning Sessions				
Special Topic	New Developments in XRD & XRF Instrumentation II (Fawcett)			
XRD		Rietveld (Kaduk)		
XRF			Trace Analysis including TXRF (Borgese)	
Thursday Afternoon Sessions				
Special Topic	Cultural Heritage (Van Grieken/Schmeling)			
XRD		General XRD (Murray)		
XRF			Advanced Fundamental Parameters (Ullom)	General XRF (Fittschen/Vaidya)
Friday Morning Sessions				
Special Topic				Imaging (Tsuji/Meirer)
XRD	Advanced Methods (Watkins/Rodriguez)	Industrial Applications of XRD (Noyan)		
XRF			Quantitative Analysis of XRF (Brehm)	