JOINT MEETING

68TH ANNUAL DENVER X-RAY CONFERENCE & THE 25TH INTERNATIONAL CONGRESS ON X-RAY OPTICS AND MICROANALYSIS

5 - 9 August 2019

The Westin Lombard Yorktown Center, Lombard, IL, USA

DXC & ICXOM 2019 Program

Sponsored by:

ICDD® International Centre for Diffraction Data

MDI Materials Data™

BRUKER

Petrick GmbH

Chemplex Industries, Inc. — Making Spectroscopy Work For You!

DECTRIS®

KETEK

PROTO

Specac

Media Sponsors:

Spectroscopy

LCGC north america

DENVER X-RAY CONFERENCE®

www.dxcicdd.com

ICDD® International Centre for Diffraction Data

ISO 9001:2015 Quality Management System Certified by DEKRA Cert. No. 11040901

2019 Denver X-ray Conference Organizing Committee

Tim Fawcett, Chair, Emeritus ICDD, USA, DXCfawcett@outlook.com

John Anzelmo, Anzelmo & Associates, Inc., USA, jaanzelmo@aol.com

Tom Blanton, ICDD, USA, tblanton@icdd.com

Lora Brehm, DuPont, USA, Lora.Brehm@Dupont.com

Don Broton, CTLGroup, USA, dbroton@ctlgroup.com

Terry Maguire, ICDD, USA, maguire@icdd.com

Scott Misture, NYS College of Ceramics at Alfred University, USA, misture@alfred.edu

Conal Murray, IBM T.J. Watson Research Center, USA, conal@us.ibm.com

Cev Noyan, Columbia University, USA, icn2@columbia.edu

Martina Schmeling, Loyola University, Chicago, IL, USA, mschmel@luc.edu

Brian Toby, Argonne National Laboratory, Advanced Photon Source, USA, brian.toby@anl.gov

Thomas Watkins, Oak Ridge National Laboratory, Oak Ridge, TN, USA, watkinstr@ornl.gov

Peter Wobrauschek, Vienna University of Technology, Atominstitut, Austria, wobi@ati.ac.at

Mary Ann Zaitz, IBM, USA, zaitz@us.ibm.com

Denise Zulli, ICDD, USA, zulli@icdd.com

Members Emeritus:

Randolph Barton, Jr., DuPont Co. (retired), USA

Victor Buhrke, USA

W. Tim Elam, University of Washington APL, USA

George Havrilla, Los Alamos National Laboratory, USA

Jim Kaduk, Poly Crystallography Inc. & Illinois Institute of Technology, USA

Greg McCarthy, ND State University (Emeritus), USA

Paul Predecki, University of Denver, USA

Clay Ruud, Penn State University, USA

Rene van Grieken, University of Antwerp, Belgium

ICXOM-25 Advisory Committees

Local Organizing Committee

Ursula Fittschen, (Clausthal University of Technology, DE)

Gerald Falkenberg (ICXOM22, 2013 Hamburg) (DESY, Hamburg, D)

Koen Janssens, (ICXOM15, 1998, Antwerp) (University of Antwerp, B)

Stefan Vogt, (Advanced Photon Source, Argonne National Laboratory, IL, USA)

Christian Stoltenberg, (Clausthal University of Technology, DE)

Denise Zulli, Conference Coordinator (International Centre for Diffraction Data, USA)

International Scientific and Advisory Committee

Koen Janssens, chair (ICXOM15, 1998, Antwerp) (University of Antwerp, B)

Peter Wobrauschek (ICXOM16, 2001, Vienna) (TUWien, A)

Alexandre Simionovici (ICXOM17, 2003, Chamonix) (U. Grenoble, F)

Sultan Dabagov (ICXOM18, 2005, Frascati) (LNFN, Frascati, I)

Shinjiro Hayakawa (ICXOM19, 2007, Kyoto) (University of Hiroshima, J)

Melissa Denecke (ICXOM20, 2009, Karlsruhe, D) (UMIST, Manchester, UK)

Carlos A. Pérez (ICXOM21, 2011 Campinas) (LNLS, Campinas, Br)

Gerald Falkenberg (ICXOM22, 2013 Hamburg) (DESY, Hamburg, D)

Juergen Thieme (ICXOM23, 2015 Brookhaven) (BNL, NY, USA)

Alessandra Gianoncelli (ICXOM24, 2017, Trieste) (ELETTRA, Trieste, I)

ICDD Conference Services Staff:

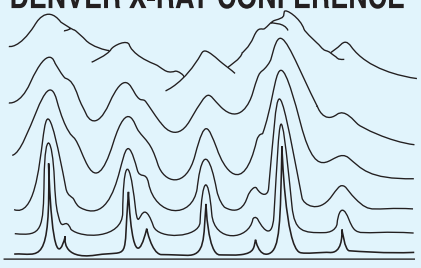
Eileen Jennings
Steph Jennings
Monika Kottenhahn
Terry Maguire
Denise Zulli

ICDD Executive Director:

Tom Blanton

Future Conference: DXC 2020 will visit the East coast for the first time in the conference's nearly 70 year history.

DENVER X-RAY CONFERENCE®



69th Annual Denver X-ray Conference

3-7 August 2020

Bethesda North Marriott Hotel & Conference Center
Bethesda, Maryland, USA

TABLE OF CONTENTS

Exhibitors .....Pages 1-11
- Floor Plan and Exhibit Hours
- Companies and Product Descriptions
- Exhibit Passport Game Card

DXC Program

WORKSHOPS

Monday Morning Workshops....Page 13
- Introduction to X-ray Computed Tomography
- Sample Preparation & Experimental Conditions for XRF/XRD
- Handheld XRF

Monday Afternoon Workshops....Page 14
- High Energy X-ray Diffraction Microscopy
- Basic to Intermediate XRD
- Trace Analysis
- Quantitative Analysis of XRF - Part I

Tuesday Morning Workshops....Page 15
- SAXS Data Reduction and Analysis - Part I
- Rietveld - Part I
- Micro & Energy Dispersive XRF

Tuesday Afternoon Workshops....Page 16
- SAXS Data Reduction and Analysis - Part II
- Rietveld - Part II
- Basic XRF
- Quantitative Analysis of XRF - Part II

POSTER SESSIONS

Monday Evening Poster Session....Pages 17-18
- XRF Posters

Tuesday Evening Poster Session....Pages 19-21
- XRD Posters

ORAL SESSIONS

Tuesday Morning Student Session....Page 22
- Student Presenters - Education in X-ray Analysis

Wednesday Morning Plenary Session....Pages 22-23
- New Approaches in Imaging

Wednesday Afternoon Oral Sessions....Pages 23-25
- New Developments in XRD & XRF Instrumentation – Part I
- Machine Learning Techniques in X-ray Analysis
- SAXS of Advanced Functional Materials
- Food Safety & Agriculture Applications
- Cultural Heritage II - DXC

Thursday Morning Oral Sessions....Pages 25-27
- New Developments in XRD & XRF Instrumentation – Part II
- X-ray and Forensic Investigations
- General XRD – Part I
- Quantitative Analysis of XRF

Thursday Afternoon Oral Sessions....Pages 28-29
- General XRF
- Rietveld
- General XRD – Part II
- Trace Analysis including TXRF

Friday Morning Oral Sessions....Pages 30-32
- Applied and Functional Materials
- Stress/Texture/In Situ
- Pair Distribution Function
- Industrial Applications of XRF

ICXOM-25 Program

Monday Morning Session....Page 35
- X-ray Optics

Monday Afternoon Session....Pages 35-36
- New Detectors and Instrumentation – Part I

Monday Evening Poster Session....Pages 36-39
- ICXOM-25 Posters

Tuesday Morning Session....Pages 39-40
- New Detectors and Instrumentation – Part II

Tuesday Afternoon Session....Page 40
- Advanced XRF and SR Nanoprobes (at ANL)
- Visit APS Beamlines

Wednesday Morning Plenary Session....Pages 40-41
- New Approaches in Imaging

Wednesday Afternoon Sessions....Pages 41-42
- Cultural Heritage I - ICXOM
- Functional Materials

Thursday Morning Sessions....Pages 42-43
- Earth & Environmental Sciences
- Data Analysis – Part I

Thursday Afternoon Sessions....Pages 43-44
- Data Analysis – Part II
- Biological Applications

Hotel Layout: Inside Back Cover

Program-at-a-Glance: Back Cover

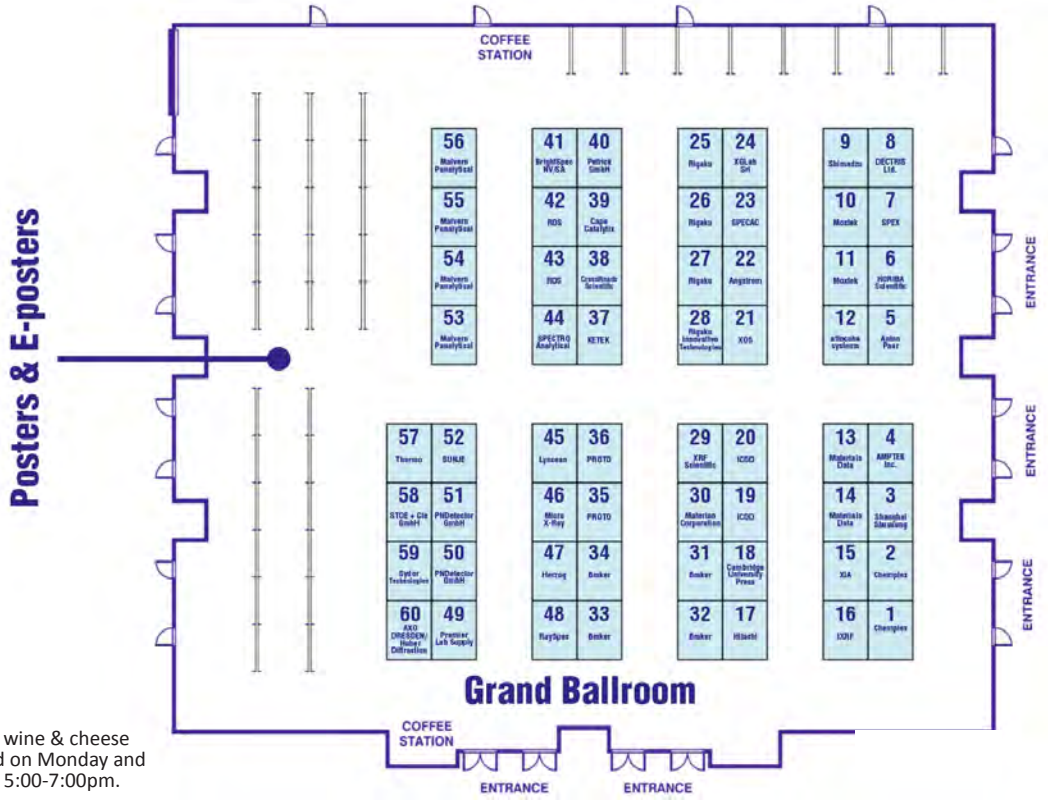
Notes:

2019 Denver X-ray Conference Exhibitors

Exhibit Hours:

- **Monday*,** 5 August: 4:30 pm - 7:00 pm
- **Tuesday*,** 6 August: 12:00 pm - 7:00 pm
- **Wednesday,** 7 August: 12:00 pm - 5:00 pm
- **Thursday,** 8 August: 10:00 am - 2:00 pm

Westin Grand Ballroom



* Poster sessions and wine & cheese receptions will be held on Monday and Tuesday evening from 5:00-7:00pm.

Company	Booth # (s)
AMPTEK Inc.	4
Angstrom, Inc.	22
Anton Paar	5
attocube systems Inc.	12
AXO DRESDEN GmbH / Huber Diffraction Equipment	60
BrightSpec NV/SA	41
Bruker	31, 32, 33, 34
Cambridge University Press	18
Cape Catalytix	39
Chemplex Industries, Inc.	1 & 2
CrossRoads Scientific	38
DECTRIS Ltd.	8
Herzog Automation Corp	47
Hitachi High Technologies Science America Inc.	17
HORIBA Scientific	6
International Centre for Diffraction Data	19 & 20
IXRF Systems, Inc.	16
KETEK GmbH	37
Lyncean Technologies	45
Malvern Panalytical	53, 54, 55, 56
Materials Data	13 & 14
Materion Corporation	30
Micro X-Ray, Inc.	46

Company	Booth # (s)
Moxtek Inc.	10 & 11
Petrick GmbH	40
PNDetector GmbH	50 & 51
Premier Lab Supply	49
PROTO	35 & 36
RaySpec Ltd	48
RDS Instruments & Electronics	42 & 43
Rigaku Americas	25, 26, 27
Rigaku Innovative Technologies	28
Shanghai Shuosong Electronic Technology Co., Ltd	3
Shimadzu Scientific Instruments, Inc.	9
SPECAC Inc.	23
SPECTRO Analytical Instruments	44
SPEX SamplePrep	7
STOE + Cie GmbH	58
SUNJE	52
Sydor Technologies	59
Thermo Fisher Scientific	57
XGLab Srl	24
XIA LLC	15
XOS	21
XRF Scientific Americas Inc	29

Exhibitors

AMPTEK Inc.
Booth: 4
Website: www.amptek.com
Email: amptek.sales@ametek.com

Amptek brings you the highest performing detectors available and in the format you need. This 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 newest 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.

Angstrom, Inc.
Booth: 22
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: 5
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.

attocube systems, Inc.
Booth: 12
Website: www.attocube.com
Email: info@attocube.com

attocube is the technology leader for nano-precise piezo positioning stages and ultra-compact fiber-based laser displacement sensor, compatible with extreme environmental conditions such as ultra-high vacuum, magnetic field, radiation exposure, as well as cryogenic to elevated operating temperatures. The portfolio includes linear, goniometric, rotational piezo stages, and customized precision positioning solutions, as well as a modular interferometer with a broad range of sensor heads, all working with nanometer accuracy.

AXO DRESDEN / Huber Diffraction Equipment
Booth: 60
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), roadband/bandpass multilayer mirrors as well as thin film X-ray fluorescence reference samples.

Brightspec NV/SA
Booth: 41
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. bAxil includes a “hybrid” spectrum fitting engine which provides ultra-fast spectrum analysis; ideal for image scanning applications. BrightSpec also presents Topaz-X, a compact and sophisticated DPP-based MCA for energy dispersive X-ray spectrometry. Our Topaz-X DPP, among many advanced features, implements a fats TLIST and LIST mode of data acquisition with pulse resolution of < 30 nsec.

Bruker
Booths: 31, 32, 33, 34
Website: www.bruker.com
Email: info@bruker.com

Bruker 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, fluorescence and Microtomography systems, including our D8 DISCOVER, D8 ADVANCE, D8 ENDEAVOR, D2 PHASER, S2 PUMA, S6 JAGUAR, S8 TIGER, S2 PICOFOX, M4 TORNADO, S4 TStar and Skyscan MCT. Unique classroom and online trainings complete the Bruker product portfolio.

Cambridge University Press
Booth: 18
Website: www.cambridge.org/academic
Email: information@cambridge.org

Cambridge University Press is a not-for-profit publisher that dates from 1534. We are part of the University of Cambridge and our mission is to unlock people's potential with the best learning and research solutions. Visit our stand to discuss publishing with us, browse our publications and get a 20% discount.

Cape Catalytix
Booth: 39
Website: www.capecatalytix.com
Email: michael.claeys@uct.ac.za

Cape Catalytix (Pty) Ltd was established as a spinoff company of the University of Cape Town. Cape Catalytix (Pty) manufactures patented instrumentation under exclusive license from the University of Cape Town, most notably its in situ X-ray reactor and associated universal controller. The easy to use X-ray reactor can be coupled with laboratory and synchrotron X-ray equipment. The company also produces laboratory-scale catalytic reaction test units, with gas and/ or liquid delivery systems and single or multiple catalytic reactor configurations.

Chemplex Industries, Inc
Booths: 1 & 2
Website: www.chemplex.com
Email: sales@chemplex.com

Chemplex is a leading global provider of Sample Preparation products and has been committed to bringing innovative ideas to the XRF/XRD community for 48 years. Chemplex® manufactures an extensive line of Pellet Presses, Grinding machines and consumables including PelletCups®, Grinding Vials, Sample Cups available in a variety of styles and sizes, Thin-film Sample Support, and our exclusive SpectroMembrane® thin-film carrier frames. We offer a full line of gas and electric Fluxers, Platinum ware and FusionFlux® formulations to support all of your Fusion needs. Chemplex is committed to providing our worldwide users with the highest quality products to achieve consistent results.

CrossRoads Scientific, LLC
Booth: 38
Website: www.crossroadsscientific.com
Email: mhaller@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: 8
Website: www.dectris.com
Email: info@dectris.com

DECTRIS develops and manufactures the most accurate X-ray and electron cameras to spark scientific breakthroughs around the world. While CCD and CMOS cameras capture and integrate X-rays indirectly, DECTRIS hybrid-photon-counting cameras count individual X-ray photons and electrons. Originally developed for synchrotrons, this technology is now tailored for laboratory use.

Herzog Automation Corp
Booth: 47
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: 17
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. We work closely with end-users on design customization. R&D is a major part of HHT-US's capabilities with the recent introduction of the Vortex ME-7 SDD and also the 2mm thick SDD sensor which extends the capabilities of the Vortex SDD to higher energies.

HORIBA Scientific
Booth: 6
Website: www.horiba.com/scientific
Email: info.sci@horiba.com

HORIBA Scientific, world leader in Raman spectroscopy, with over 50 years of history in the technique, provides complete Raman spectroscopy solutions for analytical measurements, research Raman, QC/QA and industrial Raman applications. These include Raman microscopes, bench-top Raman spectrometers, hybrid Raman systems (Raman-AFM/TERS), transmission and modular Raman systems. We are also experts in X-Ray Fluorescence (XRF) micro-analysis. Recent innovations include the MacroRAM bench-top Raman spectrometer, our NanoRaman platform that integrates Atomic Force Microscopy (AFM) to provide physical sample information on the nanometer scale and our new XGT-9000 micro-XRF analytical microscope.

International Centre for Diffraction Data
Booths: 19 & 20
Website: www.icdd.com
Email: info@icdd.com

The International Centre for Diffraction Data (ICDD®) is celebrating two exciting milestones this year. Materials Data™ (MDI) is now part of ICDD. Together we are better focused on the needs of the materials characterization scientific community by providing the Powder Diffraction File™ (PDF®) and JADE™ analysis software. The Powder Diffraction File™ (PDF®) has surpassed 1,000,000 published entries for phase identification with Release 2020. Together the PDF and JADE™ provide the best in X-ray powder diffraction data analysis. Visit the "Dynamic Duo of Powder XRD" for a demonstration of the largest materials characterization database at our DXC booth.

IXRF Systems, Inc
Booth: 16
Website: www.ixrfsystems.com
Email: info@ixrfsystems.com

IXRF Systems manufactures industry-leading microanalysis systems and x-ray fluorescence (XRF) analyzers for bulk and micro applications. We offer the smallest available XRF spot size coupled with the largest available detectors in the largest chambers on the market, all of which is paired with the most powerful software. 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: 37
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 significantly higher X-ray transmission below 3keV and boosts the LOD for lighter elements like fluorine or magnesium. The best-in-class cooling performance allows stable chip temperature down to -60°C at up to +65°C heat sink ($\Delta T >$ 125K) at 50% lower power consumption. With energy resolutions <123eV (MnKα), P/B ratios above 25,000 and peaking times down to 50ns the newest VITUS SDD series marks the state-of-the-art.

Lyncean Technologies
Booth: 45
Website: www.lynceantech.com
Email: info@lynceantech.com

The Lyncean Compact Light Source (CLS) is an X-ray light source that leverages the combination of a miniature synchrotron and a high-power laser cavity to produce high-flux, quasi-monochromatic, and energy-tunable X-rays via inverse-Compton scattering. The CLS provides the cornerstone of a modern local X-ray facility- it is compact, high-performance and versatile, enabling a variety of applications including imaging, scattering, diffraction and spectroscopy. The Lyncean CLS brings synchrotron-quality X-ray measurement capability to researchers' labs across academia and industry.

Malvern Panalytical
Booths: 53, 54, 55, 56
Website: www.malvernpanalytical.com
Email: ask@malvernpanalytical.com

Malvern Panalytical's chemical, physical and structural analysis technologies are used by scientists and engineers in many industries to solve challenges with maximizing productivity, developing better products and getting them to market faster. Our booths 53 - 56 will feature X-ray analysis systems, sample prep equipment, and application scientists. Our analytical instrumentation and solutions set new standards in data quality, functionality, flexibility and value. Come meet the experts to discuss your analytical challenges. www.malvernpanalytical.com

Materials Data
Booths: 13 & 14
Website: www.materialsdata.com
Email: mdi@materialsdata.com

Materials Data™ (www.MaterialsData.com), recently acquired by the ICDD, continues creating the industry's standard-bearing software for X-ray Powder Diffraction. Our products for XRD Analysis and Instrument Control are embraced world-wide and engineered by a group of PhD Materials Scientists with a vision for better methods to analyze, characterize, quantify and simulate both the complex and routine. For nearly 30 years we have continued to bring break-through ideas and methods to the XRD community. Visit our booth 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 Corporation
Booth: 30
Website: www.materion.com
Email: 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: 46
Website: www.microxray.com
Email: info@microxray.com

Micro X-Ray, Inc. designs and manufacturers low power x-ray tubes used in applications such as XRF, XRF, thickness gauging and imaging. Products include glass x-ray tube inserts for OEM's; silicone encapsulated x-ray tubes and shielded/packaged tubes for integrators or end users. We also provide all associated power supplies, cables, as well as thermal management systems for higher power applications, or in high temperature environments. Micro X-Ray engineers and production personnel have many years' experience designing and building x-ray tubes. As such, we are pleased to design tubes per customer specific requirements or for unique applications. Whether you are a large OEM, system integrator, repair facility, university or laboratory, we welcome the opportunity to discuss your specific x-ray tube requirements.

MOXTEK, Inc
Booths: 10 & 11
Website: www.moxtek.com
Email: info@moxtek.com

Moxtek® is a leading supplier of advanced nano-optical and x-ray components used in display electronics, imaging, and analytical instrumentation. Moxtek x-ray products enable compact handheld and benchtop elemental analysis for positive material identification. Moxtek products are used in various EDXRF systems for environmental screening, for hazardous substance analysis, and for sorting and recycling. Moxtek x-ray products are critical for optimal elemental analysis in electron microscopy, especially for low-Z elements. Please contact us at info@moxtek.com for more information.

Petrick GmbH
Booth: 40
Website: www.petrickgmbh.de
Email: antje.petrick@petrickgmbh.de

Petrick GmbH is specialized in the production and development of x-ray tubes and x-ray tube assemblies for medicine and technique since 1991. Apart from our diverse product portfolio, we develop solutions for your specific case of application and also produce small batches and single pieces. We are open to working together with institutes and universities.

PNDetector GmbH
Booths: 50 & 51
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: 49
Website: www.premierlabsupply.com
Email: info@premierlabsupply.com

PREMIER manufactures and distributes XRF sample preparation consumables, equipment and platinum labware items. PREMIER's consumables include XRF liquid sample cells, thin films and sample support materials, along with products and accessories for press pelletizing, and fusion. Visit our booth to learn about our electric xrFuse1, 2 and 6 position fusion machines. The xrFuse machines are 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.

PROTO
Booths: 35 & 36
Website: www.protoxrd.com
Email: info@protoxrd.com

PROTO is excited to continue growing our x-ray diffraction product offerings with the introduction of the AXRD-LPD High-Resolution Diffractometer. This is now the fourth instrument added to 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 system for your application.

RaySpec Ltd
Booth: 48
Website: www.rayspec.co.uk
Email: sales@rayspec.co.uk

RaySpec Ltd is a specialist manufacturer of customised 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 specialised requirements.

RDS Instruments & Electronics
Booths: 42 & 43
Website: www.rdsxray.com
Email: rc@rdsxray.com

RDS is an independent sales and service provider for XRD and WD xrf systems

- A variety of service options
- A large inventory of hard-to-find parts
- Sourcing of RDS-branded parts
- Equipment rental, refurbishment, remanufacturing, and exchange repair service
- Applications development & support

Rigaku Americas
Booths: 25, 26, 27
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: 28
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.

Shanghai Shuosong Electronic Technology Co., Ltd
Booth: 3
Website: www.shuosong.com
Email: yiliya925@163.com

Shanghai Shuosong Electronic Technology is a high technology enterprise that specialized in analytical window researching and manufacturing. We have cooperated with many companies and research centers since its set up. With the efforts of constant innovation, we have became an leading company in x-ray window fields. Our main products include beryllium foil, brazed beryllium window to SST, beryllium window in CF flange for Synchrotron Radiation Facilities and sapphire vacuum viewports. The leakage is less than 1.0*10^-10 Pa.M3/s. All product in Shuosong Electronic Technology is custom fabricated, we accept customized design according to specific requirements. We hope to cooperate with you by our high quality products and efficient service.

Shimadzu Scientific Instruments, Inc.
Booth: 9
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 Inc.
Booth: 23
Website: www.specac.com
Email: sales@specac.com

Specac Limited a worldwide innovator in the design and manufacture of spectroscopic accessories and sample preparation. We are justifiably proud of our pedigree in providing accurate and reliable IR and FTIR sample handling accessories to academic, industrial and research institutions worldwide. Spectroscopists around the globe have depended continually upon Specac products. Our solutions have the ability to analyse samples of any size and in liquid or solid form, and are also adaptable at low and high temperatures.

SPECTRO Analytical Instruments
Booth: 44
Website: www.spectro.com
Email: spectro.info@ametek.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
Booth: 7
Website: www.spexsampleprep.com
Email: learnmore@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: 58
Website: www.stoe.com
Email: strohauer-hahn@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: 52
Website: www.sunstat.com
Email: ls1214@sunstat.com

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

2. 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.

Sydor Technologies
Booth: 59
Website: www.sydortechnologies.com
Email: info@sydortechnologies.com

Sydor Technologies manufactures beam position monitors and ultra-fast direct imaging detectors. Our DBPMs provide continuous flux, position, and temporal information to ensure proper alignment at beamlines worldwide. From >90% QE to ultra-high dynamic ranges to single x-ray sensitivity, our detectors offer top tier performance capabilities. Each detector is application-optimized with the help of our engineering team. Stop by our booth to learn more about our DBPMS, x-ray detectors, streak cameras, visible imaging systems, and electronics!

Thermo Fisher Scientific
Booths: 57
Website: www.thermofisher.com

Thermo Fisher Scientific, the world leader in serving science, offers a 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). Visit our booth for a demo of the Thermo Scientific™ ARL™ QUANT'X EDXRF Spectrometer, which 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. The Thermo Scientific™ ARL™ EQUINOX 100 bench-top X-ray Diffractometer offers true flexibility with no external water cooling required, and measurements are completed in seconds. Learn more on www.thermofisher.com/xray

XGLab Srl
Booth: 24
Website: www.xglab.it
Email: info.xglab@bruker.com

XGLab is a leading provider of innovative readout electronics for radiation detectors and instrumentation for X- and Gamma-ray application. The strong focus on Research and Development and the numerous active collaborations with research institutions, synchrotrons and academies makes XGLab the best partner for high quality and technology based product innovation. The main areas of expertise of XGLab are: ASIC and Electronic Design, Digital Pulse Processors, Radiation Detection Solutions, Instrumentation Design and Customization, X-ray Spectrometers.

XIA LLC
Booth: 15
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.

XOS
Booth: 21
Website: www.xos.com
Email: info@xos.com

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.

XRF Scientific Americas Inc
Booth: 29
Website: www.xrfscientific.com
Email: info.americas@xrfscientific.com

XRF Scientific manufactures a complete product line for x-ray fluorescence featuring electric and gas instruments, platinum labware for fusion machines available in the market, and a full range of borate fluxes. Platinum electrodes, temperature measurements and evaporation materials products complete our offer for mineral testing laboratories, petrochemical and cement industries, among others. XRF offers refining services to reclaim the highest return value from used platinum accessories. We can assist you in English, Spanish and French. Visit www.xrfscientific.com for more information.

Notes:

DXC & ICXOM 2019 EXHIBIT PASSPORT

AMPTEK, Inc.	Angstrom, Inc.	Anton Paar	attocube systems Inc.	AXO DRESDEN & Huber Diffraction	Brightspec NV/SA	Bruker
Cambridge Univ. Press	Cape Catalytix	Chemplex	CrossRoads Scientific, LLC	DECTRIS Ltd	Herzog	Hitachi
HORIBA	ICDD	IXRF Systems, Inc.	KETEK	Lyncean Tech.	Malvern Panalytical	Materials Data
Materion	Micro X-Ray, Inc.	MOXTEK, Inc.	Petrick GmbH	PNDectector	Premier Lab Supply	PROTO
RaySpec Ltd	RDS Instr. & Electronics	Rigaku Americas	Rigaku Innovative Tech.	Shanghai Shuosong Electronic	Shimadzu	Specac, Inc.
VISIT TO WIN! Visit: Get: 10 companies = 1 chance 20 companies = 2 chances 30 companies = 3 chances All companies = 4 chances VISIT TO WIN!	Spectro	SPEX	STOE & Cie GmbH	SUNJE	Sydor Tech.	
	Thermo	XGLab Srl	XIA	XOS	XRF Scientific	

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 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.*

Return to Conference Registration Desk by Thursday at 3:00 pm for your chance to win an Apple iPad!

2019 DXC Monday AM 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

Special Topics in X-ray Analysis

Introduction to X-ray Computed Tomography — Junior Ballroom A

Organizer & Instructors:
A. Takase, J. Ferrara, Rigaku Americas Corporation, USA, aya.takase@rigaku.com; joseph.ferrara@rigaku.com
F. De Carlo, Argonne National Laboratory, USA, decarlo@anl.gov
E. Yen, Object Research Systems, Canada, eyen@theobjects.com

This workshop provides an introduction to X-ray computed tomography (CT) and is designed to help beginners learn how X-ray CT works and how it can be applied to materials science research. It will include an introduction to the technique, an overview of instrumentation and application examples. The advantages of using synchrotron radiation and its unique applications will also be discussed. Data analysis is one of the most involved aspects of the X-ray CT technique, so the last half of the workshop will cover an overview of the data analysis techniques such as basic image processing, segmentation and machine learning. Commonly used data analysis and visualization programs will be discussed and demonstrated to help beginners to get an idea of where to start and select the right analysis tool for their needs. There will be hands-on training of ImageJ and participants are encouraged to bring their laptops to practice image processing under guidance from the instructors.

Sample Preparation and Experimental Conditions for XRF and XRD — Cypress

Organizer & Instructors:
S. Ichikawa, Fukuoka University, Japan, sichikawa@fukuoka-u.ac.jp
R. Tanaka, Kyoto University, Japan, tanaka.ryohei.5r@kyoto-u.ac.jp
A. Ohbuchi, Applied Rigaku Technologies, Inc., USA, atsushi.ohbuchi@rigaku.com

This workshop provides a basic introduction to (i) XRF sample preparations: (a) estimation of escape depth of fluorescent X-ray, (b) appropriate sample condition (flatness, particle size, homogeneity, and thickness) based on the depth for reliable quantitative analysis, (c) pulverization and mixing of heterogeneous solid sample, and (d) characteristics and examples of typical XRF specimen such as loose powder, powder pellet and glass bead; (ii) the processing of XRF spectra in fundamental parameter method for quantitative analysis using ED-XRF (smoothing, Gaussian fitting, peak separation, background subtraction, the energy resolution, Compton effect on the incident X-rays, the intensity correction based on the energy-wavelength relation, etc.); and (iii) sample preparation and quantitative analysis for XRD: (a) appropriate sample preparation of powder and bulk samples (grinding, flatness and particle size), (b) optics configurations (Bragg-Brentano, parallel beam, transmission, Gandolfi and Kα-1 systems), (c) quantitative methods (RIR method, internal standard method, standard addition method and Rietveld refinement).

X-ray Fluorescence

Handheld XRF – The Silver Bullet or Fools Gold? — Lilac C

Organizer & Instructors:
M. Loubser, University of Pretoria, South Africa, maggi.loubser@up.ac.za
A. Seyfarth, SGS Minerals, Canada, Alexander.Seyfarth@sgs.com
N. Brand, Geochemical Services Pty Ltd, Australia, nwbrand@bigpond.net.au
L. Lee, 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. Practical issues like safety of operation will be discussed. A set of geological “exploration” based studies show how to get fit for purpose data in various scenarios will be given by Nigel Brand. Taking the applications, a step further is the approach of quantitative analysis of plant material to manure. Then conservation scientists from the Getty 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.

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

X-ray Diffraction

High-Energy X-ray Diffraction Microscopy — Junior Ballroom A

Organizers & Instructors:
J.S. Park, H. Sharma, Argonne National Laboratory, USA, parkjs@anl.gov; hsharma@anl.gov

High-energy X-ray diffraction microscopy (HEDM) is a 3D imaging technique which yields crystallographic information of individual grains within polycrystalline aggregates. This information includes the orientation and center of mass of each diffracting grain, and can be obtained non-destructively under a variety of in-situ conditions such as applied stress and temperature. Additional information includes grain shape and lattice spacing/strains, with the sensitivity to these quantities depending on the (variable) sample to detector distance. HEDM has been developed and primarily used at synchrotron X-ray sources, although some laboratory versions are now available. In this workshop, we will provide an overview of the HEDM technique and its implementation at the Advanced Photon Source. We will discuss current limitations of the technique, and share both pitfalls and tips learned from experiences with users over the past ~decade. We will then work with the participants to process example raw datasets to produce 3D microstructural images, and perform basic visualization and data exploration of the images.

Basic to Intermediate XRD — Cypress

Organizers & Instructors:
M. Rodriguez, Sandia National Laboratory, USA, marodri@sandia.gov
S. Misture, New York State College of Ceramics at Alfred University, USA, misture@alfred.edu
T. Blanton, ICDD, USA, tblanton@icdd.com

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.

X-ray Fluorescence

Trace Analysis — Lilac C

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.

Quantitative Analysis of XRF - Part I — Lilac D

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.

Tuesday Morning Workshops 9:00 AM – 12:00 Noon+

X-ray Diffraction

SAXS Data Reduction and Analysis of Specific Types of Samples – Part I — Junior Ballroom A

Organizers & Instructors:
J. Ilavsky, APS-Argonne National Laboratory, USA, ilavsky@aps.anl.gov
F. Zhang, National Institute of Standards and Technology, USA, fan.zhang@nist.gov

Small angle X-ray scattering (SAXS) is a premier technique that captures the statistically significant structural characteristics in the mesoscopic (nanometer to micrometer) regime. Recent developments in both synchrotron-based and lab-based SAXS instruments, as well as the increasing availability of user-friendly small angle scattering (SAS) data reduction and analysis software, have enabled high-quality measurements of a wide range of materials and facilitated the construction of structure-function-property relationship, critical to materials development. In particular, *in situ* or *operando* measurements of advanced functional materials in various sample environments, made possible by the high flux and high energy X-rays generated by the synchrotron sources, have played a pivotal role in unveiling the complex materials microstructural pathways under their working conditions.

The SAXS workshop and scientific session, combined, aim to showcase the most recent advancements in both SAS analysis software and the applications of SAXS. The SAXS workshop will provide an in-depth introduction to the capabilities of two leading SAS analysis software suites under active development, Irena and SasView. The scientific session invites contributions from all aspects of SAXS applications in materials science, with emphasis on advanced functional materials of real-life significance.

Rietveld – Part I — Cypress

Organizer & Instructors:
O. Borkiewicz, B. Toby, R. Von Dreele, K. Wiaderek, A. Yakovenko, Argonne National Laboratory, USA, borkiewicz@anl.gov

This workshop has been designed as a foray to structural analysis of powder X-ray scattering data – one of the most comprehensive and powerful tools for evaluating crystal structures. The primary goal of this workshop will be to discuss and explain all typical steps involved in structural analysis of X-ray scattering data with emphasis on data collected at modern users' facilities using large-area detectors. First part of the workshop will focus on such aspects of the data analysis process as measurement calibration, data reduction, peak profile fitting, Rietveld refinement. In addition to "classic" single pattern refinement approach, we will explore strategies for handling large data sets, i.e. sequential refinements and parametric fitting to in situ and operando data. The second part of the workshop will be dedicated to the complementary use of pair distribution function (PDF) analysis, which allow extraction of structural information from amorphous and disordered materials, for which classical crystallographic approaches may not yield satisfactory results. All tasks pertaining to the workshop will be carry out and accomplished within General Structure Analysis System (GSAS-II). GSAS-II is a powerful open-source Python-based tool that addresses all types of crystallographic studies and handles all standard activities involved in the reduction and analysis of data acquired with both X-ray and neutron probes. This will be an excellent opportunity to learn how to take full advantage of this powerful software directly from the program authors, Robert Von Dreele and Brian Toby, and how to apply this knowledge to real-world applications and experimental data sets presented by beamline scientists Kamila Wiaderek, Andrey Yakovenko and Olaf Borkiewicz, Advanced Photon Source, Argonne National Laboratory.

X-ray Fluorescence

Micro and Energy Dispersive XRF — Lilac D

Organizer & Instructors:
M.A. Zaitz, IBM, USA, zaitz@us.ibm.com
K. Tsuji, Osaka City University, Japan, tsuji@a-chem.eng.osaka-cu.ac.jp

The workshop will cover the basic principles of Energy Dispersive X-ray Fluorescence analysis including theory, instrumentation, software , spectral processing, qualitative and quantitative analysis. Advances in ED-XRF instrumentation have made the technique one of the most versatile spectrometers available for elemental analysis. EDXRF instruments have gone to moon and Mars, and to the depths of the oceans, into high tech manufacturing for process control and is a mainstay in any well-equipped laboratory.

Micro -XRF analysis is one of the variations in EDXRF spectrometers and provides information on samples that are difficult to analyze by more traditional EDXRF spectrometers such as small particles or small features, odd size samples or localized contaminated areas. We will discuss the state of the art instruments and applications including elemental mapping. An update on confocal micro XRF and Full Field X-ray imaging will also be discussed.

+The student presenters oral session, *Education in X-ray Analysis*, will run concurrently with the Tuesday AM Workshops. See page 22.

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

X-ray Diffraction

SAXS Data Reduction and Analysis of Specific Types of Samples – Part II — Junior Ballroom A

Organizers & Instructors:
J. Ilavsky, APS-Argonne National Laboratory, USA, ilavsky@aps.anl.gov
F. Zhang, National Institute of Standards and Technology, USA, fan.zhang@nist.gov

See previous description in Part I.

Rietveld – Part II — Cypress

Organizer & Instructors:
O. Borkiewicz, B. Toby, R. Von Dreele, K. Wiaderek, A. Yakovenko, Argonne National Laboratory, USA, borkiewicz@anl.gov

See previous description in Part I.

X-ray Fluorescence

Basic XRF — Lilac C

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 – Part II — Lilac D

Organizers & Instructors:
W.T. Elam, Washington State University, USA, wtelam@uw.edu
B. Vrebos, Malvern Panalytical, The Netherlands, bruno.vrebos@panalytical.com
K. Kawakyu, Rigaku Corporation, Japan, kawakyu@rigaku.co.jp

See previous description in Part I.

XRF Poster Session – Monday Evening
Grand Ballroom (Exhibit Hall)

The Monday evening XRF poster session will be held 5:00 pm – 7:00 pm in the Grand Ballroom, 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".
Judge: **M. Schmeling,** Loyola University Chicago, USA

**Signifies presenting author, when noted*

F-1 **Development of Synthetic Calibration Standards for X-ray Fluorescence Determination of Japanese Ancient Pottery**
S. Ichikawa*, T. Kurisaki, Fukuoka University, Japan

F-2 **All-new Electronic System for Combination with Silicon Drift Detector Preamplifiers**
N. Willems*, R. Fojt, J. Knobloch, E. Lechner, C. Luckey, R. Stötter, KETEK GmbH, Germany

F-3 **Effect of Chemical Environment in Lα, Lβ, ... y Emission Lines of 37Rb Compounds with WDXRF Spectrometer**
WITHDRAWN
H.S. Kainth*, D. Mehta, J.S. Sh... ...jab University Chandigarh, India

F-6 **Advanced Structural Analysis of Pt-Sn-based Nanoparticles with TXRF and Complementary Methods**
C. Gutsche*, H. Till, U. Fittschen, TU Clausthal, Germany
A. Erdt, J. Parisi, J. Kolny-Olesiak, University of Oldenburg, Germany

F-8 **Application of Optimize Algorithm in EDXRF Spectrum Unfolding**
L. Mingbo, L. Xueliang, NCS, Peoples Republic of China

F-12 **Full Field Energy Dispersive X-ray fluorescence Imaging and Compressed Sensing Analysis for Super-Resolution Analysis**
K. Tsuji*, A. Yamauchi, T. Matsuyama, Osaka City University, Japan

F-14 **Use of Compton to Rayleigh Ratio for the Indirect Analysis of Light Elements in Glass Fragments for Forensic Applications**
R. Corzo*, E. Steel, National Institute of Standards and Technology, USA

F-16 **2 mm Silicon Drift Detector with Improved Hard X-ray Spectroscopy Performance**
M. Zhang*, J. Wang, S. Barkan, E. Tikhomirov, V.D. Saveliev, E.V. Damron, D. Redfern, Hitachi High-Technologies Science America, USA

F-19 **Optimization of the Thickness for Target Materials for the Transmission Type X-ray Tube**
J.D. Kim*, S.H. Kim, SUNJE, Republic of Korea
D.H. Lee, Pukyung National University, Republic of Korea

F-21 **Confocal Line XRF Analysis in Comparison with Confocal Point Micro XRF Analysis**
T. Matsuyama*, S. Sonoda, K. Tsuji, Osaka City University, Japan
H. Nakano, HORIBA Ltd., Japan

F-22 **Conical Shaped Polycapillary Optics for X-ray Imaging Applications**
J. Sachs*, N. Gao, Y. He, I. Ponomarev, XOS, USA

F-23 **Beam-shaping Refractive Optics for High-energy X-rays**
D. Zverev*, A. Barannikov, A. Snigirev, Immanuel Kant Baltic Federal University, Russia
V. Kohn, National Research Center "Kurchatov Institute", Russia
V. Yunkin, S. Kuznetsov, Institute of Microelectronics Technology RAS, Russia
I. Snigireva, European Synchrotron Radiation facility, France

F-25 **Concept Testing of a Low Power Pyroelectric X-ray Source for Application in Planetary Explorations**
H. Munguia-Flores, B. Zhong, K. Uckert, R. Hodyss, C. Heirwegh*, Jet Propulsion Laboratory, USA

F-27 **Determination of the Oxidation State of Zinc and Strontium in Mineralized Osteosarcoma Tissue by in Micro X-ray Fluorescence XANES**
M. Rauwolf, R. Wanzenböck, A. Turyanskaya, D. Ingerle, TU Wien-Atominstitut, Austria
A.G. Buzanich, M. Radtke, BAM-BESSY, Germany

S. Lang, R. Windhager, Medical University of Vienna, Austria
J.G. Hofstaetter, A. Roschger, P. Roschger, Ludwig Boltzmann Institute of Osteology and AUVA Trauma Centre, Austria
S. Sprio, L. Preti, A. Tampieri, NRC - Institute of Science and Technology for Ceramics, Italy

F-28 **Elemental Analysis of Nasolacrimal Duct Tissue using Total Reflection X-ray Fluorescence Spectroscopy**
G. Mankovskii, A. Gvozdic*, A. Pejovic-Milic, Ryerson University, Canada
D. Howarth, Mount Sinai Hospital, Canada

F-34 **High-Precision Polychromatic XRF System for Valence Evaluation of Cathode Materials in Lithium-ion batteries**
T. Yoneda*, T. Omori, T. Izumi, S. Tokuda, S. Adachi, K. Sato, Shimadzu Corporation, Japan
Mi. Kobayashi, T. Mukai, H. Tanaka, M. Yanagida, National Institute of Advanced Industrial Science and Technology, Japan

F-35 **Measurement of Continuous X-ray Polarization by 3D-printed Instrument**
R. Tanaka*, D. Yamashita, J. Kawai, Kyoto University, Japan

F-37 **Optimization of the Thickness for Target Materials for the Transmission Type X-ray tube**
J. Kim*, S. Kim, SUNJE, Korea
D. Lee, Pukyung National University, Korea

F-42 **TXRF Analysis for the Screening of Uranium Surface Contamination on Demolition Debris with Sample Condensation Technique**
H. Yoshii*, Y. Izumoto, T. Matsuyama, K. Takamura, National Institutes for Quantum and Radiological Science and Technology, Japan
Y. Sakai, Toho University, Japan

F-43 **Iron, Manganese and Sulphur Va... ...Wavelength-Dispersive X-ray Fluorescence Analysis**
WITHDRAWN
V. Chubarov, Siberian Branch of R... ...ademy of Sciences, Russian Federation

F-47 **European Network for Chemical Elemental Analysis by Total Reflection X-ray Fluorescence**
D. Eichert, ELETTRA - ST, Italy
L. Borgese, INSTM and Chemistry for Technologies Laboratory, Italy

F-50 **Elemental and Trace Element Analysis of $PM_{2.5}$ Aerosols Collected From a Traffic Site in Sharjah, UAE Using XRF Technique**
N.M. Hamdan*, American University of Sharjah, United Arab Emirates
H. Alawadhi, M. Shameer, University of Sharjah, United Arab Emirates

F-51 **Automatic Correction of Oil or Water-Based Matrix by Analyzing Scattering Peaks**
W. Peng*, X. Zhang, Z. Chen, XOS, USA

F-52 **Measure Vanadium, Nickel and Sulfur by HDXRF**
X. Zhang, L. Johnson, Z. Chen, X-ray Optical Systems, USA

F-54 **Full-field XRF with Square Pore Micro-Channel Plate Optic**
P. Sarrazin*, F. Marchis, C. Chalumeau, K. Thompson, SETI Institute, USA
D. Blake, R. Walroth, T. Bristow, NASA ARC, USA
M. Gailhanou, P. Walter, CNRS, France
J. Chen, Baja Technology, USA
E. Schyns, PHOTONIS, France

F-55 **Evaluation of EDXRF Detection Limits of Air Samples with Custom Low-Loaded Multi-Elemental Reference Materials**
K. Trzepla*, W. White, N. Hyslop, University of California, Davis, USA
S. Yatkin, California Department of Public Health, USA

F-57 **From Cathode to Anode — An Adventure of the Elemental Studies**
L. Li*, Z. Chen, X. Liu, T. Liu, G. Xu, O. Antipova, Argonne National Laboratory, USA
F. Lin, Virginia Tech, USA

F-60 **Analysis of Heavy Metals and Nutrients in S...**
WITHDRAWN
C. Brand*, N. Potter, Portable XR...
V. Skrzpczyk, Deakin University, A...

XRD Poster Session – Tuesday Evening
Grand Ballroom (Exhibit Hall)

The Tuesday evening XRD poster session will be held 5:00 pm – 7:00 pm in the Grand Ballroom, 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".
Judge: **T. Watkins**, Oak Ridge National Laboratory, USA

**Signifies presenting author, when noted*

D-4 **Structural, Optical, and Magnetic Properties of Mn Doped ZnO Thin Films**
A.M. Alsmadi*, B. Salameh*, Kuwait University, Kuwait

D-8 **Deposition and Structural Characterization of Ag Films**
Q. Lin, University of California Irvine, USA

D-9 **Crystal Structures of Large-Volume Commercial Pharmaceuticals**
J. Kaduk*, Poly Crystallography Inc., USA
Z. Butler, North Central College, USA
P. Das, Nanomegas, Belgium
A. Gindhart, T. Blanton, ICDD, USA

D-11 **Comparison Studies of the Residual Stresses of Metal Cutting Tools with Various Methods**
T. Shibata, Kennametal Inc., USA

D-13 **Lithium Titanium Phosphate/Pt Composites with Enhanced Li+ Ion Conductivity**
R. Forbes, University of the Witwatersrand, South Africa

D-18 **Characterization of Synthetic and Biogenic Hydroxyapatite Using Modern Synchrotron Pair Distribution Function Techniques**
E.L Arnold*, K.D. Rogers, Cranfield University, UK
C. Greenwood, University of Keele, UK
D.L. Keeble, Diamond Light Source, UK

D-21 **X-ray analysis of MSWI Fly Ash using Multiple Approaches**
A. Ohbuchi*, W. Matsuda, Rigaku Corporation, Japan
Y. Koike, Meiji University, Japan

D-22 **X-ray Diffraction: Beyond 1D**
S. Sohn, LG Chem, Korea

D-23 **Shine Bright Like a Diamond: Microfocus X-ray Sealed Tube Sources with Diamond Hybrid Anode Technology**
F. Hertlein*, J. Graf, J. Schmidt-May, P. Radcliffe, C. Michaelsen, Incoatec GmbH, Germany

D-24 **Beam at all End-Stations in the Brockhouse Beamlines at the Canadian Light Source**
B. Moreno, A. Leontowich, N. Appathurai, G. King, Canadian Light Source, Canada
S. Kycia, University of Guelph, Canada

D-27 **Ultra-High-Speed System - Over 50 kfps Hybrid Pixel Array Detector –**
Y. Nakaye*, Y. Sakuma, S. Mikusu, T. Sakumura, Rigaku Corporation, Japan

D-28 **Non-Destructive XRD Analysis of Paints for Art Historical Research**
G.M. Hansford*, C.I. Hiley, University of Leicester, UK
N. Eastaugh, Art Analysis and Research Inc., UK
G. Cibin, Diamond Light Source, UK

D-30 **Operand Measurement of Battery Cell using New SmartLab**
T. Kuzumaki, Y. Shiramata, K. Nagao, Rigaku Corporation, Japan

D-32 **Commercialization of an Ultra-Wide Dynamic Range Direct X-ray Detection System**
B. Martin*, J. Farrington, B. Chan, Sydor Technologies, USA
H. Philipp, M. Tate, K. Skanks, P. Purohit, S. Gruner, Cornell University, USA

D-33 **Variable Angle XRF and XRD Studies Using a Lab-based Instrument**
S. King, University of Wisconsin - La Crosse, USA

D-34 **X-ray Diffraction as a Non-destructive tool in Failure Analysis of Aerospace Hardware**
C. Brennan, Collins Aerospace, USA

D-36 **State-of-the art Texture Analysis Plugin of SmartLab Studio II**
A. Himeda, A. Sasaki, K. Nagao, M. Rusetsky, Rigaku Corporation, Japan

D-38 **Approaches towards Phase Quantification with Full Profile Matching and SQUALL**
N. Henderson*, S. Rodesney, J. Giencke, B. Jones, Bruker AXS, USA

D-39 **3D Visualization of XRD^3 Texture Data as a Routine Research Tool and an Intuitive Teaching Aid**
V.M. Jarvis, J.F. Britten, W. Guan, McMaster University, Canada

D-40 **Local Structure Analysis of Non-Crystalline Materials based on PDFs**
A. Sasaki*, A. Himeda, N. Muroyama, Y. Shiramata, Rigaku Corporation, Japan
K. Saito, Rigaku Americas Corporation, USA

D-41 **Introducing a New Method for In Situ X-ray Scattering to Quantify Structural and Chemical Controls on Amorphous Calcium Phosphate**
A. Hoeher*, S. Mergelsberg, F.M. Michel, Virginia Tech, USA
O. Borkiewicz, APS/Argonne National Laboratory, USA

D-43 **The Crystal Structure of CuZIGO Using Neutron and X-ray Diffraction**
S. Flynn, K. Poeppelmeier, Northwestern University, USA
A. Adekoya*, G. Gonzalez-Aviles, DePaul University, USA

D-44 **Quantitative Microstructural Analysis of Plutonium Oxalate Decomposition over Time**
J. Corbey*, L. Sweet, Pacific Northwest National Laboratory, USA

D-45 **Diffracted Beam Collimators – Extending the Range of Applications for 2D Detectors**
D. Beckers*, M. Gateshki, Malvern Panalytical B.V., The Netherlands

D-49 **Evolution of Mechanically Formed Bow Due to Surface Waviness and Residual Stress Difference on Sapphire (0001) Substrate**
S. Song, I. Jung, C.S. Kim, Korea Research Institute of Standards and Science, Korea

D-51 **The Influence of Gas and Humidity on Salt Mineral Compositions Studied by in-situ XRD**
A.O.F. Jones*, B. Puhr, Anton Paar GmbH, Austria
B. Strauch, GFZ German Research Centre for Geosciences, Germany

D-60 **Structural, Magnetic and Electronic Prop... Doped Ferroelectric Ceramics**
A. Kaur, L. Singh, Guru Nanak De...
K. Asokan, Inter-University Accele...

WITHDRAWN

D-65 **A High-Precision Measurement of the Molybdenum K-Shell X-ray Spectrum**
M.H. Mendenhall*, L.T. Hudson, C.I. Szabo, A. Henins, J.P. Cline, NIST, USA
C. I Szabo, Theiss Research, USA

D-66 **NIST Standard Reference Materials for X-ray Metrology**
J. Cline*, M. Mendenhall, D. Black, A. Henins, NIST, USA

D-67 **BRAGG2D: Rapid Assessment of XRPD Sample Preparation**
J. Giencke*, B. Jones, N. Henderson, B. Krueger, Bruker AXS, USA

D-68 **Synthesis and Structure Solution of UOP Layered Silicate-1 (ULS-1) with a Layer Comprising [$4^2 6^2$] Half-Sodalite Cages**
C.P. Nicholas, M.A. Miller, S.R. Miller, R.W. Broach, M.M. Galey, S. Prabhakar, B. Lyons, C.L. Nicholas*, Honeywell UOP, USA

D-69 **Synthesis of Li-Sn-Zn Ternary Alloy**
C.K. Saw*, B.W. Choi, Lawrence Livermore National Lab, USA

D-71 **Status of the Diamond CRL Development**
S. Antipov*, Euclid Techlabs LLC, USA
X. Shi, L. Assoufid, Argonne National Laboratory, USA

D-72 **Planetary XRD/XRF Beyond Chemin: New Developments Toward Smaller Instruments**
P. Sarrazin*, SETI Institute, USA
T. Bristow, D. Blake, NASA ARC, USA
M. Gailhanou, CNRS, France
J. Chen, Baja Technology, USA
K. Zacny, Honeybee Robotics, USA

D-73 **Investigation of the Real Structure Using X-ray Diffraction as a Tool for Laser Welding Optimization**
J. Capek*, N. Ganev, Czech Technical University in Prague, Czech Republic
S. Nemecek, RAPTECH s.r.o., Czech Republic

D-75 **Residual Stress in 0D, 1D, or 2D? Let the Sample Decide**
B. Krueger*, B. Jones, J. Giencke, N. Henderson, Bruker AXS, USA

D-80 **Spherical Optics by Dislocation of Crystal Structure**
J.M. Maj, Marquette University, USA

D-85 **ICDD® Polymer Diffraction Data Project – 100+ PDF® Entries AND Growing**
T. Blanton*, M. Rost, S. Gates-Rector, ICDD, USA

D-96 **Fully Automated Multi-Applications Approach in the Analysis of Material: A Case Study on Heat Treatment Effects on TiN Thin Film Samples**
F. Masiello*, Z. Bao, M. Sommariva, M. Fransen, Malvern Panalytical, The Netherlands

S-15 **Back-Reflection Energy-Dispersive X-ray Diffraction to Assess the Origin of the "MacGregor Man"**
C.I. Hiley,* G.M. Hansford, University of Leicester, UK
L. McNamara, D. Bone, K. Domoney, Ashmolean Museum, University of Oxford, UK
A.J. Shortland, Cranfield University, UK
P. Degryse, K.U. Leuven, Belgium
G. Cibin, Diamond Light Source, UK

Post Deadline Posters:

D-99 **Molecular- To Macro- Energy Absorption Mechanisms in a Biological Body Armour Illuminated by *in-situ* Diffractive Pseudo-Tomographic X-ray Imaging**
Y. Zhang*, Chinese Academy of Science, China and Deutsches Elektronen-Synchrotron DESY, Germany
J. Garrevoet, J. Torben Roeh, G. Falkenberg, Deutsches Elektronen-Synchrotron DESY, Germany
Y. Wang, H. Gupta, Queen Mary University of London, UK
N. Terrill, Diamond Light Source, UK
Y. Dong, Chinese Academy of Science, China

D-100 **X-ray Diffraction Imaging Techniques for Non-Destructive Characterization of Crystalline Grains Inside Bulk Polycrystalline Alloys**
Y. Yang, Institute of High Energy Physics, Chinese Academy of Sciences, China

D-101 **Structure and Hirshfeld Surface Analysis of a New Structure of Oxymetazoline Chloride**
K.V. Serrano*, R.A. Toro, J.A. Henao, Industrial University of Santander, Columbia

D-102 **Synthesis and Characterization of a Nickel Complex of Enalaprilo and Solubility Study**
L. Pabón González*, R.A. Toro, J.A. Henao, Universidad Industrial de Santander, Columbia

D-103 **The Moving Diffraction Beam Problem on The Dual Imaging and Diffraction Beamline (DIAD)**
A. James*, C. Reinhard, S. Ahmed, J. Filik, A. Ashton, Diamond Light Source, UK

D-104 **New Capabilities for Structural Analysis using High-energy X-rays at the APS**
U. Ruett*, O. Borkiewicz, S. Lapidus, A. Yakovenko, W. Xu, APS - Argonne National Laboratory, USA

D-105 **Synchrotron Powder Diffraction Simplified: The High-Resolution Diffractometer 11-BM at the Advanced Photon Source**
L. Ribaud*, S.H. Lapidus, Argonne National Laboratory, USA

D-106 **APS Upgrade Plans**
U. Ruett*, Argonne National Laboratory, USA

Tuesday Morning Student Session
9:00 AM – 11:10 AM

**Signifies presenting author, when noted*

Education in X-ray Analysis – Student Presentations — Lilac C

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

9:00	F-31	Evaluation of Sample Preparation Methods for Beverages and Condiments for Analysis by TXRF and AAS **E. Jamka*, B. Folga, S. Kasperek, M. Lund, M. Schmeling**, Loyola University Chicago, USA
9:20	S-11	Crystal Structure Characterization of Uranium- Silicides Accident Tolerant Fuel by High Temperature Neutron Diffraction **T.L. Wilson*, T.M. Besmann**, University of South Carolina, USA **S.C. Vogel, J.T. White**, Los Alamos National Laboratory, USA
9:40	D-91	In-Situ Synchrotron X-ray Computed Microtomography and Diffraction Investigation of Deformation and Fracture Behavior in a Laser Powder Bed Fusion Processed 316L Stainless Steel **L. White*, M. Koehler, H. Choo**, University of Tennessee, USA **X. Xiao, Y. Ren**, Argonne National Laboratory, USA **D. Morin, E. Garlea**, CNS/Y-12 National Security Complex, USA
10:00		Break
10:30	S-37	Using XRF to Identify Multiple Environmental Hazards in St. Joseph County, IN **M. Tighe*, H. Beidinger, C. Knaub, M. Sisk, M. Lieberman, G.F. Peaslee**, Univeristy of Notre Dame, USA
10:50	S-7	Genetic Algorithm For Crystal Structure Prediction **K.A. Thasneema**, Farook College, Kozhikode, India

Wednesday Morning Plenary Session
8:30 AM - 12:15 PM

**Signifies presenting author, when noted*

PLENARY – New Approaches in Imaging (Combined DXC & ICXOM-25 Session) — Lilac C & D

Chairs: **U. Fittschen**, Clausthal University of Technology; Germany; **T.G. Fawcett**, Emeritus, ICDD, USA

8:30 Opening Remarks and Awards

Opening remarks from **Tim Fawcett**, Chairman of the Denver X-ray Conference, Emeritus ICDD, USA

2019 Barrett Award presented to **Peter Stephens**, Stony Brook University, USA. Presented by the Chairman of the Barrett Award Selection Committee, **Conal Murray**, IBM T.J. Watson Research Center, USA.

2019 Jenkins Award presented to **John Anzelmo**, Anzelmo & Associates, Inc., USA. Presented by the Chairman of the Jenkins Award Selection Committee, **Tim Fawcett**, Emeritus ICDD, USA

2019 Hanawalt Award presented to **Cev Noyan**, Columbia University, USA. Presented by **Tom Blanton**, Executive Director, ICDD, USA

2019 Jerome B. Cohen Student Award winner to be announced by the Chairman of the Cohen Award Selection Committee, **Cev Noyan**, Columbia University, USA

2019 Robert L. Snyder Student Awards to be announced by **Tom Blanton**, Executive Director, ICDD, USA

Remarks by the Plenary Session Chair, **Ursula Fittschen**, Clausthal University of Technology; Germany

9:00	I-5	Multimodal Imaging Using Lyncean's Compact Synchrotron Source **B. Hornberger,** Lyncean Technologies, USA
9:45	I-70	Spatial and Temporal Exploration of Heterogeneous Catalysts with Synchrotron Radiation **F. Meirer,** University of Utrecht, The Netherlands

10:30		Break
11:00	I-105	X-ray Imaging from Tissues to Cells to Subcellular Structures **G. Woloschak,** Northwestern University, Feinberg School of Medicine, USA
11:45	P-2	Nanocrystalline Powder Diffraction Analysis **I.C. Noyan*, H. Öztürk, S. Xiong,** Columbia University, USA

Wednesday Afternoon Sessions

**Signifies presenting author, when noted*

New Developments in XRD/XRF Instrumentation - Part I *(vendor/commercial presentations permitted)* — Junior Ballroom A

Chairs: **T. Fawcett**, Emeritus, ICDD, USA, dxcfawcett@outlook.com; **A. Drews**, Ford Motor Company, USA; adrews@ford.com

1:30	S-32	Versatile Benchtop X-ray CT Scanner: CT Lab HX **A. Takase,** Rigaku Americas Corporation, United States
1:45	S-26	D8 DISCOVER Plus: Uncompromised Power, Unmatched Accuracy, Unparalleled Efficiency **J. Giencke*, B. Jones, N. Henderson, B. Krueger,** Bruker AXS, USA
2:00	S-9	Investigating Coin Cell Processes in Transmission Geometry on a Laboratory Diffractometer **T. Hartmann,** Stoe & Cie GmbH, Germany
2:15	S-3	New Developments in Microfocus Sources for X-ray Diffractometry **F. Hertlein*, U. Heidorn, J. Wiesmann, J. Graf, J. Schmidt-May, C. Michaelsen,** Incoatec GmbH, Germany
2:30	S-17	Benefits of the MYTHEN Detector for XRF Analysis in Laboratory Spectrometers **D. Šišak Jung*, N. Pilet,** DECTRIS, Switzerland
2:45	S-16	News on Silicon Drift Detectors for High-Speed and High Resolution XRF Spectroscopy closed to Room Temperature **A. Niculae*, A. Simsek, H. Schmidt, T. Barros, A. Liebel, R. Lackner, M. Kopetzky,** PNDetector GmbH, Germany
3:00		Break
3:30	S-1	Automate Complex Workflows with HighScore (Plus) **T. Degen*, M. Sadki, E. Bron,** Malvern Panalytical B.V., The Netherlands
3:45	S-28	New Innovations in DIFFRAC.EVA v5.0 **B. Jones*, N. Henderson, S. Rodesney, J. Giencke,** Bruker AXS, USA
4:00	S-22	MOXTEK'S Developments in X-ray Sources **S. Cornaby*, T. Parker, B. Harris, E. Miller, K. Kozaczek,** Moxtek, USA
4:15	S-2	New possibilities in non-ambient XRD from Anton Paar **A.O.F. Jones*, B. Puhr,** Anton Paar GmbH, Austria
4:30	S-40	Novel in-situ X-Ray reaction cell from Cape Catalytix **M. Claeys,** Cape Catalytix, South Africa

Machine Learning Techniques in X-ray Analysis[+] — Cypress A

Chair: **A. Mehta,** SLAC, SSRL, USA, mehta@slac.stanford.edu

1:30	S-39	Invited - Autonomous X-ray Scattering Experiments under Uncertainty **M. Noack*,** Lawrence Berkeley National Laboratory, USA **K.G. Yager, G.S. Doerk, M. Fukuto, R. Li,** Brookhaven National Laboratory, USA **J. Sethian,** Lawrence Berkeley National Laboratory and University of California, Berkeley, USA
2:00	S-35	Invited- Automating Powder Pattern Interpretation with High-Throughput Measurements and Artificial Intelligence **H.S. Stein*, C.P. Gomes, J. Bai, Y. Xue, J. Bjorck, B. Rappazzo, S. Ament, R. Bernstein, S. Kong, S.K. Suram, R.B. van Dover, J.M. Gregoire,** California Institute of Technology, USA

2:30	S-4	Machine Learning to Quantify XRF Measurements **M. Radtke,** BAM, Germany
2:50	S-6	LCLS Analysis and Automation Advances: Bi-Cross Validation of the Inverted Laplacian for Cluster Number and Generalized Hyper-Parameter Estimation **S. Zohar,** PCDS/LCLS/SLAC, USA
3:10		Break
3:40	S-12	Automated Feature Extraction for High-Throughput Synchrotron Characterization **R. Tang-Kong*, S. Sarker, A. Mehta,** Stanford Synchrotron Radiation Lightsource, USA **J. Scargle,** National Aeronautics and Space Administration, USA
4:00	S-19	Interpreting Five Dimensional X-ray Images with Machine Learning **J.M. Davis*, J. Schmidt, M. Huth, H. Soltau,** PNDetector, Germany **R. Hartmann, L. Strüder,** PNSensor, Germany
4:20	S-23	Deep Convolutional Neural Networks for Real-Time Coherent X-ray Diffraction Inversion **M. Cherukara*, Y. Nashed, R. Harder,** Argonne National Laboratory, USA
4:40	D-26	Artificial Intelligence Methods in Analytical Data Interpretation: Bayesian Approach and Fisher Information **A. Ulyanenkov*,** Atomicus LLC, USA **A. Mikhalychev, S. Vlasenko, N. Lappo, I. Perapechka,** Atomicus OOO, Belarus + The previously advertised talk, *Autonomous Research Systems - Phase Mapping,* by **A.G. Kusne***, National Institute of Standards & Technology and University of Maryland, USA, was withdrawn from the Program.

Small Angle X-ray Scattering of Advanced Functional Materials — Lilac C

Chairs: **J. Ilavsky,** APS, ANL, USA, ilavsky@aps.anl.gov; **J. Hammons,** Lawrence Livermore National Laboratory, USA, hammons3@llnl.gov

1:30	D-88	Invited- Extracting New Kinds of Information from Scattering Data **K.G. Yager,** Brookhaven National Laboratory, USA
2:00	D-57	Invited- USAXS/SAXS/WAXS as a Powerful In-Situ Approach to Understand Helium Bubble Kinetics in Metals; from Crystal Defects to Meso-Scale Bubble Growth **J. Hammons*, Y. Idell, S. Tumey, J. Jeffries,** Lawrence Livermore National Laboratory, USA
2:30	D-50	Precise GISAXS Analysis for Advanced Nano-Devices **K. Omote*, Y. Ito,** Rigaku Corporation, Japan
2:50	D-83	Intensity Enhancement of Transmission Small Angle X-ray Scattering For Nano-Structure Measurements **W.E Fu*, B.C. He, C.T. Liu, G. Chen, W.L. Wu,** Industrial Technology Research Institute, Taiwan
3:10		Break
3:40	D-95	Invited- From Membranes to Superconductors: Functional Mesostructured Materials Enabled by In-Situ and High-Throughput SAXS **P.A. Beaucage,** National Institute of Standards and Technology, USA
4:10	D-15	Characterization of Crystal Size of Palladium Nanoparticles by XRD, SAXS, SP-ICP-MS and SEM **K. Walbrueck, S. Witzleben*,** Bonn-Rhein-Sieg University of Applied Sciences, Germany **F. Kuellmer, K. Guenther,** University Bonn, Germany
4:30	D-35	An In-situ USAXS Study of Microstructural Evolution in a Ni-Based Alloy **M.G. Frith*, J. Ilavsky,** Argonne National Laboratory, USA **G. Muralidharan,** Oak Ridge National Laboratory, USA
4:50	D-14	Extended Range Ultra Small-Angle X-ray, Small-Angle, and Wide-Angle Scattering for Materials Characterization at 9ID Beamline **J. Ilavsky*, I. Kuzmenko, M. Frith,** APS/ANL, USA **F. Zhang, L. Levine, A.J. Allen,** NIST, USA

Food Safety and Agriculture Applications — Lilac D

Chair: **K. Russell,** Bruker Nano Analytics Division, USA, kimberley.russell@bruker.com

2:00 F-30 Invited- Using Portable XRF to Facilitate Nutrient Management Planning
L.M. McDonald*, West Virginia University, USA
Y. Sapkota, Louisiana State University, USA
B.L. Drake, University of New Mexico, USA

2:30 F-58 Analysis of Sodium in Soils using Portable X-ray Fluorescence (pXRF)
C. Brand, Portable XRF Services, Australia

2:50 F-10 Portable XRF for Plant Material
M. Cameron*, Bruker Handheld, USA
C. Burand, D. Lempuhl, Colorado State University, USA

3:10 Break

3:40 F-49 Invited- Predicting Crop Root Depth for Improved Nutrient and Water Acquisition and Carbon Sequestration using Handheld X-ray Fluorescence
M. Hanlon*, Penn State University, USA
J. Lynch, Penn State University, USA and University of Nottingham, UK

4:10 F-39 Quantifying Heavy Metals in Vegetables at Low Concentrations Using WD-XRF and ED-XRF
H. Byers*, L. McHenry, T. Grundl, University of Wisconsin Milwaukee, USA

Cultural Heritage II - DXC+ — Cypress B

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

3:10 S-27 Invited- Portable XRF for Anthropology Collections and Archaeologogy
L. Dussubieux, Field Museum, USA

3:40 S-36 Invited- Engaging the Non-Specialists in XRF: Reconsidering the Learning Process
L. Lee, Getty Conservation Institute, USA

4:10 S-10 Using X-ray Fluorescence Spectroscopy to verify the authenticity of a portrait attributed to Rembrandt
M. Loubser*, G. de Kamper, I. McGinn, University of Pretoria, South Africa
R. Tagle, Bruker Nano, Germany

4:30 S-29 X-ray Spectroscopies for Mesoamerican Green Stone Characterization: Challenges and Complementary Techniques
J.L. Ruvalcaba-Sil*, M. Manrique-Ortega, A. Mitrani, V. Aguilar-Melo, M.A. García-Bucio, E. Casanova-Gonzalez, Universidad Nacional Autonoma de Mexico, México

4:50 S-30 Analyses of Pigments from Japanese 17th Century Sugito Door Paintings
T.G. Fawcett*, S. Gates-Rector, M. Rost, T.N. Blanton, ICDD, USA
C.I. Duffy, B.A. Price, P.A. Olley, Philadelphia Museum of Art, USA

+ Cultural Heritage I - ICXOM will be held in the Magnolia Room from 1:00 pm - 2:50 pm

Thursday Morning Sessions

**Signifies presenting author, when noted*

New Developments in XRD/XRF Instrumentation - Part II *(vendor/commercial presentations permitted)* — Junior Ballroom A

Chairs: **T. Fawcett,** Emeritus, ICDD, USA, dxcfawcett@outlook.com; **A. Drews,** Ford Motor Company, USA; adrews@ford.com

9:00 D-20 Analysis of Martian Analogs Using Benchtop XRD and XRF
G. Schmidt, Thermo Fisher Scientific, USA

9:15 S-18 High Speed, Simultaneous XRD-XRF Mapping of Geological Specimens with the Color X-ray Camera
J.M. Davis*, J. Schmidt, M. Huth, H. Soltau, PNDetector, Germany
R. Hartmann, L. Strüder, PNSensor, Germany

9:30	S-25	Liquid MetalJet X-ray Source for Diffraction and Scattering **A. Adibhatla*,** Excillum, Inc., USA **J. Hallstedt, M. Otendal, U. Lundstrom,** Excillum AB, Sweden
9:45	S-14	Compact AutoEdge X-ray System to Measure HED Target Areal Density to 1% Precision and Accuracy **H. Huang*, K. Sequoia, J. Walker, K. Boehm, K. Engelhorn,** General Atomics, USA
10:00		Break
10:30	S-8	Latest Generation of Silicon Drift Detectors and Readout Electronics **M. Fraczek*, F. Dams, R. Fojt, J. Knobloch, C. Luckey, N. Miyakawa, A. Pahlke, N. Willems,** Ketek GmbH, Germany
10:45	S-20	A Compact High Solid Angle Annular Silicon Drift Detector System for XRF and Synchrotron Applications **A. Liebel, R. Lackner, D. Steigenhöfer, A. Bechteler, M. Bornschlegl, A. Niculae, H. Soltau,** PNDetector GmbH, Germany
11:00	S-21	Can a 44-Year-Old Idea Improve XRF Detection Limits Today? **R. Mott,** XrayMaps.Com, USA
11:15	S-33	Newly Developed X-ray Optic: CBO-μ for Micro Beam XRD Applications **K. Saito,** Rigaku Americas Corporation, USA
11:30	S-38	Total Pattern Analyses for Non-Crystalline Materials **T.G. Fawcett*, S. Rector-Gates, A.M. Gindhart, M. Rost, S.N. Kabekkodu, J.R. Blanton, T.N. Blanton,** ICDD, USA

X-ray and Forensic Investigations — Cypress

Chairs: **C. Greenwood,** Keele University, UK, c.e.greenwood@keele.ac.uk; **K. Rogers,** Halo X-ray Technologies, UK; k.d.rogers@cranfield.ac.uk

The following talks are invited:

9:00	S-5	Handheld XRD Methods for Forensic Applications **G. Hansford,** University of Leicester, UK
9:30	S-24	High Speed Detection of Narcotics using Novel X-ray Diffraction Methods **K.D. Rogers*, D. Prokopiou,** Cranfield University, UK **P. Evans, A. Dicken,** Nottingham Trent University, UK **S. Godber,** Halo X-ray Technologies Ltd, UK
10:00	S-34	New Insights into the Identification of Bone Fragments in Forensic Science **E.L. Arnold*, K.D. Rogers,** Cranfield University, UK **C. Greenwood,** University of Keele, UK

General XRD – Part I+ — Lilac C

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

9:00	D-77	Structural Analysis of Ce Doped $Ba(Zr_{0.8-x}Ce_x)Y_{0.2}O_{3-\delta}$ (x: 0.8-0.1, BZCY) Nanoceramic Powder Series As Proton Conductive Anode for IT-PCFC Applications **K. Kucuk*, A. Siqueira, S. Aryal, C.U. Segre, Y. Xu, A.S. Hock,** Illinois Institute of Technology, USA **A.F. de Araújo Maia,** Wroclaw University of Science and Technology, Poland
9:20	D-81	In Operando Multimodal X-ray Measurements of Coin Cell Batteries **J. Okasinski*, A. Chuang,** Advanced Photon Source, USA **K. Yao, M. Fonseca Rodrigues, D. Abraham,** Argonne National Laboratory, USA
9:40		Break
10:30	D-52	Adaptable Web-based Virtual X-ray Powder Diffraction Laboratory for Education and Professional Training **Y. Cherner*,** ATeL – Advanced Tools for e-Learning, USA **T. Blanton,** International Centre for Diffraction Data, USA
10:50	D-64	Thermal Expansion and Phase Transformation Mechanism in the Lanthanide Di-titanate System **B. Hulbert*, S. McCormack, K. Tseng, W. Kriven,** University of Illinois at Urbana Champaign, USA

11:10	D-70	X-ray Diffraction Analysis of PM2.5 and PM10 Aerosols **N.M. Hamdan,** American University of Sharjah, United Arab Emirates **H. Alawadhi,** University of Sharjah, United Arab Emirates
11:30	D-19	XRD and In-situ Synchrotron Radiation XRD Studies on the phase transition of the Oxidative Coupling of Methane Catalysts **H. Wang,** SINOPEC Beijing Research Institute of Chemical Industry, China

+ The previously advertised talk, *Influence of Layer Charge on the Hydration Properties of Synthetic Smectites*, by **D. Vinci**, University of Bari, Italy, was withdrawn from the Program.

Quantitative Analysis of XRF — Lilac D

Chair: **L.L. Brehm,** DuPont, USA, Lora.Brehm@Dupont.com

8:30	F-59	Invited- Total Reflection Energy Dispersive X-ray Fluorescence for Analysis of Human Samples: From Cells to Tissues **A. Pejovic-Milic*, G. Mankovskii,** Ryerson University, Canada
9:00	F-65	Invited- Actinide Characterization using Selective Optics and High Resolution X-ray Spectroscopy **K.G. McIntosh*, M.H. Carpenter, A.S. Hoover, E.R. Batista, K.E. Koehler, M.P. Caffrey, M.P. Wilkerson, P. Yang, S.A. Kozimor, G.L. Wagner, Z.K. Baker, M.P. Croce, M.W. Rabin, G.J. Havrilla,** Los Alamos National Laboratory, USA
9:30	F-62	Invited- Matrix Correction Methods for XRF Analysis of Oils **K. Kawakyu,** Rigaku Corporation, Japan
10:00		Break
10:30	F-32	Method, Validation and Optimization Process to Exploit the In Vivo and Ex Vivo Energy Dispersive X-ray Fluorescence Detection Limit in Terms of Digital Signal Processing **D. Crawford*, A. Moslemi, A. Pejovic-Milic, J.L. Gräfe,** Ryerson University, Canada
10:50	F-44	Evaluation of Uranium and Plutonium in Simulated Blood Extracted from Wounds by X-ray Fluorescence Analysis **Y. Izumoto*, K. Fukutsu, K. Takamura, H. Yoshii,** National Institutes for Quantum and Radiological Science and Technology, Japan **Y. Oguri,** Tokyo Institute of Technology, Japan **Y. Sakai,** Toho University, Japan
11:10	F-56	M-BLANK: A Program for X-ray Fluorescence Data Analysis and Processing **A.M. Crawford*, G.N. George, I.J.** Pickering, University of Saskatchewan, Canada **A. Deb, J.E. Penner-Hahn,** University of Michigan, USA
11:30	F-5	Thickness Measurement of Common-element Multilayer **T. He,** Bowman Analytic, Inc., USA
11:50	F-9	Kß/Kα Intensity Ratio and Total Vacancy Transfer Probability of Cu through Radioactive Decay of Zn **L.F.M. Anand*,** Government First Grade College, India **D. Joseph,** Bhabha Atomic Research Centre, India **S.B. Gudennavar, S.G. Bubbly,** Christ University, India

Thursday Afternoon Sessions

**Signifies presenting author, when noted*

General XRF — Junior Ballroom A

Chair: **C.G. Worley,** LANL, USA, cworley@lanl.gov

1:30	F-13	Invited- The Critical Role Portable XRF Played in the Discovery and Delineation of the Rarest Economic Mineral Deposit on Earth - Pollucite at Sinclair, Western Australia **N. Brand*,** Geochemical Services Pty Ltd, Australia **C. Brand,** Portable XRF Services Pty Ltd, Australia **D. Crook,** Pioneer Resources Limited, Australia
2:00	F-64	Invited- Environmental XRF and PIXE Applications with Public Health Implications **G. Peaslee*, M. Tighe, H. Beidinger, M. Sisk, M. Lieberman,** University Of Notre Dame, USA
2:30	F-29	Flux Comparisons between Types of X-ray Anodes for HHXRF: Transmission and Reflection Anodes **S. Cornaby*, D. Paas, R. Zimmerman,** Moxtek, Inc., USA
2:50	F-33	In situ X-ray Absorption Spectroscopy of Li Rich Mn-Ni-Fe Oxide Cathode **S. Aryal*,** Argonne National Laboratory and Illinois Institute of Technology, USA **E. Timofeeva, C. Segre,** Illinois Institute of Technology, USA
3:10		Break
3:40	F-40	In Situ EXAFS Study of Tin Sulfide/Graphite Composite Anodes for Lithium-Ion Batteries **Y. Ding*, E. V. Timofeeva, C. U. Segre,** Illinois Institute of Technology, USA
4:00	F-48	Practical Guidelines for Distinguishing Minerals with X-ray Scattering **L.P. O'Neil*, D.C. Catling, W.T. Elam,** University of Washington, USA
4:20	F-41	Characterization and Signal Readout from the New Linear Silicon Drift Detector for Soft X-ray Studies **A. Patel*, H.S. Mazumdar, S. Vadawale,** Physical Research Laboratory, India

Rietveld — Cypress

Chair: **K.H. Stone,** SLAC, SSRL, USA, khstone@slac.stanford.edu

2:00	D-31	Invited- Can We Trust Structures from Powder Diffraction Data? **P. Stephens,** Stony Brook University, USA
2:30	D-25	Model-Free Whole-Powder-Pattern Fitting for Quantitative Phase Analysis: A Practical Approach to the Direct Derivation (DD) Method **H. Toraya,** Rigaku Corporation, Japan
2:50	D-53	Synthesis and Characterization of Nano-Sized ZSM-5 Zeolite **R. Abdullah Al-Ghamdi*, H. Sitepu, L. Ding,** Saudi Aramco, Saudi Arabia
3:10		Break
3:40	D-61	Rietveld Phase Analysis of Deposits Formed at Different Locations within Electric Submersible Pumps **H. Sitepu*, R. Abdullah Al-Ghamdi,** Saudi Aramco, Saudi Arabia
4:00	D-78	X-ray Characterization of Copper Integration into $Cu_{2x}Hg_{2-x}GeTe_4$ for Thermoelectric Applications **B. Levy-Wendt*,** Stanford University, USA **B.R. Ortiz, E.S. Toberer,** Colorado School of Mines, USA **D. Passarello, K.H. Stone, M.F. Toney,** SLAC National Accelerator Laboratory, USA **S.H. Lapidus,** Argonne National Laboratory, USA
4:20	D-93	Unravelling the Multivalent Charge-Storage Mechanism of NASICON $Na_3V_2(PO_4)_3$ for Rechargeable Zn-ion Batteries **J.S. Ko*, P. Paul, J.N. Weker,** SLAC National Accelerator Laboratory, USA **N. Seitzman,** Colorado School of Mines, USA **R. DeBlock, B. Dunn,** University of California, USA

General XRD – Part II — Lilac C

Chair: **J. Okasinski,** Advanced Photon Source, Argonne National Lab, USA, okasinski@anl.gov

2:00	D-54	Revealing 3D Microstructures using X-ray Scattering Tomography **J. Almer*, J. Okasinski, P. Kenesei, J.S. Park,** Argonne National Laboratory, USA **S. Stock,** Northwestern University, USA
2:20	D-6	Overview of Two-Dimensional X-ray Powder Diffraction **B. He,** Bruker Nano, USA
2:40	D-37	Role of High-Resolution X-ray Diffraction in Calibrating Modern-Day Transmission Electron Microscopes **M. Sunder*, G. Lian, M. Ali, S. Boettcher,** IBM Systems, USA **J. Bruley,** IBM Research, USA
3:00		Break
3:30	D-59	The State of High-Energy Diffraction Microscopy Instrument at the Advanced Photon Source – Past, Present and Future **J. Almer, P. Kenesei, J.S. Park, H. Sharma*,** APS/Argonne National Laboratory, USA
3:50	D-55	Optical Aberrations from Johansson-type Incident Beam Monochromators on Bragg-Brentano Powder Diffractometers **M. Mendenhall*, J. Cline,** National Institute of Standards and Technology, USA
4:10	D-56	Grazing Incidence Diffraction with Single Crystal Diffractometer **A. Vailionis,** Stanford University, USA
4:30	D-7	Detection of Low Energy X-rays with High Efficiency and Spectral Resolution **L. Strüder*,** PNSensor GmbH and University of Siegen, Germany **S. Aschauer, R. Hartmann,** PNSensor GmbH, Germany **H. Soltau, A. Nuculae, J. Davis,** PNDetector GmbH, Germany

Trace Analysis including TXRF — Lilac D

Chair: **D. Eichert,** Elettra-Sincrotrone Trieste, Italy, diane.eichert@elettra.eu

2:00	F-24	Invited- Trace Analysis: Quantification Problems in 1, 2 or 3 Dimensions **M. Krämer*, R. Dietsch, T. Holz, D. Rogler, D. Weißbach,** AXO DRESDEN GmbH, Germany **B. Beckhoff, P. Hönicke, C. Streeck, R. Unterumsberger,** Physikalisch-Technische Bundesanstalt (PTB), Germany **U. Fittschen,** Technische Universität Clausthal, Germany **A. von Bohlen,** Leibniz-Institut für Analyt. Wissenschaften - ISAS - e.V, Germany
2:30	F-45	Invited- Nanoscopic Quantitative X-ray Fluorescence Imaging of Cells with a High Energy X-ray Cryo Nano-probe **S. Bohic*,** European Synchrotron Radiation Facility and Université Grenoble Alpes, France **A. Pacureanu, Y. Yang, M. Salomé, J.C. Da Silva, F. Villard, L. Andre, P. Van Der Linden, P. Cloetens,** European Synchrotron Radiation Facility, France
3:00	F-53	Studies of Nickel Uptake by Plants Using X-ray Fluorescence Microscopy **O. Antipova*, Q. Jin,** Argonne National Laboratory, USA **O. Ponomarenko,** University of Saskatoon, Canada **E. Horan,** Lemont High School, USA
3:20		Break
3:50	F-61	Invited- Reliable TXRF Quantification and Standardization Ventures **B. Beckhoff,** Physikalisch-Technische Bundesanstalt (PTB), Germany
4:20	F-46	Analysis of Wine Vinegars by TXRF **M. Schmeling*, B. Folga,** Loyola University Chicago, USA
4:40	F-20	TXRF Analysis using Carbon Coated Glass Substrate in Comparison with Conventional Sample Preparation **T. Matsuyama*, K. Tsuji,** Osaka City University, Japan **H. Yoshii,** National Institutes for Quantum and Radiological Science and Technology, Japan

Friday Morning Sessions

**Signifies presenting author, when noted*

Applied and Functional Materials — Junior Ballroom A

Chairs: **I.C. Noyan,** Columbia University, USA, icn2@columbia.edu; **J.R. Bunn**, ORNL, USA, bunnjr@ornl.gov

8:30 D-84 Invited- Microstructural and Micromechanical Insights into Shape Memory Alloys from *in situ* Neutron Diffraction Experiments at Stress and Temperature
R. Vaidyanathan, University of Central Florida, USA

9:00 D-2 XRD of Natural and Artificial Pozzolanes - Industrial Residues and Natural Supplementary Cementitious Materials
H. Poellmann*, S. Galluccio, University of Halle, Germany

9:20 D-5 Morphological, Structural, and Chemical Properties of Thermally Stable Ni-Nb2O5 for Catalytic Applications
D. Barrett*, University of the Witwatersrand/LNLS, South Africa
G. Leal, C. Rodella, Brazilian Synchrotron Light Laboratory (LNLS), Brazil,
E. Teixeira-Neto, Brazilian Nanotechnology National Laboratory (LNNano), Brazil

9:40 Break

10:00 D-16 Synthesis and Characterization of Bone Replacement Materials by XRD, µ-CT and SEM
D. Buechner, E. Tobiasch, M. Schulze, S. Witzleben*, Bonn-Rhine-Sieg University of Applied Sciences, Germany
W. Goetz, University of Bonn, Germany

10:20 D-74 Application of Whole Powder Pattern Modeling to Understand Microstructural Properties Evolution of PuO_2 as a Function of Process Conditions
L. Sweet, J. Corbey, Pacific Northwest National Laboratory, United States
M. Leoni, University of Trento, Italy

10:40 D-82 The Role of Local Structure in the Optical Properties of Hexagonal $YMn_{1-x}Ga_xO_3$ and Isostructural Compounds
H. Sun, Illinois Institute of Technology, USA
S. Mukherjee, Uppsala University, Sweden
C. Segre, Illinois Institute of Technology, USA

Stress/Texture/In-Situ — Cypress

Chair: **T.R. Watkins,** ORNL, USA, watkinstr@ornl.gov

8:30 D-58 Invited- In-situ 3D Strain Mapping in Engineering Materials with X-ray Computed Tomography
E. Cakmak*, M. Gussev, S. Venkatakrishnan, T. Watkins, Oak Ridge National Laboratory, USA

9:00 D-76 Elucidating the Crystallographic Microstructure of Human Tooth Enamel with Sub-micron Resolved Synchrotron X-ray Diffraction
R.F. Free*, K.D. DeRocher, D. Joester, S.R. Stock, Northwestern University, USA
R. Xu, Argonne National Lab/APS, USA

9:20 D-86 Systematic Errors in Phase Fraction Measurements Due to Crystallographic Texture
A. Creuziger*, C. Calhoun, T. Gnaupel-Herold, National Institute of Standards and Technology, USA
W. Poling, NIST and General Motors Research & Development, USA

9:40 D-63 In-Situ Diagram Determination of the HfO_2-Ta_2O_5 Binary Up to 3000 °C
S.J. McCormack*, K.P. Tseng, W.M. Kriven, University of Illinois at Urbana Champaign, USA
R. Weber, Materials Development, USA
S.V. Ushakov, D. Kapush, A. Navrotsky, University of California Davis, USA

10:00 Break

10:20 D-90 Invited- Deformation and Fracture Behavior during In-Situ Tensile Loading of a Laser Powder Bed Fusion Processed 316L Stainless Steel Alloy
H. Choo*, L. White, M. Koehler, University of Tennessee, USA
X. Xiao, Y. Ren, Argonne National Laboratory, USA
D. Morin, E. Garlea, CNS/Y-12 National Security Complex, USA

10:50	D-79	In-situ Characterization of Laser Additive Manufacturing Process by High-Speed, High-Energy X-ray Diffraction **A. Chuang*, T. Sun, P. Kenesei, N. Parab, C. Zhao, J.S. Park, J. Almer,** Argonne National Laboratory, USA
11:10	D-10	Thermal Stresses in Two - Phase Systems **M.H. Seren*, I.C. Noyan,** Columbia University, USA **T.R. Watkins, E. Çakmak,** Oak Ridge National Laboratory, USA
11:30	D-89	Use of a Be-dome Holder for Texture and Strain Characterization of Li Metal Thin Films via Tilt-a-Whirl Methodology **M.A. Rodriguez*, K.L. Harrison, B. Perdue, J.J.M. Griego, S. Goriparti, B. Boyce,** Sandia National Laboratory, USA
11:50	D-17	Effect of Nucleating Agents on Crystalline Orientation and Warpage of Injection-molded Polypropylene **M. Ren*, J. Yin, X. Liu, Y. Tang, M. Guo, T. Zhang,** Sinopec Beijing Research Institute of Chemical Industry, China

Pair Distribution Function — Lilac C

Chairs: **O. Borkiewicz, K. Wiaderek,** APS, ANL, USA, borkiewicz@aps.anl.gov; kwiaderek@aps.anl.gov

8:30	D-47	Invited- 3D-Printed Devices for *In Situ* X-ray Pair Distribution Function Experiments **F.M. Michel*, A. Hoeher, A. Namayandeh,** Virginia Tech, USA **B. Raimbault,** École Normale Supérieure, France **O. Borkiewicz,** APS/Argonne National Laboratory, USA
9:00	D-87	Invited- Pair Distribution Function Analyses of Ultrathin-Films and Molecular Catalysts at Electrode and Functional Interfaces **D. Tiede*, A. Martinson, K. Mulfort,** Argonne National Laboratory, USA **G. Kwon,** Brookhaven National Laboratory, USA
9:30	D-92	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, M. Zhou,** Clemson University, USA
9:50		Break
10:10	D-94	Invited- High-rate Operando X-ray Studies of Lithium-ion Battery Materials **K.J. Griffith*,** Northwestern University, USA and University of Cambridge, UK **K.M. Wiaderek,** Advanced Photon Source, USA **G. Cibin,** Diamond Light Source, UK **L.E. Marbella, C.P. Grey,** University of Cambridge, UK
10:40	D-46	Use of Pattern Correction Algorithm to Remove the Effect of Axial Divergence in Atomic Pair Distribution Function (PDF) Analysis **D. Beckers*, M. Gateshki,** Malvern Panalytical B.V., The Netherlands **V.A. Kogan,** Dannalab, The Netherlands

Industrial Applications of XRF — Lilac D

Chair: **D. Broton,** CTLGroup, USA, dbroton@ctlgroup.com

8:30	F-38	Invited- How to Use and How Not to Use Certified Reference Materials in Industrial Chemical Metrology Laboratories **J.R. Sieber,** National Institute of Standards and Technology, USA
9:00	F-26	Examining Spatial Distributions of Elemental Impurities in Uranium Certified Reference Material 124 (CRM 124) Using Micro-X-ray Fluorescence **C. Worley*, S. Pacheco,** Los Alamos National Laboratory, USA
9:20	F-17	A Methodology to Obtain Traceability for Standards for the Mass per Unit Area of Thin Metal Alloy Layers for X-ray Fluorescence Tools **A. Nutsch*, A. Sehorz, M. Schwarzenberger,** Helmut Fischer, Germany **M. Krämer,** AXO DRESDEN GmbH, Germany **C. Streeck, B. Beckhoff,** Physikalisch-Technische Bundesanstalt, Germany **H. Merz,** Forschungsinstitut Edelmetalle & Metallchemie, Germany **S. Recknagel,** Bundesanstalt für Materialforschung und -prüfung, Germany

9:40		Break
10:00	F-7	Source of Errors in Sample Preparation for XRF Analysis **F. Davidts,** XRF Scientific, Belgium
10:20	F-36	Novel Approaches to quantifying light elements in complex matrices using benchtop Energy Dispersive X-Ray Fluorescence (EDXRF) **P. Dutta, C. McAlpin,** Dow Chemical Company, USA
10:40	F-18	A Novel Method for Conducting X-ray Fluorescence Experiments **B. Ganly*,** CSIRO, Australia **M. Kirkpatrick,** University of Wollongong, Australia **S. Armstrong,** University of New South Wales, Australia
11:00	F-4	Iteration Convergence of XRF Thickness Measurement Using Coating Substrate as Internal Standard **T. He*,** Bowman Analytic, Inc., USA

ICXOM-25 Program

ICXOM-25 Advisory Committees

Local Organizing Committee

Ursula Fittschen, (Clausthal University of Technology, DE)

Gerald Falkenberg (ICXOM22, 2013 Hamburg) (DESY, Hamburg, D)

Koen Janssens, (ICXOM15, 1998, Antwerp) (University of Antwerp, B)

Stefan Vogt, (Advanced Photon Source, Argonne National Laboratory, IL, USA)

Christian Stoltenberg, (Clausthal University of Technology, DE)

Denise Zulli, Conference Coordinator (International Centre for Diffraction Data, USA)

International Scientific and Advisory Committee

Koen Janssens, chair (ICXOM15, 1998, Antwerp) (University of Antwerp, B)

Peter Wobrauschek (ICXOM16, 2001, Vienna) (TUWien, A)

Alexandre Simionovici (ICXOM17, 2003, Chamonix) (U. Grenoble, F)

Sultan Dabagov (ICXOM18, 2005, Frascati) (LNFN, Frascati, I)

Shinjiro Hayakawa (ICXOM19, 2007, Kyoto) (University of Hiroshima, J)

Melissa Denecke (ICXOM20, 2009, Karlsruhe, D) (UMIST, Manchester, UK)

Carlos A. Pérez (ICXOM21, 2011 Campinas) (LNLS, Campinas, Br)

Gerald Falkenberg (ICXOM22, 2013 Hamburg) (DESY, Hamburg, D)

Juergen Thieme (ICXOM23, 2015 Brookhaven) (BNL, NY, USA)

Alessandra Gianoncelli (ICXOM24, 2017, Trieste) (ELETTRA, Trieste, I)

Monday Morning ICXOM Session

**Signifies presenting author, when noted*

X-ray Optics — Magnolia

Chairs: **U. Fittschen,** Clausthal University of Technology, Germany; ursula.fittschen@tu-clausthal.de; **S. Vogt,** APS, ANL, USA, svogt@anl.gov

8:30		Welcoming Remarks from the ICXOM-25 Organizers
8:40	I-29	Invited- Aberration-Corrected Optics for Diffraction-Limited Nanofocusing **F. Seiboth*, A. Schropp, F. Wittwer, M. Scholz, J. Garrevoet, G. Falkenberg, C. G. Schroer,** Deutsches Elektronen-Synchrotron (DESY), Germany **U. Boesenberg,** European XFEL GmbH, Germany **C. Rödel, M. Wünsche, T. Ullsperger, S. Nolte,** Friedrich-Schiller-Universität Jena, Germany **J. Rahomäki, K. Parfeniukas, S. Giakoumidis, U. Vogt,** KTH Royal Institute of Technology, Sweden **F. Koch, C. David,** Paul Scherrer Institut (PSI), Switzerland
9:10	I-65	Invited- Multilayer Laue Lenses for High Resolution X-ray Applications **A. Kubec*,** Fraunhofer IWS Dresden, Germany and Paul Scherrer Institut, Switzerland **S. Niese,** AXO Dresden GmbH, Germany **J. Gluch,** Fraunhofer IKTS, Germany **M. Rosenthal,** European Synchrotron Radiation Facility, France **J. Keckes,** Montanuniversität Leoben, Austria
9:40	I-75	Multi-beam Diffractive Optics for Experiments at X-ray Free-Electron Lasers **C. David*, B. Rösner, F. Döring, G. Seniutinas, V.A. Guzenko,** Paul Scherrer Institut, Switzerland
10:00	I-74	Plenoptic X-ray Microscopy **K.M. Sowa, M.P. Kujda, P. Korecki*,** Jagiellonian University in Krakow, Poland
10:20		Break
10:50	I-86	Invited- Quantitative, Total Metal Imaging Using 3D Confocal X-ray Fluorescence Microscopy at the Micron Scale **A. Woll*, D. Agyeman-Budu,** Cornell High Energy Synchrotron Source, USA **R. Tappero, Y. Chu, J. Thieme,** Brookhaven National Laboratory, USA **J.C. Chia, M.R. Ishka, O. Vatamaniuk,** Cornell University, USA
11:20	I-89	A Simple, High-Yield Solution for Fabrication of X-ray Transmission Mirror Optics **D.N. Agyeman-Budu*, A.R. Woll,** Cornell High Energy Synchrotron Source, USA
11:40	I-45	3D Additive Manufacturing of X-ray Polymer Refractive Nanolenses **A. Barannikov, P. Ershov, A. Snigirev,** Immanuel Kant Baltic Federal University, Russia **M. Polikarpov,** European Molecular Biology Laboratory, Germany **I. Snigireva*,** European Synchrotron Radiation Facility, France **V. Bessonov, K. Abrashitova, A. Fedyanin,** Moscow State University, Russia **V. Yunkin,** Institute of Microelectronics Technology RAS, Russia
12:00	I-59	Next-Generation X-ray Capillary Optics for High Throughput, High Resolution Applications **S. Seshadri*, W. Yun, M. Cordier, B. Stripe, R. Qiao, S. Lewis, J. Kirz,** Sigray Inc, USA

Monday Afternoon ICXOM Session

**Signifies presenting author, when noted*

New Detectors and Instrumentation - Part I — Magnolia

Chairs: **P. Siddons, J. Thieme,** BNL, USA, siddons@bnl.gov; jthieme@bnl.gov

2:00	I-8	Invited- Detector Developments for Photon Science at PSI **G. Tinti*, M. Andrae, R. Barten, M. Brueckner, S. Chiriotti Alvarez, R. Dinapoli, E. Froejdh, D. Greiffenberg, C. Lopez Cuenca, D. Mezza, M. Meyer, A. Mozzanica, S. Redford, Ch. Ruder, B. Schmitt, X. Shi, D. Thattil, S. Vetter, J. Zhang,** Paul Scherrer Institut, Switzerland

2:30 I-85 Application of Area Detector to Simultaneous X-ray Diffraction and X-ray Absorption Spectroscopy Measurements
C. Sun*, Argonne National Laboratory, USA

2:50 I-25 Laboratory-based X-ray Absorption System for Study of Battery Materials
S. Seshadri*, R. Qiao, S. Lewis, W. Yun, Sigray, Inc., USA
U. Fittschen, Clausthal University of Technology, Germany

3:10 Break

3:40 I-61 ARDESIA: A Fast SDD X-ray Spectrometer for Synchrotron Applications
C. Fiorini*, G. Utica, M. Gugiatti, I. Hafizh, M. Carminati, A. Capsoni, S. Coelli, Politecnico di Milano and INFN Milano, Italy
A. Balerna, V. Tullio, INFN, Frascati, Italy
G. Borghi, F. Ficorella, N. Zorzi, Fondazione Bruno Kessler - FBK, Italy
L. Bombelli, XGLAB srl, Italy
G.O. Lepore, ESRF, France

4:00 I-92 Recent Breakthroughs in Nano-tomography with the Transmission X-ray Microscope at APS
V. De Andrade*, M. Wojcik, A. Deriy, S. Bean, F. De Carlo, Argonne National Laboratory, USA

ICXOM Poster Session - Monday Evening
5:00 pm - 7:00 pm in the Grand Ballroom (Exhibit Hall)

**Signifies presenting author, when noted*

I-14 **A Road Map to Asses Critical Materials Content in Boron Industrial Wastes using Sustainable micro-XRF and TXRF Instrumentation**
U.E.A Fittschen, C. Gutsche, A. Fittschen, Clausthal University of Technology, Germany
I. Kula, Mugla Sitki Kocman University, Turkey

I-15 **Characterization of Slags with Respect to Recycling of Critical Materials with TXRF and Laboratory-based XANES**
A. Wittkowski, U. Fittschen*, T. Schirmer, Clausthal University of Technology, Germany
S. Seshadri, R. Qiao, Sigray, USA

I-17 **Double Multilayer Monochromators DMM and Montel X-ray Optics for Synchrotron Beamlines**
F. Hertlein*, U. Heidorn, C. Umland, C. Michaelsen, J. Wiesmann, Incoatec GmbH, Germany

I-19 **Metal Localization and Speciation in Plant Leaves and Roots: From Small to Big Objects**
A. Mijovilovich*, F. Morina, A. Mishra, E. Andresen, Czech Academy of Sciences, Czech Republic
D. Brueckner, Deutsches Elektronen-Synchrotron (DESY), University of Hamburg and Ruhr-University Bochum, Germany
K. Spiers, J. Garrevoet, G. Falkenberg, Deutsches Elektronen-Synchrotron (DESY), Germany
H. Küpper, Czech Academy of Sciences and University of South Bohemia, Czech Republic

I-20 **Investigation on Vanadium Crossover in Nafion™ and Novel ETFE-Based Membranes for Vanadium Redox Flow Batteries**
C. Lutz*, X. Ke, S. Beuermann, U. Fittschen, Clausthal University of Technology, Germany
S. Seshadri, R. Qiao, Sigray Inc., USA

I-23 **Micro X-ray Fluorescence Computed Tomography System for Determination of Three-Dimensional Elemental Distribution in a Single Hair Strand**
S. Hayakawa*, R. Kondo, T. Yamato, K. Komaguchi, Hiroshima University, Japan
A. Munoz-Noval, University Complutense of Madrid, Spain
S. Honda, SPring-8, Japan
Y. Nishiwaki, Kochi University, Japan

I-24 **In Situ Local Temperature Mapping in X-ray Microscopy Nano-Reactors with Luminescence Thermometry**
I.K. van Ravenhorst*, R.G. Geitenbeek, A.M.J. van der Eerden, F. Meirer, B.M. Weckhuysen, Utrecht University, The Netherlands
T.J. van Omme, H.H. Peréz Garza, DENSsolutions B.V., The Netherlands

I-26 **Recent Performance Improvements to TomoPy**
J.R. Madsen, R. Thomas, National Energy Research Scientific Computing Center, USA
D. Ching*; D. Gursoy, Argonne National Laboratory, USA
V. Nikitin, Max IV Laboratory, Sweden
Z. Ronaghi, Nvidia Corporation, USA
P. Oleksandr, Intel Corporation, USA

I-27 **Laser-Driven Secondary X-ray Sources and Applications at ELI Beamlines**
R. Lera*, D.D Mai, O. Hort, E. Klimešová, O. Kulyk, B. Angelov, S. Espinoza, M. Krikunova, J. Nejdl, J. Andreasson, ELI Beamlines, Czech Republic

I-30 **The Diamond I13 Full-field Transmission X-ray Microscope: A Zernike Phase Contrast Setup for Material Sciences**
M. Storm*, S. Marathe, C. Rau, Diamond Light Source, United Kingdom
F. Döring, Paul-Scherrer-Institut, Switzerland

I-31 **A Combined Approach to High-Throughput Single Catalyst Particle Diagnostics**
A.E. Nieuwelink*, M.E.Z. Velthoen, Y.C.M. Nederstigt, K.L. Jagtenberg, F. Meirer, B.M. Weckhuysen, Utrecht University, The Netherlands

I-33 **X-ray Imaging, Microscopy and Tomography on EMBL Beamline P14 at PETRA III**
M. Polikarpov*, G. Bourenkov, T. Schneider, European Molecular Biology Laboratory, Germany
A. Snigirev, Immanuel Kant Baltic Federal University, Russia

I-36 **Statistically Uniform Hybrid Pixel Array Detector**
Y. Nakaye*, Y. Sakuma, S. Mikusu, T. Sakumura, Rigaku Corporation, Japan

I-39 **First Experiences from an International Initiative for Round Robin Tests in X-ray Absorption Spectroscopy**
E. Welter*, Deutsches Elektronen-Synchrotron (DESY), Germany
H. Abe, M. Kimura, High Energy Accelerator Research Organization (KEK), Japan
B.A. Bunker, University of Notre Dame, USA
C.T. Chantler, The University of Melbourne, Australia
M. Newville, University of Chicago - CARS, USA

I-40 **Creating Nano-focused X-** WITHDRAWN **Bimorph Deformable Mirror**
L. Peverini, Thales SESO S

I-41 **First Results from a Monochromatic Confocal Micro X-ray Fluorescence (µXRF) Spectrometer for the Lab**
D. Ingerle*, P. Wobrauschek, C. Streli, TU Wien Atominstitut, Austria
K. Hradil, TU Wien X-ray Center, Austria

I-42 **X-ray Reflecto-Interferometer Based on Refractive Optics**
I. Snigireva*, O. Konovalov, European Synchrotron Radiation Facility, France
S. Lyatun, D. Zverev, P. Ershov, I. Lyatun, A. Snigirev, Immanuel Kant Baltic Federal University, Russia

I-47 **X-ray Microscopy for Materials Research under Extreme Conditions**
A. Barannikov, P. Ershov, A. Snigirev*, Immanuel Kant Baltic Federal University, Russia
T. Fedotenko, L. Dubrovinsky, E. Koemets, N. Dubovinskaia, University of Bayreuth, Germany
M. Hanfland, I. Snigireva, European Synchrotron Radiation Facility, France

I-48 **New Compact Transfocator for X-ray Focusing**
A. Narikovich, P. Ershov, A. Lushnikov, A. Barannikov, I. Lyatun, N. Klimova, I. Panormov, A. Sinitsyn, D. Zverev, A. Snigirev*, Immanuel Kant Baltic Federal University, Russia
M. Polikarpov, European Molecular Biology Laboratory, Germany
I. Snigireva, European Synchrotron Radiation Facility, France

I-49 **X-ray Phase-Contrast Imaging Technique Based on Multilens Interferometer**
D. Zverev, A. Snigirev, Immanuel Kant Baltic Federal University, Russia
I. Snigireva*, European Synchrotron Radiation Facility, France
S. Kuznetsov, V. Yunkin, Institute of Microelectronics Technology RAS, Russia

I-50 **Full Field Nanotomography: Towards Time Resolution and *in-situ* Applications**
I. Greving*, S. Flenner, E. Longo, F. Wilde, J. Brehling, U. Tietze, L. Lottermoser, H. Burmester, T. Dose, F. Beckmann, Helmholtz-Zentrum Geesthacht, Germany
M. Storm, Diamond Light Source, UK
A. Kubec, C. David, Paul-Scherrer-Institut, Switzerland

I-51 **Beam-shaping Refractive Optics for High Energy X-rays**
D. Zverev*, A. Barannikov, A. Snigirev, Immanuel Kant Baltic Federal University, Russia
V. Kohn, National Research Center "Kurchatov Institute", Russia
V. Yunkin , S. Kuznetsov, Institute of Microelectronics Technology RAS, Russia
I. Snigireva, European Synchrotron Radiation Facility, France

I-54 **Compact Table Top micro-XRF Spectrometer with Low Power Rh Target Tube Excitation**
P. Wobrauschek, D. Ingerle*, J. Prost, C. Streli, TU Wien - Atominstitut, Austria
S. Dhara, N. Lal Misra, Bhaba Atomic Research Centre, India

I-57 **EIGER2 Detector Systems: Tools for Advanced X-ray Studies**
M. Müller*, S. Brandstetter, DECTRIS Ltd, Switzerland

I-58 **Long Distance Multilayer Laue Lenses – New Possibilities for X-ray Nanoprobe Experiments**
P. Gawlitza*, A. Leson, Fraunhofer IWS Dresden, Germany
A. Kubec, Paul Scherrer Institute (PSI), Switzerland
J. Gluch, Fraunhofer IKTS Dresden, Germany
S. Niese, AXO Dresden GmbH, Germany
J. Keckes, J. Todt, Mointanuniversität Leoben, Austria

I-63 **Seven-Element Silicon Drift Detector for Ultra-High Count Rate Application**
J. Wang*, V.D. Saveliev, S. Barkan, E. Tikhomirov, M. Zhang, E.V. Damron, D. Redfern, Hitachi High-Technologies Science America, Inc., USA

I-68 **A Route from 2D-XRD to Polycrystal Properties**
L.E. Fuentes-Cobas*, D.C. Burciaga-Valencia, E.E. Villalobos-Portillo, M.E. Montero-Cabrera, Centro de Investigacion en Materiales Avanzados, Mexico
L. Fuentes-Montero, Diamond Light Source, UK
D. Chateigner, Normandie Université, France
G. Pepponi, Fondazione Bruno Kessler, Italy
S. Grazulis, Vilnius University, Lithuania

I-69 **X-ray Fluorescence Analysis in an Electron Microscope: Further Improvement of the Spotsize of Polycapillary Focusing Optics combined with the Modular X-ray Source iMOXS/2®**
M. Menzel*, A. Bjeoumikhov, Helmut Fischer GmbH, Germany

I-73 **Visualising Metals in Hyperaccumulator Plants using Synchrotron µXRF Computed Tomography**
K.M. Spiers*, G. Falkenberg, J. Garrevoet, Deutsches Elektronen-Synchrotron DESY, Germany
D. Brueckner, Deutsches Elektronen-Synchrotron DESY, University of Hamburg and Ruhr-University Bochum, Germany
E. Montargès-Pelletier, Université´ de Lorraine, France
A.van der Ent, The University of Queensland, Australia and Université´ de Lorraine, France

I-76 **Full-field Structured-Illumination Super-Resolution X-ray Transmission Microscopy**
B. Günther*, L. Hehn, M. Dierolf, F. Pfeiffer, Technical University of Munich, Germany
A. Hipp, Helmholtz Zentrum Geesthacht, Germany

I-77 **Evaluation of X-ray Diffraction (XRD) P… …tion in Chitosan Zinc Oxide (CZnO) Nanoadsorbent**
S. Hiregoudar*, B.L. Dinesha, P.M. S… …, University of Agricultural Sciences, India

WITHDRAWN

I-78 **Polycapillary Optic for Liquid-Metal-Jet X-ray sources**
A. Adibhatla*, Excillum Inc., USA
M. Lindqvist, B. Hansson, Excillum AB, Sweden

I-79 **Implementation of the Rococo 2 Silicon Drift Detector at the cryogenic Endstation of Beamline P06 at Petra III**
A. Graefenstein*, C. Rumancev, S. Stuhr, A.R. von Gundlach, T. Senkbeil, L. Jolmes, B. Koenig, A. Rosenhahn, T. Voepel, S. Ebbinghaus, Ruhr University Bochum, Germany
J. Garrevoet, G. Falkenberg, W. Schroeder, Deutsches Elektronen-Synchrotron (DESY), Germany

I-80 **The Hard X-ray Microprobe Experiment at Beamline P06 (DESY)**
G. Falkenberg*, K. Spiers, D. Brückner, K.V. Falch, J. Garrevoet, Deutsches Elektronen-Synchrotron (DESY), Germany

I-81 **Determination of the Composition of Fine-dispersed Inclusions of Native Gold in a Matrix of a Sulfide Mineral by Electron Microprobe**
V.V. Tatarinov, Siberian Branch of the Russian Academy of Sciences, Russia

I-84 **In-situ microCT Instrument for Planetary Exploration**
P. Sarrazin*, R. Obbard, SETI Institute, USA
N. Vo, Diamond Light Source, UK
K. Zacny, Honeybee Robotics, USA

I-87 **Optimizing Scan Trajectory for X-ray Fluorescence Tomography**
F.S. Marin, C. Roehrig, D. Gursoy, K. Kemner, O. Antipova, Argonne National Laboratory, USA
J. Cabana-Jimenez, E. Allen, University of Illinois at Chicago, USA

I-88 **Runout Characterization of a Heavy Load Mechanical Rotation Stage by a Precision Steel Sphere**
E. Larsson*, S. Yu, T. Sjögren, Sweden
Z. Hegedues, T. Müller, T. Bä, Deutsches Elektronen-Synchrotron (DESY), Germany
S. Hall, R. Mokso, Lund University, Sweden
WITHDRAWN

I-91 **Spherical Optics by Dislocation of Crystal Structur**
J.M. Maj, Marquette University, USA

I-93 **Analyzing the Color Appearance Original Microstructure via Numerical Solutions of Maxwell's Equations**
S.H. Tseng*, T.H. Kuo, T.Y. Ch, University, Taiwan
WITHDRAWN

I-95 **Application of X-ray computed Microtomography to Structural Analysis of Jewels from the Museum of the Royal Tombs of Sipán**
S. Azeredo*, R. Lopes, Universidade Federal do Rio de Janeiro, Brasil
R. Cesareo, Universita di Sassari, Italy
A. Bustamante, Universidad Nacional Mayor de San Marcos, Peru
W. Alva, Museuo ''Tumbas Reales de Sipan'', Peru

I-96 **Flux Optimization of an Illinois Tech Bending Magnet Beamline**
B. Carlson*, C. Segre, A. Khounsary, Illinois Institute of Technology, USA

I-98 **In-situ Strain Mapping during Nanoindentation of CVD TiAlN Thin Films**
G. Lotze, S. Kalbfleisch, S. Carlson, MAX IV Laboratory, Sweden
O. Bäcke, M. Hörnqvist Colliander, Chalmers University of Technology, Sweden

I-101 **Microscopic Mapping of the Full Strain Tensor, Local Orientation and Composition in an $In_xGa_{1-x}N$ Heterostructure via Scanning X-ray Diffraction**
C. Richter*, Leibniz-Institut fuer Kristallzuechtung, Germany and ESRF, France
A. Even, OSRAM, Germany and CEA-LETI, France
A. Dussaigne, P. Ferret, CEA-LETI, France
Y-M. Le Vaillant, Nelumbo Digital, France
T. Schulli, ESRF, France
D. Barrett*, University of the Witwatersrand/LNLS, South Africa
G. Leal, C. Rodella, Brazilian Synchrotron Light Laboratory (LNLS), Brazil,
E. Teixeira-Neto, Brazilian Nanotechnology National Laboratory (LNNano), Brazil

Tuesday Morning ICXOM Session

**Signifies presenting author, when noted*

New Detectors and Instrumentation - Part II — Magnolia

Chairs: **P. Siddons, J. Thieme,** BNL, USA, siddons@bnl.gov; jthieme@bnl.gov

9:00 I-107 Invited- Accelerating Discovery with Multi-Modal Operando Microscopy
D. Shapiro*, Lawrence Berkeley National Laboratory, USA

9:30 I-11 Invited- Hard X-ray Full-field Transmission X-ray Microscopy at NSLS-II
W.K. Lee*, M. Ge, X. Xiao, D.S. Coburn, E. Nazaretski, W. Xu, H. Xu, K. Gofron, Z. Yin, Brookhaven National Laboratory, USA

10:00 I-43 High Resolution 3D X-ray Diffraction Microscopy using Nano Focused X-rays
H. Stieglitz*, C. Krywka, M. Müller, Helmholtz-Zentrum Geesthacht, Germany

10:20		Break
10:50	I-83	Hollow Beam X-ray Diffraction and Absorption Tomography **P. Evans*, A. Dicken, F. Elarnaut, D. Downes,** Nottingham Trent University, UK **K. Rogers,** Cranfield University, UK
11:10	I-4	Detection of Low Energy X-rays with High Efficiency and Spectral Resolution **L. Strüder*,** PNSensor GmbH and University of Siegen, Germany **S. Aschauer, R. Hartmann,** PNSensor GmbH, Germany **H. Soltau, A. Niculae, J. Davis,** PNDetector GmbH, Germany
11:30		Please break for lunch at this time. *For those joining the session at Argonne National Laboratory, please meet in the hotel main lobby at **12:30 pm**. The bus for ANL will leave the hotel at exactly **12:40 pm**. *Only approved ICXOM attendees registered with ANL may attend.

Tuesday Afternoon ICXOM Session

(Held at Argonne National Laboratory - Building 402, Auditorium)

**Signifies presenting author, when noted*

Advanced XRF and SR Nanoprobes

Chairs: **A. Lanzirotti,** The University of Chicago, USA, lanzirotti@uchicago.edu; **C. Sun,** ANL, USA, cjsun@aps.anl.gov

2:00	I-28	Invited- Nanoscale Multimodal X-ray Imaging at NSLS-II **Y.S. Chu *, H. Yan, X. Huang, A. Pattammattel, E. Nazaretski, N. Bouet, P. Ilinski,** Brookhaven National Laboratory, USA
2:30	I-104	Invited- Cryo X-ray Nanotomography Correlating Structure and Elemental Composition **P. Cloetens*, J.C. da Silva, A. Pacureanu, M. Salome, Y. Yang,** ESRF, France **S. Bohic,** ESRF and UGA, France
3:00	I-12	Ptychographic Nano-analytical X-ray Microscope (PtyNAMi) at PETRA III **C.G. Schroer*,** DESY & University of Hamburg, Germany **M. Seyrich, A. Schropp, S. Botta, R. Döhrmann, J. Hagemann, M. Kahnt, M. Lyubomirskiy, M. Scholz, P. Wiljes, F. Wittwer, D. Brückner, J. Garrevoet, G. Falkenberg,** DESY, Germany **L. Grote,** University of Hamburg, Germany
3:20	I-99	The NanoMAX Beamline at MAX IV **S. Kalbfleisch*, K. Thånell, U. Johansson, G. Carbone, A. Björling, A. Rodriguez-Fernandez, L. Roslund, K. Åhnberg, P. Bell, A. Mikkelsen,** Lund University, Sweden **U. Vogt,** KTH/Royal Institute of Technology, Sweden
3:40	I-72	Nanoscopes at Pohang Accelerator Laboratory (PSL-II and PAL-XFEL) **H.J. Shin*, N. Kim, H. Kim, J. Baik, J.H. Lim,** Pohang Accelerator Laboratory, Korea
4:00		Break
4:15		Begin tour of the APS
6:00		Transfer back to the Westin Lombard Yorktown Hotel

Wednesday Morning Plenary Session
8:30 AM - 12:15 PM

**Signifies presenting author, when noted*

PLENARY – New Approaches in Imaging - A joint session of ICXOM and DXC — Lilac C & D

Chairs: **U. Fittschen,** Clausthal University of Technology; Germany; **T.G. Fawcett,** Emeritus, ICDD, USA

8:30	Opening Remarks and Awards Opening remarks from **Tim Fawcett**, Chairman of the Denver X-ray Conference, Emeritus ICDD, USA 2019 Barrett Award presented to **Peter Stephens,** Stony Brook University, USA. Presented by the Chairman of the Barrett Award Selection Committee, **Conal Murray,** IBM T.J. Watson Research Center, USA. 2019 Jenkins Award presented to **John Anzelmo,** Anzelmo & Associates, Inc., USA. Presented by the Chairman of the Jenkins Award Selection Committee, **Tim Fawcett**, Emeritus ICDD, USA

2019 Hanawalt Award presented to **Cev Noyan**, Columbia University, USA. Presented by **Tom Blanton**, Executive Director, ICDD, USA

2019 Jerome B. Cohen Student Award winner to be announced by the Chairman of the Cohen Award Selection Committee, **Cev Noyan**, Columbia University, USA

2019 Robert L. Snyder Student Awards to be announced by **Tom Blanton**, Executive Director, ICDD, USA

Remarks by the Plenary Session Chair, **Ursula Fittschen**, Clausthal University of Technology; Germany

9:00 I-5 Multimodal Imaging Using Lyncean's Compact Synchrotron Source
B. Hornberger, Lyncean Technologies, USA

9:45 I-70 Spatial and Temporal Exploration of Heterogeneous Catalysts with Synchrotron Radiation
F. Meirer, University of Utrecht, The Netherlands

10:30 Break

11:00 I-105 X-ray Imaging from Tissues to Cells to Subcellular Structures
G. Woloschak, Northwestern University, Feinberg School of Medicine, USA

11:45 P-2 Nanocrystalline Powder Diffraction Analysis
I.C. Noyan*, H. Öztürk, S. Xiong, Columbia University, USA

Wednesday Afternoon ICXOM Sessions

**Signifies presenting author, when noted*

Cultural Heritage I - ICXOM+ — Magnolia

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

1:00 I-100 Invited- Innovative Strategies for the use of in-situ and SR-based X-ray Techniques to Reveal Artistic Technology and Relight History
E. Pouyet*, H. Chopp, O. Cossairt, Q. Dai, A. Katsaggelos, M. Walton, Northwestern University, USA

1:30 I-37 Invited- Combining X-ray and Visual Hyperspectral Imaging for the Investigation of Painted Cultural Heritage Objects
M. Alfeld, TU Delft, The Netherlands

2:00 I-38 Simultaneous XRD-XRF Mapping of Daguerreotypes with the Color X-ray Camera
J.M. Davis*, J. Schmidt, M. Huth, H. Soltau , PNDetector, Germany
E. Vicenzi, Smithsonian Museum Conservation Institute, USA
R. Hartmann, L. Strüder, PNSensor, Germany

2:20 I-82 Invited- Vermeer's Discriminating use of Lead White Pigments in Girl with a Pearl Earring, as Revealed by Macroscopic XRPD
S. De Meyer, F. Vanmeert, R. Vertongen, G. Van der Snickt, K. Janssens*, University of Antwerp, Belgium
A. Vandivere, A. Van Loon, Mauritshuis Museum, The Netherlands
V. Gonzalez, Delft University of Technology, The Netherlands
K. Dooley, J. Delaney, National Gallery of Art, USA

2:50 Break

+ Cultural Heritage Part II (DXC Session) will continue in Cypress B Room from 3:10 - 5:10 pm.

Functional Materials+ — Magnolia

Chairs: **F. Meirer,** Utrecht University, The Netherlands, f.meirer@uu.nl; **G. Pepponi,** Fondazione Bruno Kessler, Italy, pepponi@fbk.eu

3:20 I-9 Invited- Multimodal Imaging of Solar Cells during in-situ and Operando Experiments
M.E. Stuckelberger*, C. Ossig, DESY, Germany
M.I. Bertoni, Arizona State University, USA
C.G. Schroer, DESY, Germany

3:50 I-13 Invited - Characterization of Vanadium in Slags and Redox Flow Batteries
U. Fittschen*, A. Wittkowski, C. Lutz, T. Schirmer, Clausthal University of Technology, Germany
S. Seshadri, R. Qiao, Sigray, USA

4:20 I-52 Invited- Elemental Imaging of Trace Elements in Bone Samples
C. Streli*, M. Rauwolf, A. Turyanskaya ,D. Ingerle, P. Wobrauschek, TU Wien - Atominstitut, Austria

4:50 I-35 Unraveling Ni Interaction with γ-Al_2O_3 Matrix in a Fluid Catalytic Cracking Individual Particle
M. Gambino*, M. Veselý, M. Filez, R. Oord, F. Meirer, B.M. Weckhuysen, Utrecht University, The Netherlands
D. Ferreira Sanchez, D. Grolimund, Paul Scherrer Institute, Switzerland
N. Nesterenko, D. Minoux, Total Research and Technology Feluy, Belgium
M. Maquet, Total Research and Technology Gonfreville, France

5:10 I-60 Identification of Secondary Phases in Thin Film Solar Cells by 3DXRD and Multigrain Crystallography
M. Mar Lucas*, M. Gansukh, S. Canulescu, S. Engberg, T. Ramos, P.S. Jørgensen, H.F. Poulsen, J.W. Andreasen, Technical University of Denmark, Denmark
P. Kenesei, Argonne National Laboratory, USA
J. Wright, ESRF, France

5:30 I-53 Combined GIXRF and XRR Analysis (GIXA) for the Nondestructive Characterization of Nanomaterials in the Laboratory
D. Ingerle*, P. Wobrauschek, C. Streli, TU Wien - Atominstitut, Austria
G. Pepponi, Fondazione Bruno Kessler, Italy

5:50 I-7 Selected Application Examples in Functional Materials by Coated Hollow Capillaries used as X-ray Optics
J. Wochnowski, Technische Hochschule Lübeck, Germany

+Previously advertised talk, *The Function of Heterogeneous Catalysts as Revealed by X-ray Absorption Spectroscopy*, by **S.R Bare*,** SLAC National Accelerator Laboratory, USA, has been withdrawn from the Program.

Thursday Morning ICXOM Sessions

**Signifies presenting author, when noted*

Earth & Environmental Sciences — Magnolia

Chairs: **D. Eichert,** Elettra-Sincrotrone Trieste, Italy, diane.eichert@elettra.eu; **U. Fittschen,** Clausthal University of Technology, Germany, ursula.fittschen@tu-clausthal.de

8:30 I-22 Invited- Do the Naica Giant Crystals Deteriorate due to Human Action?
M.E. Montero-Cabrera*, I. Castillo-Sandoval, I.J.A. Carreño-Márquez, L.E. Fuentes-Cobas, H.E. Esparza-Ponce, J. Canche-Tello, M.Y. Luna-Porres, G. González-Sánchez, G. Herrera-Pérez, D. Burciaga-Valencia, C. Caraveo, Centro de Investigacion en Materiales Avanzados, Mexico
B. Pérez-Cázares, M.E. Fuentes-Montero, J.M. Nápoles, G. Gómez, L. Muñoz, I. Reyes-Cortés, M. Reyes-Cortés, Universidad Autónoma de Chihuahua, Mexico
E. Menéndez-Méndez, Instituto Eduardo Torroja de Ciencias de la Construcción, Spain
H. Castillo-Michel, European Synchrotron Radiation Facility, France
D. Eichert, Elettra-Sincrotrone Trieste, Italy
R. Loredo-Portales, Universidad Nacional Autónoma de México, Mexico
U. Salazar-Kuri, Benemérita Universidad Autónoma de Puebla, Mexico

9:00 I-62 Invited- X-ray Micro and Nanotomographic Investigation of Soil Aggregate Microbial and Pore Structure
K.M. Kemner*, O. Antipova, D. Gursoy, B. Lai, C. Roehrig, S. Vogt, F. Marin, Argonne National Laboratory, USA
S. O'Brien, University of Illinois, USA
D. Sholto-Douglas, Illinois Institute of Technology, USA
A. Dohnalkova, L. Kovarik, Pacific Northwest National Laboratory, USA
M. Whiteside, Vrije Universiteit Amsterdam, The Netherlands

9:30 I-106 Invited- Samples from Mars and How to Study Them
J. Thieme*, C. Trewhella, M. Schoonen, NSLS II, Brookhaven National Laboratory, USA
J. Hurowitz, Stony Brook University, USA

10:00 I-97 Positioning Capabilities of the Planetary Instrument for X-ray Lithochemistry
C. Heirwegh, Jet Propulsion Laboratory, USA

10:20 Break

Data Analysis - Part I — Magnolia

Chairs: **F. De Carlo, W. Di,** ANL, USA, decarlo@aps.anl.gov; wendydi@anl.gov

10:50	I-18	Invited- Improving X-ray Tomography Reconstruction and Analysis using Deep Learning **D.M. Pelt*,** Centrum Wiskunde & Informatica, The Netherlands
11:20	I-56	Machine Learning and Computational Tools for the Scale-up of X-ray Dataset **P. KC*,** The University of Chicago and Argonne National Laboratory, USA **V. De Andrade,** Argonne National Laboratory, USA **N. Kasthuri,** The University of Chicago, USA
11:40	I-34	Missing-wedge X-ray Tomography with Deep Learning **X. Yang*, A. Schropp, D. Brückner, C.G. Schroer,** Deutsches Elektronen-Synchrotron (DESY), Germany
12:00	I-90	Invited- Computed Tomography at High-speeds **D. Gursoy,** Argonne National Laboratory, USA
12:30		Lunch Break

Thursday Afternoon ICXOM Sessions

**Signifies presenting author, when noted*

Data Analysis - Part II — Magnolia

Chairs: **F. De Carlo, W. Di,** ANL, USA, decarlo@aps.anl.gov; wendydi@anl.gov

1:40	I-16	Optimization-Based Simultaneous Alignment and Reconstruction in Fluorescence Tomography **W. Di*, S. Chen, D. Gursoy, S. Leyffer, S. Wild, S. Vogt,** Argonne National Lab, USA **T. Paunesku,** Northwestern University, USA
2:00	I-102	Invited- High Throughput Phase Retrieval **S. Marchesini,** Lawrence Berkeley Lab, USA
2:30	I-64	Multibeam X-ray Ptychography for High Throughput, Large Field-Of-View Imaging **Y. Yao*, Y. Jiang, J.A. Klug, M. Wojcik, Z. Cai, B. Lai, S. Vogt, J. Deng,** Argonne National Laboratory, USA
2:50	I-67	Alternating Direction Method of Multipliers for 3D Ptychography **S. Aslan*, D. Gursoy, S. Leyffer, D.J. Ching, T. Bicer,** Argonne National Laboratory, USA **V. Nikitin,** Max IV Laboratory, Sweden
3:10	I-46	WONDER – Whole POwder PatterN MoDElling in Orange **L. Rebuffi*,** Argonne National Laboratory, USA **A. Flor, B. Mukherjee, P. Scardi,** University of Trento, Italy
3:30		Break

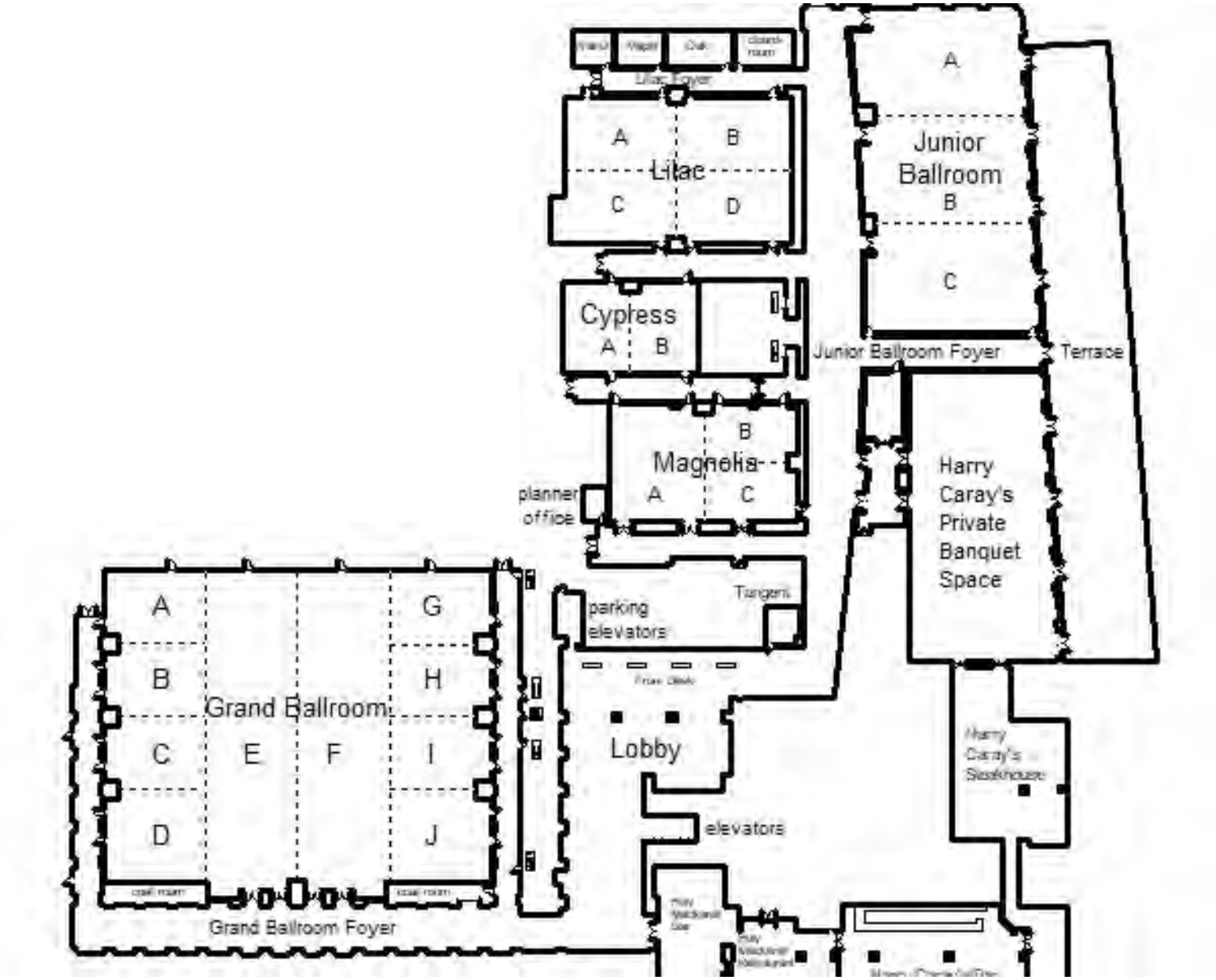
Biological Applications — Magnolia

Chairs: **G. Falkenberg, K. Spiers,** DESY, Germany, Gerald.Falkenberg@desy.de; kathryn.spiers@desy.de

4:00	I-32	Invited- Investigation of Metal(loid) Distribution and Speciation in Plants by µXRF and µXANES on Frozen-Hydrated and Living Sample **H. Küpper*, A. Mijovilovich, A. Mishra, F. Morina,** Biology Centre of the Czech Academy of Sciences, Czech Republic **S. Mishra,** Deen Dayal Upadhyay Gorakhpur University, India **E. Peiter,** Martin Luther University Halle-Wittenberg, Germany **D.s Brückner, G. Falkenberg,** Deutsches Elektronen-Synchrotron DESY, Germany **K. Ignatiev,** Diamond Synchrotron, England, UK
4:30	I-103	Invited- Imaging Metals in Single Cells at the Nanoscale and the Accompanying Quest for Quantification **B. de Samber,** Universiteit Gent, Belgium
5:00	I-44	Assessment of Image Contrast and Signal to Noise Ratio in Analyzer Based Imaging of Lungs in Rodents **R. Hendrik Menk*,** Elettra Sincrotrone Trieste, Italy **L. Rigon, F. Arfelli,** Università di Trieste, Italy

5:20	I-66	Invited- Adventures in Iron Biochemistry: X-ray Spectroscopy as a Tool for Studying Biological Iron Coordination Chemistry **S.A James*, G. McColl,** The Florey Institute of Neuroscience and Mental Health and Australian Synchrotron, ANSTO, Australia **M.D. de Jonge,** Australian Synchrotron, ANSTO, Australia **A. Ramirez, C. Opazo,** The Florey Institute of Neuroscience and Mental Health, Australia **M.M.W. Jones,** Queensland University of Technology, Australia
5:50		Closing Remarks
6:10		ICXOM-25 End

Westin Lombard Hotel Layout



2019 DXC & ICXOM-25 Program at a Glance ♦ Monday-Friday, 5-9 August

	Junior Ballroom A	Cypress	Lilac C	Lilac D	Magnolia
Monday am DXC Workshops 9:00 am – 12:00 pm; ICXOM am Session 8:30 am – 12:20 pm					
Special Topic	Intro to X-ray Computed Tomography (**Takase**)	Sample Prep./Exp.Conditions XRF/XRD(**Ichikawa/Tanaka/Ohbuchi**)			
XRF			Handheld XRF (**Loubser**)		
ICXOM					X-ray Optics (**Fittschen/Vogt**)
Monday pm DXC Workshops 1:30 pm - 4:30 pm; ICXOM pm Session 2:00 pm – 4:20 pm					
XRD	High Energy XRD Microscopy (**Park/Sharma**)	Basic to Intermediate XRD (**Blanton/Misture/Rodriguez**)			
XRF			Trace Analysis (**Streli/Wobrauschek**)	Quantitative Analy. of XRF I (**Elam/Vrebos**)	
ICXOM					New Detectors & Instr. I (**Siddons/Thieme**)
Monday Evening XRF & ICXOM Poster Session, Reception and Exhibits, Grand Ballroom, 5:00 pm – 7:00 pm (Schmeling)					
Tuesday am DXC Workshops 9 am - 12:00 pm; ICXOM am Session 9:00 am – 11:30 am					
Special Topic			Education in X-ray Analysis (**Schmeling**)		
XRD	SAXS Data Reduction and Analysis…I (**Ilavsky/Zhang**)	Rietveld I (**Borkiewicz**)			
XRF				Micro & Energy Dispersive XRF (**Zaitz**)	
ICXOM					New Detectors & Instr. II (**Siddons/Thieme**)
Tuesday Afternoon DXC Workshops 1:30 pm - 4:30 pm; ICXOM pm Session held off-site at ANL. Bus boards at 12:30 pm					
XRD	SAXS Data Reduction and Analysis…II (**Ilavsky**)	Rietveld II (**Borkiewicz**)			
XRF			Basic XRF (**Anzelmo**)	Quantitative Analy. of XRF II (**Elam/Vrebos**)	
ICXOM					ICXOM at ANL: Advanced XRF & SR Nanoprobes (**Lanzirotti/Sun**)
Tuesday Evening XRD Poster Session, Reception and Exhibits, Grand Ballroom, 5:00 pm – 7:00 pm (Watkins)					
Wednesday Morning DXC & ICXOM Plenary Session: *New Approaches in Imaging*, Lilac Room C & D (**Fittschen/Fawcett**) 8:30 am - 12:15 pm					
Wednesday Afternoon DXC & ICXOM Sessions					
Special Topic	New Developments in XRD & XRF Instr. I (**Fawcett/Drews**) 1:30 – 4:45	Machine Learning Techniques… (**Mehta**) (Cypress A) 1:30-5:00 Cultural Heritage II – DXC (**Schmeling**) (Cypress B) 3:10 – 5:10			
XRD			SAXS of Advanced Functional Mats. (**Ilavsky/Hammons**) 1:30 - 5:10		
XRF				Food Safety & Agriculture Applications (**Russell**) 2:00 – 4:30	
ICXOM					Cultural Heritage I - ICXOM (**Janssens**) 1:00-2:50 Functional Materials (**Meirer/Pepponi**) 3:20 – 6:10
Wednesday Evening Bruker Social Event					
Thursday Morning DXC & ICXOM Sessions					
Special Topic	New Developments in XRD & XRF Instr.II (**Fawcett/Drews**) 9:00 – 11:45	X-ray and Forensic Investigations (**Greenwood/Rogers**) 9:00 – 10:30			
XRD			General XRD I (**Murray**) 9:00 – 11:50		
XRF				Quantitative Analysis of XRF (**Brehm**) 8:30 – 12:10	
ICXOM					Earth & Environmental Sciences (**Fittschen/Eichert**) 8:30 – 10:20 Data Analysis I (**De Carlo/Di**) 10:50 – 12:30
Thursday Afternoon DXC & ICXOM Sessions					
XRD		Rietveld (**Stone**) 2:00 – 4:40	General XRD II (**Okasinski**) 2:00 – 4:50		
XRF	General XRF (**Worley**) 1:30 – 4:40			Trace Analysis including TXRF (**Eichert**) 2:00 – 5:00	
ICXOM					Data Analysis II (**De Carlo/Di**) 1:40 – 3:30 Biological Apps (**Falkenberg/Spiers**) 4:00 – 6:10
Friday Morning DXC & ICXOM Sessions					
XRD	Applied and Functional Materials (**Noyan/Bunn**) 8:30 – 11:00	Stress/Texture/In Situ (**Watkins**) 8:30 – 12:10	Pair Distribution Function (**Borkiewicz/Wiaderek**) 8:30 – 11:00		
XRF				Industrial Apps. of XRF (**Broton**) 8:30 – 11:20	