

DENVER X-RAY CONFERENCE

6-10 AUGUST 2012 / DENVER MARRIOTT TECH CENTER HOTEL / DENVER, COLORADO, U.S.A.

ON-SITE PROGRAM

PLENARY SESSION:

*New Frontiers in X-ray Analysis—
Dedicated to the life and work of
Robert L. Snyder*



Training & Applications

Techniques & Instrumentation

Exhibits, Workshops, Sessions

Free CD of the Proceedings
(with appropriate fees paid)

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*Past Chair, **Victor Buhrke**, Portola Valley, CA*

Future DXC Dates

5-9 August 2013

The Westin Westminster, Westminster, CO

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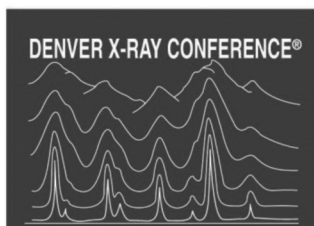
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PROGRAM-AT-A-GLANCEBACK COVER



61st Annual Conference on
Applications of X-ray Analysis

**DENVER X-RAY
CONFERENCE**

6-10 AUGUST 2012

Denver Marriott Tech Center Hotel, Denver, Co, U.S.A.

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EXHIBIT INFORMATION

Exhibits will be held in the Rocky Mountain Event Center, on the ground floor of the hotel.

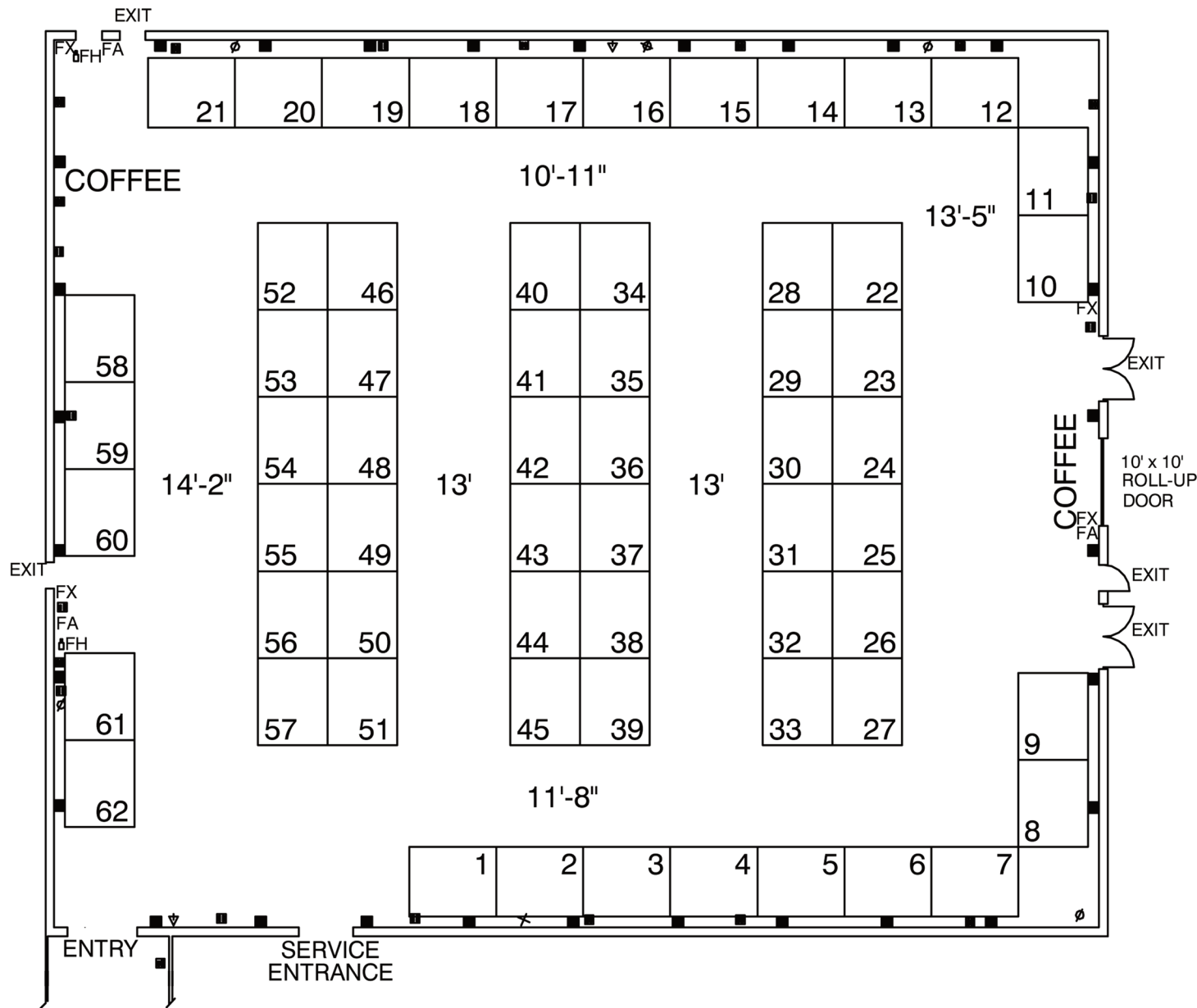


Exhibit Hours:

Monday	11:00 am – 5:00 pm
Tuesday	11:00 am – 5:00 pm
Wednesday	12:00 pm – 7:00 pm (Reception in the exhibit hall from 5:45–7:00 pm)
Thursday	10:00 am – 1:00 pm

The following coffee breaks are served in the Exhibit Hall:

Monday pm Break	3:00 – 4:00
Tuesday pm Break	3:00 – 4:00
Wednesday pm Break	3:00 – 4:00
Thursday am Break	10:00 – 11:00

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Angstrom manufactures the well known TE250 Laboratory Ring Pulverizer and 4451AE Laboratory Briquetting Press for preparation of various types of samples for X-ray analysis. Both products are built to last, providing many years of service and are rugged enough to handle the toughest workloads. A full line of aluminum sample cups are also offered to complement the 4451AE Briquetting Press.

Founded in 1922, Anton Paar has 1500 employees worldwide, providing a dense customer support network. The company is market leader for non-ambient attachments for X-ray diffraction and offers the most comprehensive range of sample stages, covering temperatures from -190 to 2300 °C and various atmospheric conditions. Anton Paar also offers the most versatile small-and-wide-angle X-ray scattering equipment on the market—SAXSess mc2—featuring transmission and reflection geometry, line and point-collimation mode, automated sample handling and software packages for routine data analysis. Anton Paar also offers the most versatile small-and-wide-angle X-ray scattering equipment on the market—SAXSess mc2—featuring transmission and reflection geometry, line and point-collimation mode, automated sample handling and software packages for routine data analysis.

AXO DRESDEN presents their latest developments in multilayer X-ray optics for 1-dim and 2-dim diffraction applications (Cr K – Ag K radiation) and soft X-ray polarization (≤ 1 keV) as well as broadband/bandpass mirrors and (T)XRF reference samples. Huber Diffraction is a manufacturer of precise positioning and diffraction equipment for laboratory and synchrotron applications. Huber Diffraction presents examples for precision motion systems.

Blake Industries is the leader in supplying high precision X-ray and neutron instrumentation to research laboratories, universities and synchrotron beam lines worldwide. We are the exclusive distributors for Huber instruments in the United States, Mexico and Canada with multiple installations at all the North American Synchrotrons and have been supplying X-ray users for over 40 years.

Bourevestnik Inc. is the largest enterprise in Russia of research, development and manufacture of X-ray equipment for industrial and scientific purpose in various branches: metallurgy, oil refining, medicine, ecological monitoring and mining industry. The company has more than 700 patents and copyright certificates.

2012 EXHIBITORS

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Cambridge is delighted to publish Powder Diffraction on behalf of the International Centre for Diffraction Data (ICDD). We also publish Microscopy and Microanalysis and Microscopy Today for the Microscopy Society of America (MSA), and the print and online journals of the Materials Research Society (MRS). Stop by our booth to view sample journals and peruse our highly regarded books. Also visit Cambridge Journals Online at <http://journals.cambridge.org/> to view sample content, sign up for tables of content alerts, and more.

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EXHIBITOR PRODUCTS

Elvatech Ltd. (Kiev, Ukraine) is an R&D enterprise specializing in the production of a range of EDXRF spectrometers. Among Elvatech products there are benchtop and handheld EDXRF analyzers based on Si-PIN Diode and SDD detectors. ElvaX benchtop analyzers have been operated all over the world in all the main XRF applications such as metallurgy, casting, scrap sorting, jewelry, etc. In 2011 Elvatech launched a new handheld XRF analyzer ElvaX ProSpector, which employs the most recent developments in XRF analysis.

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.hertzogautomation.com for our full product line.

Incoatec celebrates its 10th anniversary this year. In 2002 we started with the commercialization of Multilayer Optics for XRD and Light Element Analyzer Crystals for XRF. In 2006 we launched the Incoatec Microfocus Source $\text{I}\mu\text{S}$, which has up to now sold more than 250 times. Its outstanding performance raises the standard of low-maintenance sealed-tube solutions for crystallography, and is available for Cu, Mo and Ag radiation. Besides instrumentation for lab equipment we supply the world's best synchrotrons with state-of-the-art total reflection and multilayer optics.

Serving the X-ray diffraction community for over 30 years, Inel is one of the world's leading suppliers of quality X-ray diffractometer systems incorporating curved or linear position sensitive detectors. Built for speed and resolution, our Equinox product line ranges from bench top models to large laboratory instruments. Applications include powders, combinatorial chemistry and materials analysis, micro-diffraction, polymers, capillaries, in situ, on-line, transmission and reflection, small angle scattering, reflectometry, texture analysis, thin films, and variable temperature dynamic studies.

ICDD's material identification databases are designed for rapid materials identification and interfaced with diffractometers and data analysis systems of the world's leading software developers and manufacturers of X-ray equipment. The File is available in PDF-2 Release 2012 (250,182 entries); PDF-4+ 2012 (328,660 entries) featuring digitized patterns, molecular graphics and atomic parameters; PDF-4/Minerals 2012 (39,410 entries); and PDF-4/Organics 2013 (Over 470,000 entries). ICDD promotes the application of materials characterization methods by sponsoring the Denver X-ray Conference; its proceedings, *Advances in X-ray Analysis* and the journal, *Powder Diffraction*.

KETEK is a leading Silicon Drift Detector manufacturer offering a broad portfolio with active areas from 7mm^2 to 100mm^2 . With our improved VITUS series, energy resolutions below 123eV and P/B ratios above 20.000 are achievable at high count rates. The new and complete VICO electronics series allows tailored OEM solutions, optimized for VITUS SDDs. KETEK further presents the latest generation of its successful VIAMP and AXAS systems as well as our brand new Photo Multiplier (SiPM) family with unprecedented PDE exceeding 60%.

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

Micro Photonics, Inc. offers the latest Micro- & Nano- 3D tomography systems from Bruker microCT, high resolution X-ray CCD detectors from Photonics Science Ltd., and full digital X-ray cabinet imaging systems from Kub Technologies, Inc. MPI can customize a complete Laue backscattered diffraction station with high resolution digital imaging. Whether you are looking for unrivalled 3D nondestructive testing, superior X-ray imaging, or unique Laue backscatter diffraction, we have a solution that will fit your scientific and budgetary needs!

MICROMATTER has provided XRF calibration standards for more than 40 years. All reference materials are produced by vacuum deposition on polymer backings. Several mounting options are available. MICROMATTER also produces diamond-like carbon foils for applications in particle and accelerator physics as well as thin film and multi-layer coatings.

Mikron Digital Instruments provides XRF/XRD sample preparation equipment. The MDI-250CC Ring Pulverizer is a very quiet 58db-64db centrifugal flat table grinder with options for programmable speeds and multiple programs. The PSP-80K Programmable Stepping Press includes up to 10 programs. Our touch screen display allows selecting a program to Step/Hold or ramp to pressure, hold at pressure and pressure release all under computer control. We provide repair services onsite or at our factory for Mikron/Dietert/Foundry Test/Angstrom presses.

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EXHIBITOR PRODUCTS

Moxtek is a leading supplier of advanced X-ray detectors, sources, windows, and JFET's. 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. Come visit Moxtek at Booths 40 & 41 to preview our new X-ray products.

Products include highly precise and accurate XRF Calibration Standards for all XRF instruments, particularly thick and multi-element standards for various industries. We also provide metallic, semiconductor, polymer, insulator and exotic thin films, foils, cathodes and coatings for X-ray windows, targets, tubes and detectors. We specialize in diamond and DLC materials. We also supply thin film equipment such as sputtering, e-beam evaporation and PECVD systems. We also undertake advanced thin film product development for high technology companies.

OLYMPUS NDT Analytical Instruments provides portable X-ray Fluorescence (XRF) and X-ray Diffraction (XRD). Handheld XRFs analyze 25+ elements in a single test in seconds. Analyze dust, soil, metal, teeth, plants, and more. With a variety of calibration models, it's the hand-held XRF that adapts to researchers needs. This is cost-effective analysis when time counts and when materials cannot be transported or altered. Our X-5000 Mobile XRF offers portable power with a closed beam configuration and touch screen interface. Our portable and bench top XRD systems offer rapid compound identification and active substance verification.

10 years Strong... PANalytical has built on the 54 years as Norelco/Philips Analytical to become the PANalytical of today: an innovation leader, focused on delivering superior solutions for R&D and process control. From the first commercial diffractometer in 1948 to the only true optical bench diffractometer with lifetime performance (2011 R&D100 award-winning Epyrean), from zero drift XRF tubes (SST-mAX) to Epsilon3 benchtop performance rivaling more powerful WDXRF, PANalytical delivers. Come see the technologies, people and corporate values that make up the PANalytical Difference.

PNDetector is one of the leading suppliers of ultimate performance, high reliability detector modules for X-ray spectroscopy applications. Furnished with state-of-the-art silicon drift detectors, the modules offer unequaled performance in energy resolution, photon throughput and QE. Various standard packages as well as customized designs for targeted applications are available.

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2012 EXHIBITORS

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Solid Sealing Technology, Inc.

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Watervliet, NY 12189

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Web: www.solidsealing.com

EXHIBITOR PRODUCTS

Residual stress affects crack initiation and propagation, fatigue life, stress corrosion cracking and distortion. For over 25 years, Proto Manufacturing has been providing both measurement services and equipment for measuring residual stress in metal components. Proto's leading edge X-ray diffraction (XRD) technology is portable, cost effective and provides the necessary data for making informed decision about the health of components. Contact Robert Drake, Physicist, Phone 1-800-965-8378.

Rigaku provides the world's most complete line of X-ray diffraction and X-ray fluorescence instruments and components. Systems include the MiniFlex benchtop XRD and Supermini benchtop WDXRF systems, the Ultima IV and SmartLab® multi-purpose diffractometers with SAXS and in-plane capabilities, DMAX Rapid II micro-diffraction systems, SMAX3000 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, the originator of graded multilayer X-ray optics and microfocus X-ray generators, introduces Arc)Sec® Technology for the best instruments ever! Come learn why Osmic™ multilayer optics, beam modules and CCD detectors outshine all others. With the widest range of solutions for line- and point-focus XRD and XRF, Rigaku can help you with application specific products. VariMax™ and Confocal Max-Flux® Optics provide high flux and controlled divergence for single-crystal, SAXS, high-pressure and other diffraction applications. The MicroMax® family of microfocus X-ray generators create high-flux, low-divergence beams offering rotating-anode-like performance from a sealed tube source Max-Flux® parallel or focusing optic retrofits are available for all brands of X-ray sources. Ovonix™ multilayer analyzers are the original and industry standard for WDXRF spectrometry.

SGX Sensortech (formerly e2v Scientific Instruments) manufactures specialist EDXRF detectors for the OEM industrial markets and for scientific research (synchrotron, PIXE, laboratory XRF etc). We offer a full range of single and multi-element Si(Li) and SDD detector products with individual sensor active areas ranging from 7mm² to 100mm² active area. Additionally, SGX provides a series of digital signal processors which, together with our comprehensive detector range, are designed to satisfy the requirements of today's analytical applications.

Excellent resolution, high count rate, 50mm² Vortex®, Silicon Drift, X-ray Detector, achieves <133 eV at outputs > 600 Kcps at 0.25μs. The LN2 free, Vortex®, developed for XRF and Synchrotron Applications (XAFS) is exceptionally reliable. Advantages include extremely high-count rates with unprecedented resolution and peak stability, despite the count rate. Widely used by OEMs and Research Institutions, the Vortex® detector is amongst the most advanced in the world. Our ME 4 is the world best four element system available.

Solid Sealing Technology, Inc. specializes in the design and manufacture of highly engineered, hermetic products using metalizing and brazing, ceramic-to-metal and glass-ceramic sealing, welding, and critical mechanical assembly. Products include: Vacuum Feedthroughs, Coaxial Connectors, Multi-Pin Connectors, Thermocouple Connectors and Isolators. SST is a global provider of industry standard and custom designed products. SST provides ideal sealing solutions for demanding applications including high temperature, ultra-high vacuum, and high pressure environments. Whether you are looking for standard products, custom solutions, or a partner to develop a new bonding technique using advanced materials, SST is ready to support you.

2012 EXHIBITORS

COMPANY

Spectro Analytical Instruments, Inc.

Booth 19

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Phone: 201-642-3000
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SPEX SamplePrep, LLC.

Booth 36

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E-mail: sampleprep@spexcsp.com
Web: www.spexsampleprep.com

Thermo Fisher Scientific

Booths 28 & 29

1400 North Pointe Parkway, Suite 10
West Palm Beach, FL 33407
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Web: www.thermoscientific.com

VSG—Visualization Sciences Group

Booth 24

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XGLab SRL

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XIA, LLC.

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Web: www.xia.com

EXHIBITOR PRODUCTS

SPECTRO Analytical Instruments is a global leader in the design and manufacturing of Energy Dispersive XRF, ICP-OES, ICP-MS and both mobile and stationary metal analyzers. SPECTRO offers a wide range of EDXRF products from handheld to multi-purpose laboratory spectrometers for a wide variety of applications. Typical uses include the analysis of fuels, plastic, rubber, pharmaceutical products, foodstuffs, minerals, ores, rocks, sands, slags, cements, heat-resistant materials, glass, ceramics, wafers, sorting of metal alloys, toys, solid waste, effluent and many others.

For over 50 years, SPEX SamplePrep has provided superior sample preparation equipment for X-ray and XRF analysis. Our Katanax K2 Prime is an automated, electric fusion fluxer that prepares glass beads for XRF analysis. It has a throughput of 24-30 samples per hour. The X-Press is an automated, 35-ton, hydraulic laboratory press that presses sample pellets for XRF, IR in minutes. Stop by booth 36 to see our innovative equipment and ask about your tradeshow discount.

Thermo Fisher Scientific will showcase the Thermo Scientific ARL PERFORM'X WDXRF spectrometer for advanced materials characterization integrating bulk elemental analysis capabilities with mapping and small spot analysis to create a solution that offers unmatched versatility and performance for the analysis of any solid or liquid sample. Talk with our experts about Thermo Scientific XRF/XRD solutions for advanced material characterization including the ARL QUANT'X EDXRF spectrometer coupled with UNIQANT software and the ARL 9900 X-ray Workstation with integrated XRF-XRD capability.

VSG is the provider of the Avizo® Fire software, a comprehensive toolset dedicated to materials analysis in a wide range of application areas. Avizo supports complex analytical processes and the prediction of materials properties. Avizo helps interpret the results of CT-scanners, micro-/nano-CT, Electronic Microscopy, MRI, etc. Using powerful volume rendering, segmentation, 3D reconstruction and quantification tools, Avizo enables interactive exploration and visualization. It allows the extraction of information, from which physical parameters can be calculated (porosity, connectivity, absolute permeability, etc.).

XGLab, spin-off of "Politecnico di Milano", holds a leadership and innovative position in the field of radiation detectors and related electronics. XGLab's product lines include: X-ray Detection Solutions, X and Gamma ray Electronics, Synchrotron and Custom Applications, Gamma Detection and Medical Imaging. XGLab's continuous research recently led to new products such as ultra-fast digital pulse processor (DPP) for X-ray applications and "CUBE", a front-end integrated circuit for SDDs.

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.

2012 EXHIBITORS

COMPANY

XOS

Booths 37 & 38

15 Tech Valley Drive
East Greenbush, NY 12061
Phone: 518-880-1500
E-mail: info@xos.com
Web: www.xos.com

EXHIBITOR PRODUCTS

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

EVENING TECHNICAL SESSIONS & SOCIAL EVENTS

Spouses and families are welcome to attend all social functions. Wine & Cheese Receptions and Poster Sessions will be held in the Evergreen Ballroom, unless otherwise noted.

Monday 6, August 5:30 – 7:30 pm

XRD Poster Session and Wine & Cheese Reception
Sponsored by PANalytical and ICDD

Tuesday 7, August 5:30 – 7:30 pm

XRF Poster Session and Wine & Cheese Reception
Sponsored by Chemplex Industries, Inc.

Wednesday 8, August 5:45 – 7:00 pm

Vender Sponsored Reception
held in the Exhibit Hall (Rocky Mountain Event Center)

Thursday, 9 August 5:45 – 9:00 pm

“Off-site” event: A Taste of Colorado Tour

The bus will begin loading at 5:45 pm, and leave promptly at 6:00 pm from the Denver Marriott Tech Center. The bus will be stationed at the North entrance of the hotel, which is located near the Tower elevators. Please bring your ticket confirmation with you the night of the event. Tickets will not be sold at the conference or at the event.

Spouses' Coffee Hour

All spouses are invited to attend a complimentary coffee hour, sponsored by the Denver X-ray Conference. Coffee, tea and pastries will be served in the Conifer 2 Room from 9:30 to 10:30 am on Monday and Tuesday. Information on local attractions and activities of interest will be provided.

Conference Proceedings

Don't miss this opportunity to showcase your research by submitting your presented paper to the DXC conference proceedings, *Advances in X-ray Analysis*, Volume 56 on CD. Work presented during either an oral session or poster session is eligible for submission. Select papers will also be published in the journal, *Powder Diffraction*.

See the *Guidelines for the Preparation of Manuscripts*. The deadline for submission is 4 September 2012.

Note: To be accepted for publication, papers should describe new methods, theory and applications, improvements in methods or instrumentation, or other advances in the state of the art. Papers emphasizing commercial aspects are discouraged.

Advances in X-ray Analysis is distributed throughout the world, and the complete manuscripts of Volumes 40–52 (1996–2008) can also be viewed on the ICDD website.

Special Thanks to our Evening Reception Sponsors, Coffee Break Sponsors and Media Sponsors



WORKSHOPS MONDAY & TUESDAY 6–7 AUGUST

AM Workshops 9:00 am– 12:00 pm **PM Workshops** 1:30 pm– 4:30 pm

Monday am **XRD & XRF**

3D Imaging – Sponsored by Xradia | *Evergreen A*

Organizer & Instructors:

B. Patterson, Los Alamos National Laboratory, Los Alamos, NM, bpatterson@lanl.gov

M. De Graef, Carnegie Mellon University, Pittsburgh, PA

R. Ketcham, The University of Texas at Austin, Austin, TX

R.M. Suter, Carnegie Mellon University, Pittsburgh, PA

The use of three dimensional X-ray imaging, especially computed tomography (CT), has exploded over the past 10 years. Many researchers use it, but few to no courses exist in the basics of operation. This workshop will focus on the basics of X-ray CT, both laboratory and synchrotron sources, how radiography is collected at the different length scales, reconstructed into 3D data sets, and data sets processed. Building upon X-ray absorption imaging, 3D X-ray diffraction imaging will be explored.

Monday am **XRD**

Residual Stress | *Evergreen B*

Organizer & Instructors:

I.C. Noyan, Columbia University, New York, NY, icn2@columbia.edu

C.E. Murray, IBM T.J. Watson Research Center, Yorktown Heights, NY

C. Goldsmith, IBM, Hopewell Junction, NY

This workshop will cover the basic theory and experimental technique of stress/strain determination with X-ray and neutron diffraction. In addition, error analysis and techniques to check accuracy, precision and resolution of stress measurement instruments will be discussed.

Nanostructures I | *Evergreen C*

Organizer & Instructor:

V. Petkov, Central Michigan University, Mt. Pleasant, MI, petkov@phy.cmich.edu

This full day workshop will start with a brief introduction and continue with hands-on training on the atomic pair distribution function analysis, from XRD data reduction into atomic PDFs to structure determination based on atomic PDFs.

Attendees should install the following free software:

RAD: www.phy.cmich.edu/people/petkov/software.html

ISAACS: www.phy.cmich.edu/people/petkov/software.html

PDFgui: <http://www.diffpy.org/download.shtml>

...and come to the workshop with their laptops. Attendees are also encouraged to bring data sets of their own.

Monday am **XRF**

Basic XRF | *Evergreen D*

Organizers & Instructors:

W.T. Elam, University of Washington APL, Seattle, WA, wtelam@apl.washington.edu

G.J. Havrilla, Los Alamos National Laboratory, Los Alamos, NM, havrilla@lanl.gov

This workshop provides a basic introduction to the principles of XRF, and is specifically aimed at those new to the field. It will start with a general overview of the technique, followed by more specific details of the basic principles. The emphasis will be on understanding how to use XRF and what its capabilities are. In the second half of the workshop, a few selected applications will be presented. The focus of this segment will be to provide an understanding of how the basic principles affect actual practice.

WORKSHOPS MONDAY & TUESDAY 6–7 AUGUST

Monday pm **XRD & XRF**

X-ray Reflectivity | *Evergreen A*

Organizer & Instructors:

K. Sakurai, National Institute for Materials Science (NIMS) and University of Tsukuba, Tsukuba, Japan, sakurai@yuhgiri.nims.go.jp

W.-L. Wu, NIST, Gaithersburg, MD

R. Matyi, University at Albany—SUNY, Albany, NY

V. Samson, University of Tsukuba, Tsukuba, Japan

K. Ueda, Hitachi Ltd, Saitama, Japan

The workshop topics will include:

- What is X-ray Reflectivity?
- Application to Semiconductor and Magnetic Multilayers
- Application to Nano Technology
- Tips for data analysis

Monday pm **XRD**

Two-Dimensional Detectors | *Evergreen B*

Organizers & Instructors:

T.N. Blanton, Eastman Kodak Company Research Labs, Rochester, NY, thomas.blanton@kodak.com

B.B. He, Bruker AXS, Inc., Madison, WI, bob.he@bruker-axs.com

T. Taguchi, Rigaku Corporation, Tokyo, Japan, takey@rigaku.co.jp

M. Fransen, PANalytical B.V., Almelo, The Netherlands

Two-dimensional diffraction data contain abundant information about the atomic arrangement, microstructure, and defects of a solid or liquid material. In recent years, the use of two-dimensional detectors has dramatically increased in academic, government and industrial laboratories. This workshop covers recent progress in two-dimensional X-ray diffraction in terms of detector technology, data collection strategy, data evaluation algorithms and software, and instrument configurations. In addition to new hardware developments, various application examples, such as phase ID, texture, stress, crystallinity, combinational screening and thin film analysis will be discussed.

Nanostructures II | *Evergreen C*

Organizer & Instructor:

V. Petkov, Central Michigan University, Mt. Pleasant, MI, petkov@phy.cmich.edu

Continuation of Nanostructures I.

Monday pm **XRF**

Energy Dispersive XRF | *Evergreen D*

Organizer & Instructors:

R. Phillips, Thermo Fisher Scientific, West Palm Beach, FL, rich.phillips@thermofisher.com

R. Cone, Thermo Fisher Scientific, West Palm Beach, FL

A. McWilliams, Research Triangle Institute, Research Triangle Park, NC

B. Cross, CrossRoads Scientific, El Granada, CA

K. Lackey, Teck Alaska, Inc., Kotzebue, AK

This workshop is designed to provide a discussion of the theoretical and practical aspects of EDXRF spectrometry providing a comprehensive review of the basic fundamentals for both the beginner and experienced X-ray spectroscopist. Topics to be covered include instrumentation, components, and applicability of EDXRF; ease of use; rapid qualitative analysis and material screening; calibration techniques for quantitative analysis; standardless analysis; sensitivity of EDXRF for a wide variety of elements in various matrices; and sample preparation. A variety of applications will be presented as real-life examples where EDXRF is being used to solve complex analytical problems. The workshop will appeal to both the beginner and experienced spectroscopist. The major emphases will be applicability of EDXRF and the optimal protocol for generating and reporting of reliable experimental results.

WORKSHOPS MONDAY & TUESDAY 6-7 AUGUST

Tuesday am **XRD**

Rietveld Analysis I | Evergreen A

Organizers & Instructors:

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

S.T. Misture, NYS College of Ceramics at Alfred University, Alfred, NY, misture@alfred.edu

T. Degen, PANalytical B.V., Almelo, The Netherlands

The workshop will cover the theory (briefly) and applications of Rietveld analysis. A broad range of applications will be covered, including: crystal structure and unit cell refinement, quantitative analysis, size and microstrain determination, texture analysis, and handling partially amorphous specimens. The instructors will provide not only traditional lectures but also will show live demonstrations of refinements, and will be happy to field questions during the demonstrations.

Phase Identification | Evergreen B

Organizers & Instructors:

T.G. Fawcett, International Centre for Diffraction Data, Newtown Square, PA, fawcett@icdd.com

T.N. Blanton, Eastman Kodak Company Research Labs, Rochester, NY, thomas.blanton@kodak.com

C. Crowder, S.N. Kabekkodu, International Centre for Diffraction Data, Newtown Square, PA

Material identification methods using X-ray analyses have been known for over 75 years since the landmark 1936 publication of Hanawalt and Rinn. The fundamental principles have remained the same where unknown materials are compared to a series of reference materials, commonly referred to as a “fingerprint” technique. While the principles remain the same, there have been evolutionary changes in the algorithms used, the quality of data collected, the number of reference materials, and the accuracy and precision of both the experimental and reference data. In general, the evolution has been accomplished by integrating more information and more types of information in the phase identification process, using more powerful algorithms, and increasing the speed and accuracy of the analysis by using increasingly more powerful computers. Modern methods use total patterns, self analyzing and correcting software and sophisticated information filters and diagnostics. These tools are applied to both the experimental and reference data to obtain the best results. Overall, this results in having routine laboratory capabilities today that far exceed the capabilities of the method founders. In this workshop, we will discuss the evolutionary process, the best application of today’s methods, diagnostic tools, and end with a discussion on new developments feeding the next stages of evolution.

Tuesday am **XRF**

Quantitative Analysis I | Evergreen C

Organizer & Instructors:

M. Mantler, Rigaku Corporation, Purkersdorf, Austria, michael.mantler@rigaku.com

B. Vrebos, PANalytical, Almelo, The Netherlands

W.T. Elam, University of Washington APL, Seattle, WA

Basic Methods of Quantitative Analysis:

1. Theoretical and mathematical foundation: Classical fundamental parameter models.
2. Practical application: Working curves and influence coefficients, compensation methods.

Trace/TXRF Analysis | Evergreen D

Organizers & Instructors:

C. Strelt, TU Wien, Atominstitut, Wien, Austria, strelt@ati.ac.at

P. Wobrauschek, TU Wien, Atominstitut, Wien, Austria, wobi@ati.ac.at

K. Tsuji, Osaka City University, Osaka, Japan

A. Martin, Thermo Fisher Scientific, Sugarland, TX

This year’s trace analysis workshop will provide an introduction of basic fundamentals in XRF, interesting for both beginners and experienced X-ray spectroscopists. Main topics to be covered are presentations of most modern techniques and instrumentation for trace element analysis. Physical methods to improve minimum detection limits in XRF by background reduction will be discussed; Special emphasis will be on Synchrotron radiation as an excitation source. Introduction to total reflection XRF (TXRF) and actual instrumentation is another point of interest and will show achievable advantages and results in terms of detection limits, sensitivities and detectable elemental range down to light elements (e.g., Carbon). Confocal μ -XRF will be presented as method for 2D and 3D spatially resolved elemental imaging. Applications from interesting scientific fields as environment, microelectronics, forensic, and life science will show the successful use and importance of the various XRF spectrometric techniques.

WORKSHOPS MONDAY & TUESDAY 6-7 AUGUST

Tuesday pm **XRD & XRF**

Cultural Heritage | Evergreen B

Organizers & Instructors:

A. Karydas, International Atomic Energy Agency, Vienna, Austria, a.karydas@iaea.org

M.K. Donais, Saint Anselm College, Manchester, NH, mdonais@anselm.edu

A. Heginbotham, J. Paul Getty Museum, Los Angeles, CA

V.A. Solé, European Synchrotron Radiation Facility, Grenoble, France

The workshop will review the current status and exploit the challenges and perspectives for XRF calibration and quantification of cultural heritage materials using fundamental parameter-based methodologies. Applications using handheld analyzers, laboratory or portable milli- or 2D/3D micro- XRF instrumentation for a variety of samples from paper to metals will be demonstrated to illustrate concepts. Best practices that can improve data reproducibility and assessment will be discussed also.

Tuesday pm **XRD**

Rietveld Analysis II | Evergreen A

Organizers & Instructors:

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

S.T. Misture, NYS College of Ceramics at Alfred University, Alfred, NY, misture@alfred.edu

T. Degen, PANalytical B.V., Almelo, The Netherlands

Continuation of Rietveld Analysis I.

Tuesday pm **XRF**

Quantitative Analysis II | Evergreen C

Organizer & Instructors:

M. Mantler, Rigaku Corporation, Purkersdorf, Austria, michael.mantler@rigaku.com

B. Vrebos, PANalytical, Almelo, The Netherlands

W.T. Elam, University of Washington APL, Seattle, WA

Fundamental Parameters in XRF:

Fundamental parameters for XRF include all physical constants related to the excitation and measurement of X-rays such as attenuation coefficients (total, subshell, coherent/incoherent scattering), binding energies of electrons (hence also line energies), transition probabilities, probabilities for radiative and non-radiative transitions (Auger, Coster-Kronig), as well as data related to interactions by electrons. By convention, tube spectra are sometimes included also.

The following topics intend to complement, at an introductory level, the special session dedicated to fundamental parameters during the regular scientific part of DXC 2012:

1. Available collections of fundamental parameters. Sources for download.
2. Reliability of data as a function of element and line-energy (and related sub-shells). This refers in particular to the range of light elements and low energy lines (L, M-lines).
3. The influence of chemical state.
4. Propagation of errors in fundamental parameters to the analytical result (classical methods with reference materials; reference free methods).
5. The International Initiative on X-ray Fundamental Parameters.

XRF Sample Preparation | Evergreen D

Organizer & Instructors:

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

P. Ricou, Arkema, Inc., King of Prussia, PA

M.E. Provencher, Corporation Scientifique Claisse, Quebec, Canada

This workshop will discuss basic and fundamental considerations with respect to specimen preparation for XRF by pressed powder and fusion with a special session devoted to the preparation of plastics.

XRD POSTER SESSION MONDAY, 6 AUGUST



PANalytical



The Monday evening XRD Poster Session will be held 5:30 – 7:30 pm in the Evergreen Ballroom, in conjunction with a Wine & Cheese Reception sponsored by PANalytical and ICDD.

Chairs: **T. Watkins**, *Oak Ridge National Lab, Oak Ridge, TN, USA*

I. Cernatescu, *Pratt & Whitney, East Hartford, CT, USA*

D-6 Ettringites – Compositions, Water Content and Stability

H. Pöllmann, *University of Halle, Halle, Germany*

D-7 Synthesis and Crystallographic Study of Cation Substituted NZP Materials

O.P. Shrivastava, R. Chourasia, A. Bohre, *Department of Chemistry Dr H. S. Gour University, Sagar, India*

D-11 XRD Characterization of Nanocrystalline Ni-W Alloys Obtained by Electrodeposition

P. Indyka, L. Tarkowski, E. Beltowska-Lehman, A. Bigos, M. Szczerba, *Institute of Metallurgy and Materials Science, Polish Academy of Sciences, Krakow, Poland*

D-12 Microstructure Characterization of Nanocrystalline Nickel Coatings Strengthened by Ultrafine Ceramic Particles

E. Beltowska-Lehman, A. Bigos, P. Indyka, M. Szczerba, L. Tarkowski, *Institute of Metallurgy and Materials Science, Polish Academy of Sciences, Krakow, Poland*

M. Kot, *AGH University of Science and Technology, Krakow, Poland*

D-18 Multilayer Optics for Analytical X-ray Applications

P. Radcliffe, J. Schmidt-May, A. Kleine, B. Hasse, C. Michaelsen, J. Wiesmann, A. Hembd, U. Heidorn, S. Kroth, F. Hertlein, *Incoattec GmbH, Geesthacht, Germany*

D-19 Quantitative Analysis of Room Temperature Grain Growth Kinetics in Copper Thin Films through High Resolution X-ray Diffraction

M. Treger, I.C. Noyan, *Columbia University, New York, NY, USA*

C. Witt, *Global Foundries, Yorktown Heights, NY, USA*

C. Murray, R. Rosenberg, C. Cabral, J. Jordan-Sweet, *IBM, Yorktown Heights, NY, USA*

E. Eisenbraun, *College of Nanoscale Science and Engineering, The University at Albany-SUNY, Albany, NY, USA*

D-20 Improving Beamline X-ray Optics to Reduce the Damage to Crystallographic Structure

J. Maj, G. Navrotsky, A. Elaissari, *Argonne National Laboratory, Argonne, IL, USA*

WITHDRAWN

D-23 Evaluating TCO Long-Term Performance by Electrochemical Corrosion and X-ray Diffraction Residual Stress Analysis

P.S. Ricou, M. Wen, *Arkema Inc., King of Prussia, PA, USA*

D-31 Nonlinearity in X-ray Residual Stress Measurements for Determining Lifetime of Blades and Discs

P. Kodess, N. Yablokova, *ICS&E-VNIIMS, Aurora, CO, USA*

D-32 Microstructural Characteristics of High-strength and Corrosion Resistant Steel

B. Kodess, P. Kodess, *ICS&E-VNIIMS, Aurora, CO, USA*

D-33 Methods for Mounting Radioactive Powders for XRD Analysis

L.N. Squires, R.D. Mariani, J.R. Kennedy, *Idaho National Laboratory, Idaho Falls, ID, USA*

T. Hartmann, *University of Nevada Las Vegas, Las Vegas, NV, USA*

D-36 Evolution of Crystallographic Orientation during Annealing of Gold Nanoparticles on a Substrate

M. Kirkham, E.A. Payzant, *Oak Ridge National Laboratory, Oak Ridge, TN, USA*

R.L. Snyder, *Georgia Institute of Technology, Atlanta, GA, USA*

D-42 Tilt-A-Whirl: A Texture Analysis Package for 3D Rendering of Pole Figures Using Matlab

M.A. Rodriugez, M.H. Van Benthem, J.J.M. Griego, *Sandia National Laboratories, Albuquerque, NM, USA*

XRD POSTER SESSION MONDAY, 6 AUGUST

D-44 A Theoretical Study of X-ray Diffraction from Nanomaterials

H. Öztürk, I.C.Noyan, Columbia University, New York, NY, USA

Hanfei Yan, Brookhaven National Laboratory, Upton, NY, USA

D-52 X-ray Analysis of Coal Fly Ash

J.P. Nicolich, D.A. Silva, W.R. Grace, Cambridge, MA, USA

S. Cole-Wilson, W.R. Grace, Columbia, MD, USA

D-56 NIST Standard Reference Materials for X-ray Metrology

J.P. Cline, D. Windover, A. Henins, NIST, Gaithersburg, MD, USA

D-58 Efficient and Accurate Measurement of Very Sharp Crystallographic Textures: A New Measurement Strategy

F. Bachmann, T.Q. Nguyen, H. Schaeben, Institut fuer Geophysik und Geoinformatik, TU Bergakademie Freiberg, Germany

M. Witte, G. Gottstein, Institut fuer Metallkunde und Metallphysik, RWTH Aachen, Germany

D-59 Thickness Dependence of the Hydrophilic-Hydrophobic Switching Function of Methylcellulose Thin Films: An X-ray Reflectivity Study

V.A. Innis-Samson, K. Sakurai, National Institute for Materials Science, Tsukuba, Ibaraki, Japan

D-61 Structure Analysis of Divalent Doped Materials

I. Mansuri, D. Varshney, Shri Venkateswara Bhavan, Devi Ahilya University, Indore, India

I. Mansuri, D. Prasad, Department of Physics, Shri Venkateswara Institute of Technology, Indore, India

D-63 Structural Study of Yttrium Substituted $GdCu_2$

D. Prasad, K.K. Choudhary, Shri Vaishnav Institute of Technology and Science, Indore, India

D. Prasad, I. Mansuri, Shri Venkateswara Institute of Technology, Indore, India

D-71 Characterization of X-ray Irradiated Graphene Oxide Coatings Using X-ray Diffraction, X-ray Photoelectron Spectroscopy, and Atomic Force Microscopy

T. Blanton, D. Majumdar, S. Brandt, J. Fornalik, Eastman Kodak Company, Corporate Research and Engineering, Rochester, NY, USA

D-72 Structural Analysis and Photocatalytic Properties in 3-layer Aurivillius Oxides

J. Shi, Alfred, E.J. Nichols, J. Liu, V. Blair, S. Misture, Alfred University, Alfred, NY, USA

D-77 Evaluation of Lithium Ion Battery by XRD Analysis

Y. Shiramata, T. Konya, W. Yashiro, A. Nakano, Application Laboratories X-ray Research Laboratory

D-78 Characterization of Greigite Mineral by XRD and SEM/EDS Analyses in Pleistocene and Pliocene Sediments

A. Aktosun, Turkish Petroleum Corporation, Research Center, Ankara, Turkey

D-79 X-ray Diffraction Analysis of the Dislocation Structure of Cu-Nb Interfaces

G. Csiszar, T. Ungar, Materials Physics Department, Eotvos University Budapest, Hungary

A. Misra, D.W. Brown, Center for Integrated Nanotechnologies, Materials Physics and Applications Div., Alamos National Lab, Los Alamos, NM, USA

Post Deadline

D-80 Structural and Conductivity Studies of $La_{0.95}Sr_{0.05}GaO_{2.975}$ Gallate

K. Sood, K. Singh, O.P. Pandey, School of Physics and Materials Science, Thapar University, Patiala, India

D-81 Thermal Scanning with Neutron Diffraction

S. Lee, I.C. Noyan, Columbia University, New York, NY, USA

X. Wang, K. An, A.D. Stocia, H. Skorpenske, Oak Ridge National Laboratory, Oak Ridge, TN, USA

XRF POSTER SESSION *TUESDAY, 7 AUGUST*



The Tuesday evening XRF Poster Session will be held 5:30 – 7:30 pm in the Evergreen Ballroom, in conjunction with a Wine & Cheese Reception sponsored by Chemplex Industries, Inc.

Chair: A. Karydas, International Atomic Energy, Vienna, Austria

C-2 3D Characterization of Damage within Copper Using Micro and Nano X-ray Tomography

B.M. Patterson, K. Henderson, E. Cerreta, J.P. Escobedo-Diaz, D. Dennis-Koller, Los Alamos National Laboratory, Los Alamos, NM, USA

C-5 Phase Transition Behavior of a Processed Thermal Battery

J.J.M. Griego, M.A. Rodriguez, D.E. Wesolowski, Sandia National Laboratories, Albuquerque, NM, USA

C-8 Quick X-ray Reflectivity of Spherical Samples

K. Stoev, AECL, Chalk River Laboratories, Chalk River, Ontario, Canada
K. Sakurai, National Institute for Materials Science, Tsukuba, Ibaraki, Japan

C-15 Improvement of the X-ray Reflectivity Calculations on the Multilayered Surface

Y. Fujii, Kobe University, Kobe, Japan

C-17 Mineralogically, Morphologically and Chemically Investigation and Characterization of the Clay Minerals Society's Samples for their Impurities Using XRD, SEM/EDS and XRF Technique

D. Alaygut, S. Tanrinibilir, Turkish Petroleum Corporation, Research Center, Ankara, Turkey

C-18 X-ray Standing Wave Analysis of Epitaxial Graphene on SiC(0001)

J.D. Emery, H.J. Karmel, J.M.P. Alaboson, M.C. Hersam, M.J. Bedzyk, Northwestern University, Evanston, IL, USA
B. Detslefs, J. Zegenhagen, European Synchrotron Radiation Facility, Grenoble, France
V.D. Wheeler, L.O. Nyakiti, R.L. Myers-Ward, C.R. Eddy, D.K. Gaskill, US Naval Research Lab, Washington, DC, USA

C-19 Study of the Interface Structure of Ti/Ni/Ti Thin Films by GI-XAFS and XRR

X. Wei, Y. Huang, Shanghai Synchrotron Radiation Facility, Shanghai, China

F-15 Optimized Electronic Components for Silicon Drift Detector Operation—The New Vico Series from KETEK

R. Stötter, V.J. Bukas, R. Fojt, J. Knobloch, E. Lechner, Ch.F. Luckey, A. Pahlke, St. Pahlke, N. Willems, KETEK GmbH, Munich, Germany

F-23 Application of Micro-XRF for Locating and Extracting Trace Plutonium Particles on Filters and Swipes

C.G. Worley, L. Tandon, P.T. Martinez, D.L. Decker, D.S. Schwartz, Los Alamos National Laboratory, Los Alamos, NM, USA

F-29 TXRF Analysis of Silver Nanoparticles in Fabrics

M. Menzel, U.E.A. Fittschen, Institute of Inorganic and Applied Chemistry, University of Hamburg, Hamburg, Germany

F-31 Confocal Micro-XRF Setup Optimized for Light Element Analysis

S. Smolek, C. Streli, P. Wobrauschek, TU Wien, Atominstitut, Vienna, Austria

F-32 Technical Improvements of a Low Power TXRF Spectrometer and its Application for Aerosol Analysis

J. Prost, C. Felling, P. Wobrauschek, C. Streli, TU Wien, Atominstitut, Vienna, Austria
A. Markowicz, IAEA Laboratories, Nuclear Spectrometry and Applications Laboratory, Seibersdorf, Austria
S. Pahlke, KETEK GmbH, Munich, Germany

XRF POSTER SESSION *TUESDAY, 7 AUGUST*

F-33 Quantitative Analysis of the Trace Elements Zinc, Strontium and Lead in Human Bone by Energy Dispersive X-ray Fluorescence Analysis

C. Weixelbaumer, B. Pemmer, P. Wobrauschek, C. Streli, TU Wien, Atominstitut, Vienna, Austria
A. Roschger, Ludwig Boltzmann Institute of Osteology at the Hanusch Hospital of WGKK and AUVA Trauma Centre Meidling, Vienna, Austria

F-36 TXRF Analysis of Mining Waste

U.E.A. Fittschen, I. De la calle, M. Quade, Institute of Inorganic and Applied Chemistry, Hamburg, Germany

F-38 Portable X-ray Spectrometer for High-rate High-resolution XRF Analysis in Cultural Heritage Applications

A. Celani, R. Alberti, T. Frizzi, XGLab SRL, Milano, Italy
A. Longoni, Politecnico di Milano, Dip. Elettronica e Informazione, Milano, Italy
L. Miazzo, Study and Restoration of Material Constituting Ancient Furnishings, Milano, Italy

F-39 Verdi-3: New Improvements in Multi-detector Readout ASIC

A. Celani, T. Frizzi, XGLab SRL, Milano, Italy
R. Quaglia, C. Fiorini, Politecnico di Milano, Milano, Italy
O. Evrard, C. Cherukuri, Canberra, Olen, Belgium
B. Zakrzewski, J. Pavlick, Canberra – Bumn Areva, Meriden, USA

F-41 Recent Development of the Large Active Area Vortex® Silicon Drift Detector

L. Feng, V. Saveliev, M. Takahashi, S. Barkan, E. Damron, SII NanoTechnology, Northridge, CA, USA

F-65 Forarrays of Low Power WD XRF into Food and Nutritional Supplement Analysis

D. Bonvin, C. Shaffer, R. Yellepeddi, Thermo Scientific, Ecublens, Switzerland
A. Martin, Thermo Scientific, Sugar Land, TX, USA

F-68 Application of Confocal Micro-XRF to Solid-Liquid Interface Analysis and Ancient Chinese Ceramics

S. Hirano, T. Yoshioka, A. Tabe, T. Nakazawa, K. Tsuji, Osaka City University, Osaka, Japan

F-71 Depth Elemental Imaging of Forensic Samples by Confocal Micro XRF Method

K. Nakano, S. Emoto, T. Nakazawa, K. Tsuji, Osaka City University, Sumiyoshi-ku Osaka, Japan
K. Otsuki, Hyogo Prefectural Police Headquarters, Chuo-ku Kobe, Hyogo, Japan

F-72 X-ray Fluorescence Imaging of Growing Chemical Patterns

K. Sakurai, NIMS, Tsukuba, Ibaraki, Japan
M. Mizusawa, CROSS, Tokai, Ibaraki, Japan

F-74 Characterization of Layered Materials Related to Forensic Investigation by Confocal Micro-XRF and ATR-FT-IR Imaging Technique

T. Nakazawa, K. Tsuji, Applied Chemistry & Bioengineering, Graduate School of Engineering, Osaka City University, Osaka, Japan
M.A. Malek, H.W. Kang, C.U. Ro, Department of Chemistry, Inha University, Incheon, Korea

F-76 Micro X-ray Beam Produced with a Single Glass Capillary for XRF

S. Komatani, S. Hirano, K. Tsuji, Graduate School of Engineering, Osaka City Univ., Sumiyoshi-Osaka, Japan
S. Komatani, T. Aoyama, Y. Yokota, H. Ueda, HORIBA, Ltd., Kyoto, Japan

F-77 Comparison and Characterization of Key Parameters of Two Confocal Micro-XRF Spectrometers

S. Smolek, C. Streli, P. Wobrauschek, Vienna University of Technology, Wien, Austria
T. Nakazawa, K. Nakano, K. Tsuji, Osaka City University, Osaka, Japan

XRF POSTER SESSION *TUESDAY, 7 AUGUST*

F-78 Determination and Production of the Ideal TXRF Sample

C. Horntrich, P. Wobrauschek, C. Streli, Vienna University of Technology, Wien, Austria
V.M. Montoya, G.J. Havrilla, Los Alamos National Laboratory, Los Alamos, NM, USA
U.E.A. Fittschen, University of Hamburg, Hamburg, Germany

F-79 Synchrotron Micro-XRF Elemental Analysis of the Mussel Shell *Perna Viridis* from Manila Bay, Philippines

V.A. Innis-Samson, M. Mizusawa, K. Sakurai, National Institute for Materials Science, Ibaraki, Japan
M. Mizusawa, Comprehensive Research Organization for Science and Society, Ibaraki, Japan

F-88 Nanolayers for X-ray Fluorescence—Developments and Applications

R. Dietsch, M. Kraemer, T. Holz, D. Weissbach, AXO DRESDEN GmbH, Dresden, Germany

F-90 Analysis of Silver Base Solders Using the Thin Layer XRF Technique

J. Anyszkiewicz, Z. Mzyk, T. Goregwoda, Institute of Non-Ferrous Metals, Gliwice, Poland

F-94 Monte Carlo Simulation and PLS Regression-Based XRF Spectroscopy Quantification Method

A. Rakotondrajoa, G. Buzanich, M. Radtke, U. Reinholz, H. Riesemeier, Federal Institute for Materials Research and Testing (BAM), Berlin, Germany
L. Vincze, Ghent University, Ghent, Belgium
A. Rakotondrajoa, R. Raboanary, Laboratoire de Physique Nucléaire et Physique de l'Environnement (LPNPE), University of Antananarivo, Antananarivo, Madagascar

Post Deadline

F-97 Characterization and Dating of Historic Silver Gelatin Fiber Based Photographic Papers Using X-ray Fluorescence Spectroscopy and Chemometrics

A. Martins, L.A. Daffner, C. McGlinchey, The Museum of Modern Art, New York, NY, USA
J. Newhouse, New York University, New York, NY, USA
D. Dahlberg, Lebanon Valley College, Annville, PA, USA

F-98 THE CARE AND MAINTENANCE OF LABORATORY PLATINUM WARE

D. Verbeeten, XRF Scientific, Osborne Park, Western Australia

SPECIAL SESSIONS *WEDNESDAY, 8 AUGUST*

Wednesday am | *Evergreen Ballroom*

PLENARY SESSION:

New Frontiers in X-ray Analysis—Dedicated to the life and work of Robert L. Snyder

Chair: **Scott Misture**, *NYS College of Ceramics at Alfred University, Alfred, NY, USA*

8:30 Chairman of the Denver X-ray Conference Opening Remarks

W. Tim Elam, *University of Washington, Seattle, WA, USA*

Presentation of Awards:

2012 Birks Award

Awarded posthumously to John Criss

2012 Jerome B. Cohen Student Award

Recipient to be announced

Plenary Session Remarks by the Chair

9:00 D-2 Diffraction Analysis and Atomistic Modeling of the Real Structure of Nanocrystalline Materials

Paolo Scardi, L. Gelisio, *University of Trento, Trento, Italy*

9:45 Break

10:15 D-74 Milestones That Gave Momentum to XRPD

Herbert E. Goebel, *LabXA, Munich, Germany*

11:00 F-10 New Dimensions in X-ray Microscopy

Janos Kirz, *LBNL, Berkeley, CA, USA*

Wednesday pm | **XRD & XRF** | *Evergreen A*

Cultural Heritage

Chairs: **M.K. Donais**, *Saint Anselm College, Manchester, NH, USA*

A. Karydas, *International Atomic Energy Agency, Vienna, Austria*

1:30 C-16 Invited—Seeing What Others Cannot See: X-ray Based Imaging and Spectroscopy of Paintings and Painters Materials

K. Janssens, *University of Antwerp, Antwerp, Belgium*

2:00 F-48 Applications of PXRF for Cultural Heritage Diagnostics: Rapid In-field Analysis at Khirbat Faynan, Jordan

L.D. Hahn, K. Bennallack, T.E. Levy, *University of California, San Diego, CA, USA*

2:20 F-70 X-ray Fluorescence (XRF) Assisted, Multispectral Imaging of Historic Drawings

S. Stout, F. Kuester, M. Seracini, *UCSD, La Jolla, CA, USA*

2:40 F-49 Scanning MACRO-XRF Investigation of Caravaggio's "St. Francis in Meditation"

M. Alfeld, G. van der Snickt, K. Janssens, *University of Antwerp, Antwerp-Wilrijk, Belgium*

M. Cardinali, F. Kuester, M.B. De Ruggieri, M. Positano, *Emmebi Diagnostica Artistica, Rome, Italy*

3:00 Break

SPECIAL SESSIONS *WEDNESDAY, 8 AUGUST*

3:30 F-86 *Invited*—PXRF and Archaeological Obsidian: Calibration, Quantification, and the Analysis of Small Samples

J.R. Ferguson, University of Missouri Research Reactor Center, Columbia, MO, USA

4:00 F-73 PXRF Analysis of Iron Age Pottery in Western Sicily: Exchange and Transformation

W.M. Balco, University of Wisconsin-Milwaukee, Milwaukee, WI, USA

4:20 F-64 Gem Stone Analysis with EDX

R.E. Phillips, P. Lemberge,  **son, WI, USA**
C.M. Breeding, Gemological  **Carlsbad, CA, USA**

4:40 F-13 Elemental Distribution in Biological and Art Heritage Samples by Using an Imaging Gaseous Detector Based System

A.L.M. Silva, J.F.C.A. Veloso, University of Aveiro, Aveiro, Portugal

M.L. Carvalho, Atomic Physics Centre, University of Lisbon, Lisboa, Portugal

5:00 F-96 *Invited*—X-ray Fluorescence Integrate by Molecular Spectroscopies for the Non Invasive Studies of Paintings

C. Miliani, CNR-ISTM and Centro di Eccellenza SMAArt, Università di Perugia, Perugia, Italy

Wednesday pm | XRD & XRF | Evergreen D

New Developments in XRD & XRF Instrumentation

Chairs: T. Fawcett, International Centre for Diffraction Data, Newtown Square, PA, USA

T. Blanton, Eastman Kodak Company, Rochester, NY, USA

12:30 C-13 Novel Multilayer Designs Demonstrating Near Lossless Reflectivities

S. Mandal, J.R. Salisbury, B.J. Scherer, S.M. Lee, GE Global Research, Niskayuna, NY, USA

12:42 C-20 Tailored Solutions Using Multilayer Optics in X-ray Analyses

R. Dietsch, T. Holz, M. Kraemer, D. Weissbach, AXO DRESDEN GmbH, Dresden, Germany

H. Borrmann, Max Planck Institute for Chemical Physics of Solids, Dresden, Germany

S. Griessel, Huber Diffraktionstechnik, Rimsting, Germany

12:54 C-9 A New Multilayer X-ray Photonic Device

B.J. Scherer, S. Mandal, S.M. Lee, General Electric Global Research Center, Niskayuna, NY, USA

1:06 D-29 High Brilliance Micro-focus Sources for X-ray Diffractometry

P. Radcliffe, J. Schmidt-May, A. Kleine, J. Wiesmann, C. Michaelsen, Incoatec GmbH, Geesthacht, Germany

1:18 D-60 Modular SAXS-WAXS Systems with Micro-focus Source and Advanced Collimation

P. Højhøj, S. Rodrigues, P. Panine, Xenocs, Sassenage, France

1:30 F-55 Moxtek's New Optimag X-ray Sources: Performance Characterizations

S. Cornaby, D. Reynolds, R. Steck, D. Wang, J. Smith, C. Jensen, Moxtek Inc, Orem UT, USA

1:42 C-12 New Experimental Results with the PNCCD Color X-ray Camera

I. Ordavo, PNDetector GmbH, Munich, Germany

S. Ihle, A. Liebel, H. Soltau, PNSensor GmbH, Munich, Germany

A. Bjeoumikhov, IfG—Institute for Scientific Instruments GmbH, Berlin, Germany

O. Scharf, Institut für Angewandte Photonik eV (IAP), Berlin, Germany

L. Strüder, MPI Halbleiterlabor, Otto-Hahn-Ring 6, 81739 München, Germany

SPECIAL SESSIONS *WEDNESDAY, 8 AUGUST*

1:54 F-57 XRF Performance Information with Moxtek's Mini X-ray Sources & Detectors

S. Cornaby, S. Kamtekar, Moxtek Inc, Orem UT, USA

2:06 F-42 Comparison of Transparent Windows for Large Area Radiation Detectors

M. Bornschlegl, O. Jaritschin, PNDetector GmbH, München, Germany

B. Schweinfest, H. Soltau, PNSensor GmbH, München, Germany

L. Andricek, MPI Halbleiterlabor, München, Germany

2:18 D-27 A New Energy-dispersive Position Sensitive Detector

A. Kern, Bruker AXS, Karlsruhe, Germany

2:30 F-40 New Detector Systems and Measurements Results of Very Large Area SDDs for Synchrotron and Particle Physics Applications

A. Niculae, M. Bornschlegl, R. Eckhardt, J. Herrmann, O. Jaritschin, S. Jeschke, L. Mungenast, J. Treis, PNDetector GmbH, München, Germany

P. Lechner, H. Soltau, PNSensor GmbH, München, Germany

O. Zimmer, aSPECT Collaboration, Institute Laue-Langevi, Grenoble, France

L. Strüder, MPI Halbleiterlabor, München, Germany

2:42 F-8 Improved High Performance Silicon Drift Detectors

A. Pahlke, R. Fojt, T. Eggert, M. Fraczek, L. Höllt, J. Knobloch, KETEK GmbH, Munich, Germany

2:54 Break

3:15 C-3 Model Based Signal Processing for a High Rate Digital Pulse Processor

P.A.B. Scoullar, C.C. McLean, Southern Innovation, Melbourne, Victoria, Australia

3:27 C-14 Super High Throughput with a Silicon Drift Detector and Advanced Pulse Processing Technology

S. Barkan, L. Feng, V.D. Saveliev, M. Takahashi, E.V. Damron, Y. Wang, SII NanoTechnology USA Inc., Northridge, CA, USA

P. Grudberg, J. Harris, XIA LLC, Hayward, CA, USA

P. Scoullar, C. Mclean, Southern Innovation, Melbourne, Australia

3:39 C-11 Performance Comparison of "Cube" CMOS Preamplifier with Respect to JFET Front-end for SDD Readout

L. Bombelli, T. Frizzi, R. Alberti, XGLab SRL, Milano, Italy

C. Fiorini, A. Longoni, Politecnico di Milano, Milano, Italy

3:51 D-54 New Incident and Detector Side Components for Laboratory X-ray Diffraction

B. Jones, B. He, H. Ress, Bruker AXS, Madison, WI, USA

C. Olligner, G. Vanhoyland, A. Kern, Bruker AXS, Karlsruhe, Germany

4:03 D-64 The PANalytical Difference

M. Fransen, PANalytical, Almelo, The Netherlands

4:15 F-58 A Novel Micro-XRF for In-Situ Geological Exploration of Other Planets

L.A. Wade, R. Hodyss, A. Allwood, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

N. Gao, XOS Inc., East Greenbush, NY, USA

K. Kozaczek, Moxtek Inc., Orem, UT, USA

4:27 F-54 XRF Sensitivity Improvement with a Novel Capacitive Concentration Cell

C. Bupp, D. Dietrich, American Micro Detection Systems, Stockton, CA, USA

SPECIAL SESSIONS *WEDNESDAY, 8 AUGUST*

4:39 F-81 Application of Peltier Cooled Detectors for Radioisotope Induced EDXRF

D. Joseph, Nuclear Physics, **WITHDRAWN**, India

4:51 F-82 The X-5000 Bench-top EDXRF Analysis of Shale in Oil Producing Fields

J. Brum, Olympus ANI, Inc., Woburn, MA USA

5:03 F-52 Grade Control of Ore and Industrial Minerals with a New XRF Instrument Design

K. Behrens, F. Portala, A. Buman, P. de Pape, Bruker-AXS, Madison, WI, USA

5:15 F-63 Thermo Scientific's New XRF Products

D. Bonvin, C. Shaffer, R. Yellepeddi, Thermo Scientific, Ecublens, Switzerland

A. Martin, Thermo Scientific, Sugar Land, TX, USA

Wednesday pm | **XRD** | *Evergreen B*

Stress Analysis

Chair: D. Brown, Los Alamos National Laboratory, Los Alamos, NM, USA

1:30 D-38 Invited—Stresses in Mineralized Tissues

S.R. Stock, Northwestern Univ., Chicago, IL, USA

J.D. Almer, Argonne National Lab., Argonne, IL, USA

2:00 D-10 Invited—Comparing Residual Stress Measurements Using Diffraction and Mechanical Techniques

A.T. DeWald, Hill Engineering, LLC, Rancho Cordova, CA, USA

M.R. Hill, University of California, Davis, CA, USA

M.B. Prime, B. Clausen, D.W. Brown, Los Alamos National Laboratory, Los Alamos, NM, USA

2:30 D-40 Integrating Known Models with Evolutionary Algorithms to Characterize Distortions in X-ray Diffraction

J.C. Schuren, AFRL, WPAFB, OH, USA

M. Schmidt, Nutonian Inc., Boston, MA, USA

2:50 D-8 Analysis of the Deformation Behavior of Mg-RE and Mg-Li Alloys Using In-situ Energy-dispersive Synchrotron X-ray Diffraction

M. Lentz, W. Reimers, Technische Universität Berlin, Berlin, Germany

3:10 Break

3:40 D-13 Characterization of Residual Stress Gradient in Electroplated Coatings Using X-ray Diffraction

L. Tarkowski, P. Indyka, E. Beltowska-Lehman, Institute of Metallurgy and Materials Science of Polish Academy of Sciences, Krakow, Poland

4:00 D-16 Influence of the Load Character on the Martensitic Transformation Kinetics in a Trip Steel: A Synchrotron X-ray Diffraction Study

E. Cakmak, H. Choo, University of Tennessee, Knoxville, TN, USA

K. An, Spallation Neutron Source, Oak Ridge National Laboratory, Oak Ridge, TN, USA

Y. Ren, X-ray Science Division, Argonne National Laboratory, Argonne, IL, USA

SPECIAL SESSIONS *WEDNESDAY, 8 AUGUST*

4:20 D-45 Neutron and X-ray Residual Stress Mapping in Vehicle Turbocharger Shaft Wheel Assemblies

C.R. Hubbard, T. Watkins, Oak Ridge National Laboratory, Oak Ridge, TN, USA

J. Bunn, University of Tennessee, Knoxville, TN, USA

S. Chaudhury, K. Pattabiramen, Honeywell Turbo Technologies, Torrance, CA, USA

4:40 D-49 Minimize the Effect of Texture and Grain Size on Stress Analysis with 2D Detector

B.B. He, Bruker AXS, Madison, WI, USA

5:00 D-75 Neutron Diffraction Study of Residual Stress in a Multi-pass Gas Tungsten Arc Weld

T.A. Sisneros, D.W. Brown, B. Clausen, J.O. Milewski, M. Stienzig, Los Alamos National Laboratory, Los Alamos New Mexico, USA

Wednesday pm | **XRF** | *Evergreen C*

Fusion and Industrial Applications of XRF

Chair: J.A. Anzelmo, *Anzelmo & Associates, Inc., Madison, WI*

2:00 F-89 Research on the Development of Sample Preparation Methods for Sn-Pb Solders and Their Correct Analysis by Wavelength Dispersion X-ray Fluorescence Spectrometry

T.Gorewoda, J. Anyszkiewicz, Z. Mzyk, Institute of Non-Ferrous Metals, Gliwice, Poland

2:20 F-91 Micro X-ray Fluorescence for Identification of Particles in Manufacturing Processes

L.L. Brehm, Dow Chemical Company, Midland, MI, USA

M. Alpeter, D. Kwasneski, P. Ortiz, V. Mercier, Dow Chemical Company, Seadrift, TX, USA

D. Burns, Dow Chemical Company, Freeport, TX, USA

2:40 F-21 XRF Analysis Using Borate Fusion for Characterization of Major Components in Mesoporous Silica Nanoparticles Comprising the Inclusion of Gadolinium

M. Bouchard, A. Milliard, Corporation Scientifique Claisse®, Quebec City, Canada

R. Guillet-Nicolas, F. Kleitz, M.-A. Fortin, Université Laval, Quebec City, Canada

3:00 Break

3:30 F-20 ISO 9615-1 Simplified Borate Fusion/WDXRF Analytical Method for Iron Ore Including Total Iron Analysis

S. Ness, Intertek, Genalysis, Perth, Australia

M. Bouchard, C.O. Arsenault, Corporation Scientifique Claisse®, Quebec City, Canada

K. Behrens, D. Porta, Bruker-AXS GmbH, Karlsruhe, Germany

3:50 F-66 Analyze This! Point and Shoot Analysis of Unknowns with WDXRF

D. Bonvin, K. Juchli, Thermo Scientific, Ecublens, Switzerland

A. Martin, Thermo Scientific, Sugar Land, TX, USA

4:10 F-61 Analysis of Gypsum and Carbonate Rocks Using a New Silicon Drift Detector Based EDXRF Instrument

K. Behrens, F. Portala, S. Durali-Mueller, Bruker-AXS, Karlsruhe, Germany

D. Pecard, Bruker-AXS, Madison, Wisconsin

4:30 F-30 Using the Micro-spot Analysis Function and Mapping Capability of a Bulk WDXRF Instrument for Forensic Industrial Applications

L. Oelofse, Rigaku Americas Corp, The Woodlands, TX, USA

SPECIAL SESSIONS *THURSDAY, 9 AUGUST*

Thursday am | **XRD & XRF** | *Evergreen A*

Improved Fundamental Parameters

Chair: **T. Jach**, National Institute of Standards & Technology, Gaithersburg, MD, USA

Co-chair: **W.T. Elam**, University of Washington, Seattle, WA, USA

9:00 F-5 Invited—Comparing Existing Mac Tables – Hints to Possible Developments

P. Caussin, Bruker-AXS, Champs sur Marne, France

9:30 F-19 The International Workshops on X-ray Fundamental Parameters

T. Jach, National Institute of Standards and Technology, Gaithersburg, MD, USA

B. Beckhoff, Physikalisch-Technische Bundesanstalt, Berlin, Germany

M.-C. Lépy, LNE/Laboratoire National Henri Becquerel, Gif-sur-Yvette, France

M. Mantler, Rigaku Corp., Tokyo, Japan

9:50 F-37 Modeling XRF Intensities for Portable/Handheld Analyzers Using Fundamental Parameters Approach

A.G. Karydas, **R. Padilla-Alvarez**, **A. Markowicz**, IAEA Laboratories, Seibersdorf, Austria

D. Sokaras, Stanford Synchrotron Radiation Lightsource, Menlo Park, CA, USA

M. Drozdenko, National Academy of Sciences of Ukraine, Sumy, Ukraine

V. Kantarelou, NCSR Demokritos, Athens, Greece

10:10 Break

10:40 F-17 Invited—High-resolution X-ray Emission Spectroscopy: A Powerful Technique for Inner-shell Atomic Physics and Fundamental Parameters Determination

J.-C. Dousse, University of Fribourg, Fribourg, Switzerland

11:10 F-51 Microcalorimeter Spectrometers for High Resolution Spectroscopy between 30 and 400 KEV

J.N. Ullom, **D.A. Bennett**, **R.D. Horansky**, **D.R. Schmidt**, **W.B. Doriese**, **C.P. Fitzgerald**, **J.W. Fowler**, **G.C. Hilton**,

K.D. Irwin, **V. Kotsubo**, **G.C. O'Neil**, **C.D. Reintsema**, **F. Schima**, NIST, Boulder, CO, USA

A.S. Hoover, **R. Winkler**, **M.W. Rabin**, Los Alamos National Laboratory, Los Alamos, NM, USA

11:30 F-24 XRF Analysis of High Gain-on-ignition Sample by the Fusion Method Using the Fundamental Parameter Method

H. Inoue, **Y. Yamada**, **M. Watanabe**, **Y. Kataoka**, Rigaku Corporation, Takatsuki, Osaka, Japan

L. Oelofse, **M. Feeney**, Rigaku Americas Corporation, The Woodlands, Texas, USA

Thursday am | **XRD** | *Evergreen B*

Rietveld Analysis I

Chair: **Q. Huang**, National Institute of Standards & Technology, Gaithersburg, MD, USA

9:00 D-47 Invited—X-ray Powder Diffraction Structural Studies of Novel Hydrogen Storage Materials

H. Wu, National Institute of Standards and Technology, Gaithersburg, MD, USA

9:30 D-48 Quantitative X-ray Diffraction Application in Amorphous Content Determination of Crystallized Glass Seals

T. Jin, **M. Naylor**, **S. Misture**, New York State College of Ceramics at Alfred University, Alfred, NY, USA

SPECIAL SESSIONS *THURSDAY, 9 AUGUST*

9:50 D-17 Crystal Structures of Group 1 Citrate Salts

J.A. Kaduk, Illinois Institute of Technology, Chicago, IL, USA

A. Rammohan, American International University, Woodridge, IL, USA

10:10 Break

10:40 D-65 Application of Powder Diffraction and Rietveld Analysis in Superconductors

Q. Huang, NIST Center for Neutron Research, Gaithersburg, MD, USA

11:00 D-73 Kinetic Study of Crystallization Mechanisms of Aurivillius Phases by In-situ X-ray Diffraction

J. Shi, R. J. Koch, I.N. Lokuhewa, M.S. Haluska, S.T. Misture, Alfred University, Alfred, NY, USA

Thursday am | **XRD** | *Evergreen C*

Industrial Applications and Energy Materials I

Chairs: E.A. Payzant, Oak Ridge National Laboratory, Oak Ridge, TN, USA

T.R. Watkins, Oak Ridge National Laboratory, Oak Ridge, TN, USA

M. Rodriguez, Sandia National Laboratory, Albuquerque, NM, USA

9:00 D-67 Invited—XRD and XRF Techniques for Industrial Research of Advance Electrified Vehicle Energy Storage Devices

K.J. Rhodes, Ford Motor Company, Dearborn, MI, USA

9:30 D-70 Invited—A Synergistic Electron Nanodiffraction and X-ray Diffraction Study of Thin Film Functional Materials

J.Y. Howe, M.J. Kirkham, Z. Gai, Oak Ridge National Laboratory, Oak Ridge, TN, USA

10:00 D-50 The Structural Characterization of a New Form of Clenbuterol (Clenbuterol Hemihydrate) a Well Known Decongestant and Bronchodilator, Also Used as a Performance-enhancing Drug

J.M. Delgado, R. Toro, G. Díaz de Delgado, Universidad de Los Andes, Mérida, Venezuela

10:20 Break

10:50 D-15 Microbeam X-ray Diffraction on TRIP Steels: From Powder Data to Single Grains and Subgrains

R. Blondé, E. Jimenez-Melero, N.H. van Dijk, E. Brück, L. Zhao, J.P. Wright, S. van der Zwaag, Delft University of Technology, Delft, The Netherlands

11:10 D-34 Integration of Microfocus XRD with Scanning Electron Microscopy, Electron Probe Microanalysis and Scanning Thermal Diffusivity Microscopy

L.N. Squires, K.E. Wright, M.K. Fig, T.P. O'Holleran, J.R. Kennedy, Idaho National Laboratory, Idaho Falls, ID, USA

T. Hartmann, University of Nevada Las Vegas, Las Vegas, NV, USA

11:30 D-9 X-ray Analysis of PbSe Nanocrystal Superlattice Films

A. Takase, Rigaku Americas Corporation, The Woodlands, TX, USA

C. Perkins, National Renewable Energy Laboratory, Golden, CO, USA

R. Ihly, M. Law, University of California Irvine, Irvine, CA, USA

11:50 D-41 Probing Zone Boundary Phonons at the Nanoscale

G. Gopalakrishnan, K. McElhinny, P. Evans, University of Wisconsin, Madison, WI, USA

M. Holt, D. Czaplewski, Center for Nanomaterials, Argonne National Laboratory, Argonne, IL, USA

SPECIAL SESSIONS *THURSDAY, 9 AUGUST*

Thursday am | **XRF** | *Evergreen D*

Handheld XRF Applications

Chair: K.A. Russell, Olympus Innov-X, Woburn, MA, USA

9:00 F-87 Invited—Overview of Handheld XRF Applications for Soil Science

D. Weindorf, LSU AgCenter, Baton Rouge, LA, USA

9:30 F-27 X-ray Spectroscopy as a Tool for Process Control in Biorefineries

M. Thyrel, T.A. Lestander, Swedish University of Agricultural Sciences, Unit of Biomass Technology and Chemistry, Umeå, Västerbotten, Sweden

9:50 F-35 Portable XRF and “Halogen Free” Requirements: Low-level Chlorine and Bromine Analysis in Polymer Materials

B. Connors, B. Tannian, J. Koch, Olympus Innov-X, Woburn, MA, USA

10:10 Break

10:40 F-53 Invited—Use of Handheld XRF for Consumer Product Testing in the Undergraduate Chemistry Curriculum

P.T. Palmer, San Francisco State University, San Francisco, CA, USA

11:10 F-16 Portable XRF in the Undergraduate Chemistry Curriculum

M.K. Donais, Saint Anselm College, Manchester, NH, USA

11:30 F-12 Use of Handheld XRF in Catalytic Converter Recycling

M. Cameron, Bruker Elemental, Kennewick, WA, USA

11:50 F-95 Advantages of Measuring Lead in Paint by XRF Using Areal Mass Approach

S. Piorek, Thermo NITON Analyzers, LLC, Billerica, MA, USA

Thursday pm | **XRD & XRF** | *Evergreen A*

X-ray Imaging

Chair: B. Patterson, Los Alamos National Laboratory, Los Alamos, NM, USA

2:00 C-21 Invited—Scanning Versus Full-field Micro-XRF Imaging Using a Novel Energy-dispersive X-ray CCD Camera

L. Vincze, B. De Samber, J. Garrevoet, B. Vekemans, Ghent University, Ghent, Belgium

O. Scharf, A. Bjeoumikhov, IfG-Institute for Scientific Instruments GmbH, Berlin, Germany

R. Wedell, Institut für Angewandte Photonik e.V. (IAP), Berlin, Germany

M. Vandegehuchte, C. Janssen, Ghent University, Ghent, Belgium

2:30 D-37 X-ray Diffraction Imaging for Predictive Metrology of Crack Propagation in Large Diameter Silicon Wafers

B.K. Tanner, M.C. Fossati, Durham University, Durham, UK

J. Wittge, A.N. Danilewsky, University of Freiburg, Freiburg, Germany

D. Allen, P.J. McNally, Dublin City University, Dublin, Ireland

D. Jacques, Jordan Valley Semiconductors UK Ltd, Durham, UK

J. Garagorri, M.R. Elizalde, University of Navarra, San Sebastián, Spain

2:50 D-46 Progressive Structural Decomposition Analysis Using In-situ Digital Radiography

T. Wypych, F. Kuester, University of California San Diego, La Jolla, CA, USA

SPECIAL SESSIONS *THURSDAY, 9 AUGUST*

3:10 C-7 Development and Benchmarking of a First-principles Model of Highly-ordered Pyrolytic Graphite X-ray Optical Elements

Y. Van Haarlem, J. Tickner, CSIRO, Kirrawee, NSW, Australia

3:30 Break

3:50 C-4 *Invited*—Nanoscale Chemical Imaging of Energy Materials with Full-field Transmission X-ray Microscopy

J.C. Andrews, Y. Liu, J. Nelson, P. Pianetta, Stanford Synchrotron Radiation Lightsource, Menlo Park, CA, USA
F. Meirer, Fondazione Bruno Kessler; Povo, Italy

4:20 C-1 Characterization of Low Density Materials Using 3D X-ray Characterization Techniques

B.M. Patterson, C.E. Hamilton, K.A. Obrey, Z. Smith, R. Gilbertson, G.J. Havrilla, Los Alamos National Laboratory, Los Alamos, NM, USA

4:40 F-83 *Invited*—X-ray Fluorescence Elemental Imaging Using Micro, Confocal and DCC Instrumentation

G.J. Havrilla, Los Alamos National Laboratory, Los Alamos, NM, USA

Thursday pm | **XRD** | *Evergreen B*

Rietveld Analysis II

Chair: Q. Huang, National Institute of Standards & Technology, Gaithersburg, MD, USA

2:00 D-66 *Invited*—Harnessing the Power of High-resolution Synchrotron Powder Diffraction for (Your) Rietveld Analysis

M. Suchomel, L. Ribaud, Argonne National Laboratory, Argonne, IL, USA

2:30 D-51 In-situ Characterization of Spinel-supported Nanoparticulate Metal Catalysts

K.C. Glass, B. Hill, S.T. Mixture, Alfred University, Alfred, NY, USA

2:50 D-28 Quantitative Analysis of Carbides in a Superalloy for Gas Turbine Blade

H. Lee, D. Kim, K. Yoo, K. Song, Pohang Research Institute, Daejeon, Korea

WITHDRAWN

3:10 Break

3:40 D-76 *Invited*—Selected Applications of Rietveld-XRD Analysis of Aluminum Industry Materials

F.R. Feret, Feret Analytical Consulting, Saint-Colomban, Quebec, Canada

4:10 D-26 Analytical Method for Observed Powder Diffraction Intensity Data Based on Maximum Likelihood Estimation

T. Ida, Nagoya Institute of Technology, Tajimi, Gifu, Japan
F. Izumi, National Institute for Materials Science, Tsukuba, Ibaraki, Japan

SPECIAL SESSIONS *THURSDAY, 9 AUGUST*

Thursday pm | **XRD** | *Evergreen C*

Industrial Applications and Energy Materials II

Chairs: **E.A. Payzant**, Oak Ridge National Laboratory, Oak Ridge, TN, USA

T.R. Watkins, Oak Ridge National Laboratory, Oak Ridge, TN, USA

M. Rodriguez, Sandia National Laboratory, Albuquerque, NM, USA

2:00 D-69 *Invited*—Size Matters: In this New Realm of Nanotechnology the Industrial X-ray Characterization Market still requires Macro Solutions

P. LaPuma, H. Ress, B. Jones, J. Giencke, M. Sunder, Bruker AXS Inc., Madison, WI, USA

2:30 D-21 A High-speed Crystal Orientation Mapping System for Multi Crystalline Silicon Solar Cells

A. Haase, M. Klatt, A. Schafmeister, R. Stabenow, GE Sensing & Inspection Technologies GmbH, Ahrensburg, Germany

S.M. Lee, GE Global Research, Niskayuna, NY, USA

E. Meissner, T. Geiger, C. Reimann, M. Trempa, Fraunhofer IISB, Department Crystal Growth, Erlangen, Germany

T. Lehmann, Fraunhofer THM, Freiberg, Germany

2:50 D-39 Rapid Analysis of Natural Gas Bearing Shale Using Next Generation 2-D Portable PXRD

T.C. Jennison, B. Boyer, W. Brunner, P. Sarrazin, K. Stehr, Olympus ANI, Campbell, CA, USA

3:10 D-22 Measuring the Local Biaxial Stress State in the Diffuse Neck During Uniaxial Mechanical Testing

M.A. Iadicola, NIST, Gaithersburg, MD, USA

3:30 Break

4:00 D-25 High-temperature XRD Study of the Th₆Mn₂₃ Phase in Ti-Al-Ru Alloys

S. Rajsiri, E. Ryba, The Pennsylvania State University, University Park, PA, USA

J. Bai, Brookhaven National Laboratory, Upton, NY, USA

4:20 D-57 Identification of Soot Generated from Laser Processing of Titanium Alloys

R.G. Baggerly, Boeing Research & Technology, Seattle, WA, USA

4:40 D-55 Modern Applications for 2 Dimensional X-ray Diffraction

J. Giencke, B. Jones, H. Cordes, M. Sunder, B. He, Bruker AXS, Madison, WI, USA

SPECIAL SESSIONS *THURSDAY, 9 AUGUST*

Thursday pm | **XRF** | *Evergreen D*

Trace Analysis

Chair: M.A. Zaitz, IBM, Hopewell Junction, NY, USA

2:00 F-26 Invited—TXRF Analysis of Environmental and Biological Samples

K. Tsuji, S. Kaku, T. Ohmori, T. Yoshioka, Osaka City University, Osaka, Japan

2:30 F-34 Distribution of Trace Elements in the Mineralized Matrix of Human Osteosarcoma Tissue

B. Pemmer, C. Weixelbaumer, M. Foelser, P. Wobrauschek, TU Wien, Atominstitut, Vienna, Austria

A. Roschger, Ludwig Boltzmann Institute of Osteology at the Hanusch Hospital of WGKK and AUVA Trauma Centre Meidling, Vienna, Austria

J.G. Hofstaetter, Vienna General Hospital, Medical Univ. of Vienna, Vienna, Austria

2:50 F-93 Characterization of Dried Blood Spots by Wavelength Dispersive X-ray Fluorescence (WDXRF) and Supporting Instrumentation High Resolution Inductively Coupled Plasma – Mass Spectrometry (SF-ICP-MS)

A.C. McWilliams, F.X. Weber, K.E. Levine, Research Triangle Institute, Research Triangle Park, NC, USA

A.A. Martin, Thermo Fisher Scientific, Sugar Land, TX, USA

3:10 F-84 HIRX Detection of Plutonium in Contaminated Soil

G.J. Havrilla, M.C. Collins, V.M. Montoya, H. Boukhalfa, Los Alamos National Laboratory, Los Alamos, NM, USA

3:30 Break

3:50 F-43 On-line Slurry Analysis by EDXRF Using a 50 MM² SDD

S. Barkan, L. Feng, V.D. Saveliev, M. Takahashi, E.V. Damron, Y. Wang, SII NanoTechnology USA Inc., Northridge, CA, USA

T. Strombotne, Process Engineering Resources Inc., Salt Lake City, UT, USA

4:10 F-9 Design of an In-situ XRF Instrument for Elemental Diffusion Measurements

W.T. Elam, University of Washington, Seattle, WA, USA

T. Grundl, University of Wisconsin-Milwaukee, Milwaukee, WI, USA

O.X. Leupin, NAGRA, Wettingen, Switzerland

M. Descostes, Areva Bg Mines, Paris La Defense Cedex, France

4:30 F-18 High Resolution Grazing Emission X-ray Fluorescence Technique: A Powerful Tool for Material Characterization

J. Hoszowska, Y. Kayser, S.H. Nowak, J.-Cl. Dousse, University of Fribourg, Fribourg, Switzerland

SPECIAL SESSIONS *FRIDAY, 10 AUGUST*

Friday am | **XRD** | *Evergreen A*

Line Profile Analysis

Chairs: **I. Cernatescu**, *Pratt and Whitney, East Hartford, CT*

T. Ungár, *Eotvos University, Budapest, Hungary*

8:30 D-14 *Invited*—Beyond X-ray Line Profiles: Perceiving Dislocation Structures from High Resolution Reciprocal Space Mapping

W. Pantleon, *Technical University of Denmark, Kongens Lyngby, Denmark*

9:00 D-30 Modification of Line Profile Analysis Methods for Thin Film Materials Study

A. Benediktovitch, *Belarusian State University, Minsk, Belarus*

A. Ulyanenko, *Rigaku Europe SE, Berlin, Germany*

9:20 D-53 Experiment Demonstration of the Absorption Broadening of XRD Line Profile by Two Kinds of the Crystals of Silicon

K. Liu, H. Chen, *Shanghai Institute of Technology, Shanghai, China*

9:40 D-68 Time-resolved Study of a Silver Nanoparticle Self-assembly into a 3D Nanocrystal at Micro-GISAXS Beamline at PETRA III

K. Vegso, P. Siffalovic, M. Jergel, E. Majkova, M. Weis, S. Luby, *Institute of Physics, Slovak Academy of Sciences, Bratislava, Slovakia*

A. Buffet, M.A. Kashem, J. Perlich, S.V. Roth, *HASYLAB/DESY, Hamburg, Germany*

10:00 Break

10:20 D-43 *Invited*—Characterizing Twinning and Stacking Fault Activity by X-ray and Neutron Diffraction Line Profile Analysis

L. Balogh, *Los Alamos National Laboratory, Los Alamos, NM, USA*

T. Ungár, *Eotvos University, Budapest, Hungary*

10:50 D-35 The Certification of SRM 1979 for Analysis of Crystallite Size

J.P. Cline, J.J. Ritter, D. Black, D. Windover, A. Henins, J.E. Bonevich, J.J. Filliben, *NIST, Gaithersburg, MD*

11:10 D-62 *Invited*—Extending Line-profile-analysis to Textured materials and Neutron-diffraction

T. Ungár, *Eotvos University, Budapest, Hungary*

11:40 D-24 Structural Study of Nanostructured Cr-Co Based Alloys by X-ray Diffraction Line Profile Analysis

S. Louidi, F.Z. Bentayeb, W. Tebib, *Université Badji-Mokhtar, Annaba, Algérie*

A.M. Mercier, *Université du Maine, Le Mans, France*

SPECIAL SESSIONS *FRIDAY, 10 AUGUST*

Friday am | **XRF** | *Evergreen B*

Quantitative Analysis

Chair: L. Brehm, *Dow Chemical Company, Midland, MI, USA*

8:30 F-47 Invited—Quantitative XRF Analysis at Trace Level: Concepts and Approaches

W.-L. Shen, *The Dow Chemical Company, Freeport, TX, USA*

9:00 F-14 Invited—Residual Metals Analysis in the Pharmaceutical Industry: A Comparison of TXRF, ICP-MS and AAS

A.R. Diaz, A.J. Jensen, Y. Xiang, F.J. Antosz, *Pfizer Inc., Groton, CT, USA*

9:30 F-67 Minimizing Uncertainties in the XRF Analysis of Atmospheric Particulate Matter (PM) Through Calibration of PM Samples

H. Indresand, A.M. Dillner, *University of California, Davis, CA, USA*

WITHDRAWN

9:50 F-50 Validation and Traceability of XRF and SEM-EDS Elemental Analysis Results for Solder in High-reliability Applications

J.R. Sieber, *National Inst. of Stand. & Tech., Gaithersburg, MD, USA*

A. Mortensen, *Hi-Rel Laboratories, Inc., Spokane, WA, USA*

10:10 Break

10:30 F-11 Synthetically Generated Reference Spectra for X-ray Fluorescence Calibration with Application to the On-line Measurement of Fluorochemical Concentration on Carpet Fibers

R. Gullayanon, *King Mongkut Institute of Technology Latkrabang, Latkrabang, Bangkok, Thailand*

T.E. Michaels, *Georgia Institute of Technology, Atlanta, GA, USA*

10:50 F-56 Comparison of XRF, TXRF, and ICP-MS Methods for Determination of Mercury in Face Cream

P.T. Palmer, *San Francisco State University, San Francisco, CA, USA*

G. Vrdoljak, *CA Dept. of Public Health, Richmond, CA, USA*

R. Jacobs, *FDA Division of Field Science, Alameda, CA, USA*

11:10 F-59 The Average Oxidation State of Sulfur by X-ray Spectrometry

R.W. Morton, S. Soyer-Uzun, *ConocoPhillips, Bartlesville, OK, USA*

11:30 F-92 Novel WDXRF Solution for Zinc and Lead Analysis in Widely Varying Matrices Using Multiple, Simultaneous Calibration Routines

K.L. Lackey, *Teck, Inc., Red Dog Mine, Anchorage, AK, USA*

A. Martin, *ThermoARL, Sugar Land, TX, USA*

11:50 F-60 Flexibility and Performance of WDXRF Spectrometers for Successful Quality and Process Control in Modern Steel Production

K. Behrens, F. Portala, A. Buman, D. Porta, *Bruker-AXS, Karlsruhe, Germany*

SPECIAL SESSIONS *FRIDAY, 10 AUGUST*

Friday am | **XRF** | *Evergreen C*

Micro XRF

Chair: **G. Havrilla**, *Los Alamos National Laboratory, NM, USA*

8:30 F-28 *Invited*—Confocal XRF Xanes Analysis of the Cathode Electrolyte Interface of Lithium-ion Batteries

M. Menzel, U.E.A. Fittschen, M. Fröba, A. Schlifke, Institute of Inorganic and Applied Chemistry, University of Hamburg, Hamburg, Germany

9:00 F-25 *Invited*—Development of a Vacuum Confocal Micro-XRF Instrument and its Applications

K. Tsuji, T. Nakazawa, Osaka City University, Osaka, Japan

9:30 C-6 X-ray Fluorescence and Diffraction Mapping of Dentin at 200 NM

S.R. Stock, A.C. Deymier-Black, A. Veis, E. Lux, A. Telser, Northwestern Univ., Chicago, IL, USA
S. Wang, Z. Cai, Advanced Photon Source, Argonne National Lab., Argonne, IL, USA

9:50 Break

10:10 C-10 Characterization of Thermoelectric Materials by Synchrotron Micro-X-ray Fluorescence and Diffraction

U.E.A. Fittschen, K-G. Reinsberg, M. Menzel, J.A.C. Broekaert, Institute of Inorganic and Applied Chemistry, Hamburg, Germany;
C. Schumacher, K. Nielsch, Institute of Applied Physics, Hamburg, Germany

10:30 F-44 Biological Applications of X-ray Imaging and Spectroscopy: Implications for Drug Design

J. Ward, S. Vogt, Argonne National Laboratory, Argonne, IL, USA
R. Marvin, T. O'Halloran, Northwestern University, Evanston, IL, USA
D. Mustafi, U. Dougherty, G. Karczmar, University of Chicago, Chicago, IL, USA
J. Penner-Hahn, University of Michigan, Ann Arbor, MI, USA

10:50 F-22 Application of Micro-XRF for Nuclear Material Forensics and Problem Solving

C.G. Worley, L. Tandon, P.T. Martinez, D.L. Decker, Los Alamos National Laboratory, Los Alamos, NM, USA

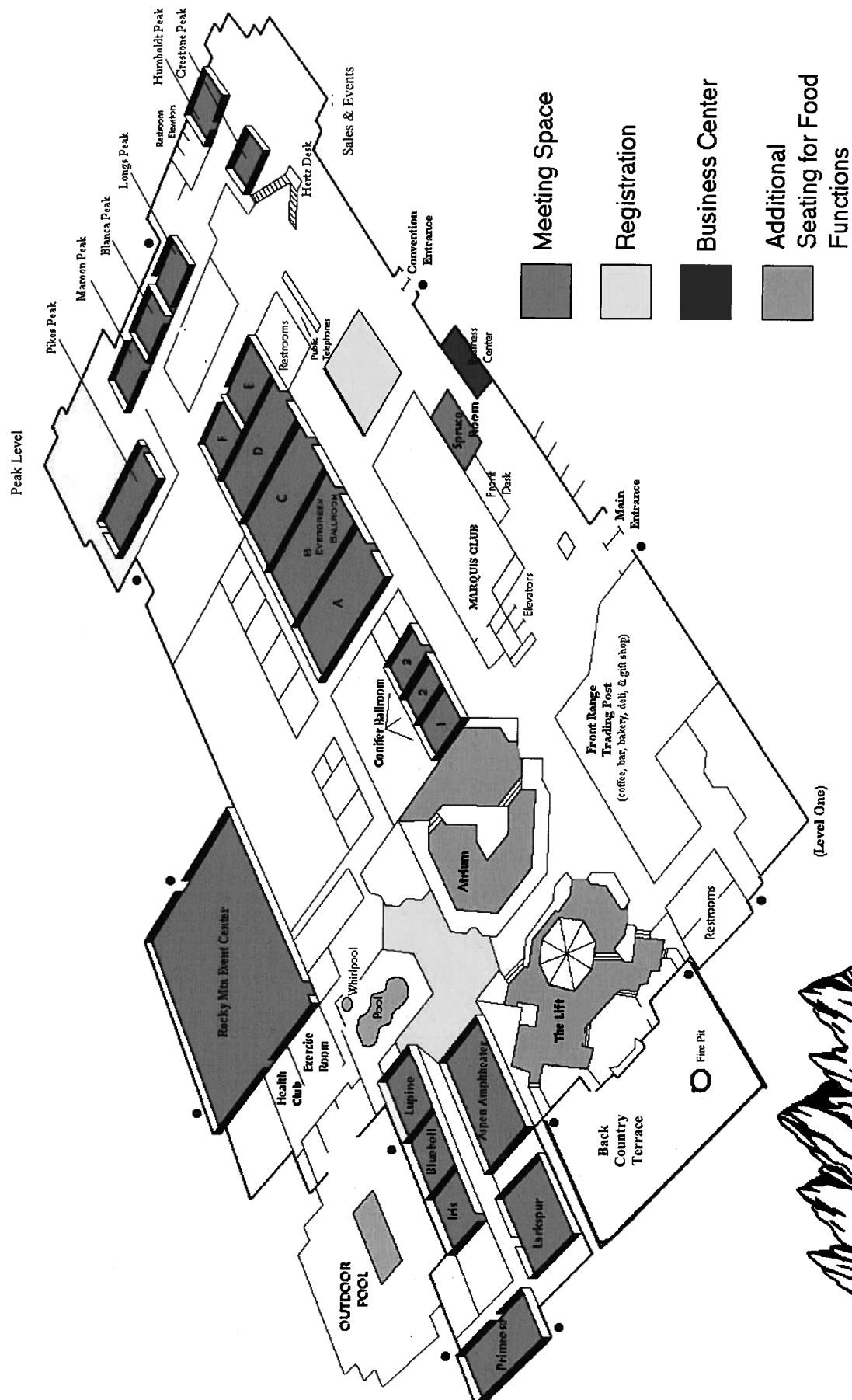
11:10 F-85 Ultra High Energy X-ray Fluorescence Application to Uranium Detection

G.J. Havrilla, M.L. Collins, V.M. Montoya, Los Alamos National Laboratory, Los Alamos, NM, USA
W.T. Elam, University of Washington, Seattle, WA, USA
S. Shastri, A. Mashayekhi, Argonne National Laboratory, Argonne, IL, USA

11:30 F-69 High-Resolution, Energy-dispersive, Soft-X-ray Spectroscopy via Arrays of Microcalorimeters

W.B. Doriese, C.P. Fitzgerald, J.W. Fowler, G.C. Hilton, K.D. Irwin, V. Kotsubo, L. Miaja-Avila, C.D. Reintsema, D.R. Schmidt, D.S. Swetz, J. Uhlig, J.N. Ullom, L.R. Vale, National Institute of Standards and Technology, Boulder, CO, USA
D.A. Fischer, C. Jaye, National Institute of Standards and Technology, Gaithersburg, MD, USA

HOTEL LAYOUT



2012 DENVER X-RAY CONFERENCE

PROGRAM-AT-A-GLANCE • MONDAY-FRIDAY • 6-10 AUGUST 2012

Monday Morning Workshops 9:00 am – 12:00 Noon				
	Meeting Room			
	Evergreen A	Evergreen B	Evergreen C	Evergreen D
XRD & XRF	3D Imaging (Patterson)			
XRD		Residual Stress (Noyan)	Nanostructures I (Petkov)	
XRF				Basic XRF (Elam/Havrilla)
Monday Afternoon Workshops 1:30 pm – 4:30 pm				
XRD & XRF	X-ray Reflectivity (Sakurai)			
XRD		Two Dimensional Detectors (He/Blanton)	Nanostructures II (Petkov)	
XRF				Energy Dispersive XRF (Phillips)
Monday Evening XRD Poster Session & Reception 5:30 – 7:30 pm Sponsored by PANalytical and ICDD; Evergreen Ballroom				
Tuesday Morning Workshops 9:00 am – 12:00 Noon				
XRD	Rietveld Analysis I (Kaduk/Misture)	Phase Identification (Fawcett/Crowder/Blanton)		
XRF			Quantitative Analysis I (Mantler)	Trace/TXRF Analysis (Streli/Wobrauschek)
Tuesday Afternoon Workshops 1:30 pm – 4:30 pm.				
XRD & XRF		Cultural Heritage (Karydas/Donais)		
XRD	Rietveld Analysis II (Kaduk/Misture)			
XRF			Quantitative Analysis II (Mantler)	XRF Sample Preparation (Anzelmo)
Tuesday Evening XRF Poster Session & Reception 5:30 – 7:30 pm Sponsored by Chemplex; Evergreen Ballroom				
Wednesday Morning Plenary Session 8:30 am – 11:45 pm. New Frontiers in X-ray Analysis - Dedicated to the life and work of Robert L. Snyder (Misture)				
Wednesday Afternoon Sessions				
XRD & XRF	Cultural Heritage (Karydas/Donais) 1:30-5:30			New Developments in XRD & XRF Instrumentation (Fawcett/Blanton) 12:30-5:30
XRD		Stress Analysis (Brown) 1:30-5:20		
XRF			Fusion & Industrial Applications of XRF (Anzelmo) 2:00-4:50	
Wednesday Evening Vendor Sponsored Reception 5:45 - 7:00 pm; Rocky Mountain Event Center				
Thursday Morning Sessions				
XRD & XRF	Improved Fundamental Parameters (Jach/Elam) 9:00-11:50			
XRD		Rietveld Analysis I (Huang) 9:00-11:20	Industrial Applications and Energy Materials I (Payzant/Watkins/Rodriguez) 9:00-12:10	
XRF				Handheld XRF Applications (Russell) 9:00-12:10
Thursday Afternoon Sessions				
XRD & XRF	X-ray Imaging (Patterson) 2:00-5:10			
XRD		Rietveld Analysis II (Huang) 2:00-4:30	Industrial Applications and Energy Materials II (Payzant/Watkins/Rodriguez) 2:00-5:00	
XRF				Trace Analysis (Zaitz) 2:00-4:50
Thursday Evening- A Taste of Colorado - Stranahan's Colorado Whiskey Distillery, 5:45 - 9:00 pm				
Friday Morning Sessions				
XRD	Line Profile Analysis (Cernatescu/Ungár) 8:30-12:00			
XRF		Quantitative Analysis (Brehm) 8:30-12:10	Micro XRF (Havrilla) 8:30-11:50	