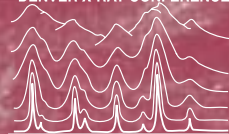




DENVER X-RAY CONFERENCE™



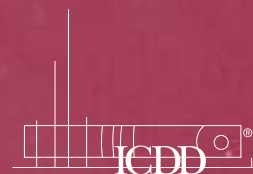
The 52nd Annual
Denver X-ray Conference

Program

Plenary Session
*X-ray Studies of
Art & Archaeological Objects*

4–8 August 2003
Denver Marriott Tech Center
Denver, Colorado, U.S.A.

Sponsored by the
International Centre for Diffraction Data



*52nd Annual
Denver X-ray Conference*

**Denver Marriott Tech Center
Denver, Colorado U.S.A.
4–8 August 2003**

2003 Denver X-ray Conference Organizing Committee

John A. Anzelmo, Bruker AXS, Inc., Madison, WI

Randolph Barton, Jr., Emeritus, DuPont Experimental Station, Wilmington, DE

Don Broton, Construction Technology Labs, Skokie, IL

Victor E. Buhrke, Chair, Consultant, Portola Valley, CA

John V. Gilfrich, Emeritus, SFA, Inc./NRL, Bethesda, MD

George J. Havrilla, Los Alamos National Laboratory, Los Alamos, NM

Ting C. Huang, Co-chair, Emeritus, IBM Almaden Research Center, San Jose, CA

James A. Kaduk, BP Chemicals, Naperville, IL

Terry Maguire, Conference Administrator, International Centre for Diffraction Data, Newtown Square, PA

Scott T. Misture, NYS College of Ceramics at Alfred University, Alfred, NY

I. Cev Noyan, IBM, Yorktown Heights, NY

Robert L. Snyder, Georgia Institute of Technology, Atlanta, GA

Mary Ann Zaitz, IBM, Hopewell Junction, NY

Future Conference Dates:

2–6 August 2004: Sheraton Steamboat Resort
Steamboat Springs, Colorado U.S.A.
1–5 August 2005: Location to be decided

Program:

This program is also available on the Denver X-ray Conference web page at <http://www.dxcicdd.com>. The information contained in this program is current as of the printing date. Changes will be communicated at the conference.

2003 Denver X-ray Conference Program

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Special Announcements

Powder Diffraction and the Denver X-ray Conference

In order to better serve the X-ray analysis community, *Powder Diffraction* and the organizing committee of the Denver X-ray Conference have agreed to a collaboration that will result in increased services for the subscribers of *Powder Diffraction* and authors of *Advances in X-ray Analysis*, the proceedings of the Denver X-ray Conference. *Powder Diffraction* will annually publish a preview program of the Denver X-ray Conference (DXC) in the June issue. Included with the online edition of *Powder Diffraction* will be active links to both the DXC authors and DXC titles enabling subscribers of *Powder Diffraction* to search by author or subject for the ~125 oral presentations made at the conference. Proceedings of the conference will continue to be published in an annual issue of *Advances in X-ray Analysis*. As a result of the collaboration, the first quarter issue of *Powder Diffraction* (January 2004) will be devoted to select advance publications from the proceedings. These publications will be selected by the Denver X-ray Conference organizing committee representing the best in X-ray analysis and materials characterization. These papers can cover a range of subjects such as X-ray diffraction, X-ray fluorescence, or special topics in X-ray analysis.

In 2004, an increase will be added to the subscription fee of *Powder Diffraction*, so that subscribers of *Powder Diffraction* who receive print or joint print and online versions may also receive the CD-ROM of Volume 47, *Advances in X-ray Analysis*. This will effectively double the number of articles annually available to *Powder Diffraction* subscribers at a fraction of the cost. This service will start in 2004 since *Advances in X-ray Analysis* is typically published in the year following the conference. It is our hope and desire that this collaboration will result in the increased exposure of the best of X-ray analysis to the international community.

ICDD and MPDS Announce Collaboration

The International Centre for Diffraction Data (ICDD) is pleased to announce a collaborative agreement between the ICDD, a Pennsylvania nonprofit corporation, Newtown Square, PA, USA and Material Phases Data Systems (MPDS), a Swiss corporation headquartered in Vitznau, Switzerland. The ICDD is a scientific organization founded by and dedicated to scientists working in the field of X-ray analysis. MPDS, with Dr. Pierre Villars as president, is focused on inorganic materials and design systems. ICDD maintains, distributes and owns copyright and database rights to the Powder Diffraction File (PDF). MPDS compiles and edits physical property, structural, diffraction and constitutional data for the purposes of inorganic materials correlation and design. MPDS has distribution rights to the Linus Pauling File (LPF). The collaborative agreement will result in the incorporation of inorganic structural data (S-entry) from the LPF into the PDF-4 relational database format of the Powder Diffraction File.

Join us on Monday evening from 5:00–6:00 for a kick-off celebration sponsored by ICDD to announce our collaboration with MPDS.

ICDD, the ICDD logo, and PDF are registered in the U.S. Patent and Trademark Office.

Powder Diffraction File and Denver X-ray Conference are trademarks of the JCPDS—International Centre for Diffraction Data.

Accommodations and Travel

Hotel Information

The 2003 Denver X-ray Conference will be held 4–8 August at the Denver Marriott Tech Center (DMTC), 4900 S. Syracuse Street, Denver, CO 80237, U.S.A., phone: 1.888.238.1491, or 1.303.779.1100, fax: 1.303.740.2523.

Reservations

Attendees are responsible for making their own reservations. All reservations must be accompanied by a first night room deposit, or guaranteed with a major credit card. Please identify yourself as a Denver X-ray Conference attendee when booking your reservation. Reservations should be made as soon as possible since there is a limited number of rooms available at the conference rate. The special conference rate of \$104 per day (plus 13.45% tax) for single, double, triple or quadruple occupancy will only be applicable before 7 July 2003, subject to availability.

Student Rooms

There are a limited number of student rooms being offered at a discounted rate. Student rooms are shared; each room will house two occupants. Please visit the Denver X-ray Conference web site: www.dxcicdd.com for additional information, and a Student Room Authorization form. Student identification will be required.

Need a Roommate?

If you are unable to pay the full price of a hotel room, consider sharing the expenses with a roommate. Check out the Denver X-ray Conference web site: www.dxcicdd.com for information on locating a roommate.

Travel Arrangements

The Denver X-ray Conference has selected Kitty Ward Travel, Inc. as the official travel agent for the conference. Kitty Ward Travel has negotiated special fares with United Airlines and US Airways. A request for air travel is included on page 45 of this program. Please complete the form and fax to Kitty Ward Travel at fax: 610.543.0786 or call 610.543.0680 or 800.752.3718. If you prefer to arrange your own travel, you may still take advantage of the special airfares by referring to the Denver X-ray Conference numbers when making your reservations. The numbers are as follows:

United Airlines	Phone: 1.800.241.6522	DXC Reference Number: 502XR
US Airways	Phone: 1.800.428.4322	DXC Reference Number: 17172780

Registration Information

Conference Registration Fees

All attendees must register for the conference, including organizers, chairs, invited speakers, and instructors.

Discounted fees will be applied to registrations received before 7 July 2003. The reduced registration fee will only be applied if registration form and payment are received on or before 7 July 2003. Attendees may pre-register online at: www.dxcicdd.com or by completing the form on page 47 of this program and sending it to: Denise Flaherty, ICDD, 12 Campus Blvd., Newtown Square, PA 19073-3273, U.S.A. ♦ E-mail: dxc@icdd.com ♦ phone: 610.325.9814 ♦ fax: 610.325.9823. Registration checks should be made payable to **ICDD/DXC** and enclosed with the registration forms.

	By July 7 th	After July 7 th
• Full week: exhibits, workshops, sessions [†]	\$ 350	\$ 425
• Monday & Tuesday: exhibits, workshops [†]	\$ 300	\$ 375
• Wednesday, Thursday & Friday: exhibits, sessions [†]	\$ 300	\$ 375
• Session organizers, invited speakers & workshop instructors [†]	\$ 100	\$ 100
• Students, unemployed X-ray people, and persons 65 and older: exhibits, workshops, sessions	\$ 75	\$ 75

[†]Includes a copy of Volume 47 of *Advances in X-ray Analysis* on CD-ROM

Take advantage of this opportunity to include the following orders with your conference registration fee:

- *Advances in X-ray Analysis*, Cumulative Volumes 1–39 on CD-ROM: \$350
- *Advances in X-ray Analysis*, individual Volumes 40–45 on CD-ROM: \$150 each
- *Powder Diffraction* (Individual one year subscription for 2003):
Domestic: Online: \$70 Print: \$70 Print & online: \$ 90
Overseas: Online: \$70 Print: \$95 Print & online: \$120
- *Powder Diffraction* (Institution one year subscription for the year 2003):
Worldwide: Online: \$100 Print: \$115 Print & online: \$140
Student online: \$35

Powder Diffraction is a quarterly journal that focuses on materials characterization employing X-ray powder diffraction techniques and procedures. For more information, please call 1.516.576.2200. Web site: ojps.aip.org/pdj.

NEW

On-site Registration:

All on-site registrations will be conducted at the Conference Registration Desk, located by the convention entrance on the ground floor (level one) of the Denver Marriott Tech Center. See the hotel layout on page 41 of this program for the exact location.

**AVOID LONG LINES!
SAVE MONEY!
PRE-REGISTER!**

Registration Times:

Sunday, 3 August	4:00 p.m.–7:00 p.m.
Monday, 4 August	8:00 a.m.–3:00 p.m.
Tuesday, 5 August	8:00 a.m.–3:00 p.m.
Wednesday, 6 August	8:00 a.m.–2:00 p.m.
Thursday, 7 August	8:00 a.m.–2:00 p.m.

Please Note: Attendees (even those pre-registered) should check in at the Conference Registration Desk for conference materials (name tags, *Book of Abstracts*, late announcements, etc.).

Cancellation Policy: Cancellations must be submitted in writing to the Conference Coordinator. A full refund will be issued, less a \$50 processing fee, if the cancellation is received at least two weeks before the conference (Monday, 21 July 2003). No refunds will be issued for cancellations received after 21 July 2003.

Exhibitor Information

Exhibits will be located in the Columbine Center on the ground floor (level one) of the DMTC. A diagram of the exhibit locations will be available in the *Book of Abstracts* and on the DXC web page at <http://www.dxcicdd.com>.

Exhibit Hours:

Monday	10:00 a.m. to 5:00 p.m.
Tuesday	10:00 a.m. to 5:00 p.m.
Wednesday	10:00 a.m. to 5:00 p.m.
Thursday	10:00 a.m. to 2:00 p.m.

Exhibitors as of 1 May 2003

AMPTEK, Inc.	Materials Data, Inc. (MDI)
Bede Scientific Incorporated	MOXTEK, Inc.
Blake Industries, Inc.	Osmic, Inc.
Bruker AXS, Inc.	Oxford Cryosystems
Corporation Scientifique Claisse, Inc.	Oxford Instruments
EDAX, Inc.	PANalytical (formerly Philips Analytical)
F.A.I.R. Corporation/Spectrum Plus	Rigaku/MSK, Inc.
GBC Scientific Equipment Pty Ltd.	Rocklabs Ltd
Gresham Scientific Instruments Ltd	Spectro Analytical Instruments, Inc.
Handley Analytical Services	SPEX CertiPrep, Inc.
Herzog Automation Corporation	Technical Associates
Inel, Inc.	Thales Components Corporation
Initiative Scientific Products Australia Pty Ltd	Thermo ARL
International Centre for Diffraction Data (ICDD)	Thermo Electron Corporation, Microanalysis & Surface Science
John Wiley & Sons	X-ray Optical Systems, Inc.
Kratos Analytical, Inc.	

All exhibitors are invited to attend the
Exhibitors' General Meeting
Wednesday, 6 August 2003, 6:00–6:30 p.m.
in the **Conifer 2** room

Evening Technical Sessions and Social Functions

Spouses are welcome to attend all social functions.

*Evening Mixers and Poster Sessions will be held in the **Evergreen Ballroom** unless otherwise noted.*

Sun., 3 August	5:30–7:30	Welcoming Reception Sponsored by Bede Scientific, SPEX CertiPrep and Claisse Scientifique (to be held in the Atrium of the DMTC)
Mon., 4 August	5:00–6:00	ICDD Kick-off Announcement Sponsored by ICDD (Evergreen E & F)
	6:30–8:30	PANalytical Reception & XRD Poster Session I Sponsored by PANalytical (formerly Philips Analytical)
Tues., 5 August	6:30–8:30	MDI and Rigaku/MSC, Inc. Reception & XRD Poster Session II Sponsored by Materials Data, Inc. and Rigaku/MSC, Inc.
Wed., 6 August	6:30–8:30	Bruker AXS, Inc. Reception & XRF Poster Session Sponsored by Bruker AXS, Inc.

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 a.m. on Monday and Tuesday. Information on local attractions and activities of interest will be provided.

General Information

Poster Boards

The poster boards used during the evening poster sessions will be 4' x 8' boards. Authors must bring their own thumbtacks or Velcro.

Employment Clearinghouse

We will have a separate bulletin board to announce employment opportunities. Prospective employers and employees should bring announcements with them for posting.

Book of Abstracts

The DXC *Book of Abstracts* will be available at the Conference Registration Desk.

Workshops

Monday, 4 August–Tuesday, 5 August

a.m. workshops: 9:00 a.m.–12:00 noon • p.m. workshops: 2:00 p.m.–5:00 p.m.

Workshops, Monday a.m.

XRD & XRF

W-1 Technical Communication (Evergreen A)

Organizers & Instructors: **J.A. Kaduk**, BP Chemicals, Naperville, IL
I.C. Noyan, IBM, Yorktown Heights, NY

This workshop is intended to convey the basic requirements of producing understandable technical documents. Guidelines for defining the audience and tailoring the information content to the defined audience will be included. The workshop will also include a set of criteria for the evaluation of documents prepared by others, jargon detectors and discuss the referee guidelines provided by leading publications.

W-2 Optics (Evergreen B)

Organized by: **S.T. Misture**, NYS College of Ceramics at Alfred University, Alfred, NY
J.P. Cline, National Institute of Standards & Technology, Gaithersburg, MD

Instructors: **J. Wiesmann**, **C. Michaelsen**, Incoatec GmbH, Geesthacht, Germany
H.E. Goebel, Emeritus, Siemens AG, Munich, Germany
L. Jiang, Osmic, Inc., Auburn Hills, MI
P.J. Schields, X-ray Optical Systems, Inc., East Greenbush, NY
T. Holz, AXO DRESDEN GmbH, Heidenau, Germany

This workshop provides an overview of the X-ray optics currently available for use in the analytical laboratory. Included in the discussions will be multilayer optics, capillary and polycapillary optics, total reflection optics, and hybrid optics that include crystals. The principles of operation for each optical component will be covered, as well as the resulting beam conditioning. Applications for and advantages of the optical components will be described in detail including examples of materials characterization problems.

XRD

W-3 Rietveld Applications I (Evergreen C)

Organizers & Instructors: **J. Faber**, International Centre for Diffraction Data, Newtown Square, PA
A. Kern, Bruker AXS GmbH, Karlsruhe, Germany,

A better understanding of the Rietveld method as applied to structural characterization and quantitative phase analysis will be emphasized.

A brief introduction of the Rietveld method will start the workshop. However, the focus will be on recovering the information content of a powder pattern, optimizing modeling of the individual structural and nonstructural contributions of the data, interpreting and understanding the results.

Instrument-sample contributions of all kinds, peak shape behavior and its origin will be covered. Measurement and data acquisition strategies that optimize the structural information content will be examined. Discussions will include quantifying the quality of the results, graphical results and several statistical tools used to judge the quality of the fit between theory and experiment.

The major components of this workshop are on problem solving and the identification of needs for improved experimental or modeling methods. Problems that can be assigned to either data quality or deficiencies of the refinement model will be identified. Methods to overcome these problems will be explored.

XRF

W-4 Specimen Preparation I—XRF (Evergreen D)

Organized by: **J. Anzelmo**, Bruker AXS Inc., Madison, WI
D. Broton, Construction Technology Laboratories, Inc., Skokie, IL

Instructors: **John Anzelmo**, Bruker AXS Inc., Madison, WI
D. Broton, **S. Nettles**, Construction Technology Laboratories, Inc., Skokie, IL
J. Pitre, Corporation Scientifique Claisse, Quebec, Canada
U. Peukert, Herzog Maschinenfabrik, GmbH & Co., Osnabrück-Lüstringen,
Germany
F. Antosz, Pharmacia, Corp., Kalamazoo, MI

This workshop will focus on the basics of sampling from large and small quantities, the equipment used, and special techniques that are necessary in order to present a representative specimen to the XRF spectrometer for analysis. Topics covered will include the preparation of powders, fusions, metals, oxides, and organic materials. Special problems encountered in sampling ore piles, boat holds, molten metals, and pharmaceutical materials will be discussed. Tips and tricks of the trade for selecting, using, and maintaining sample preparation equipment will be presented. Participants are encouraged to ask questions and describe their experiences during the question and answer sessions.

Workshops, Monday p.m.

XRD

W-5 Alignment & Standards (Evergreen B)

Organizers & Instructors: **S.T. Misture**, NYS College of Ceramics at Alfred University, Alfred, NY
J.P. Cline, National Institute of Standards & Technology, Gaithersburg, MD

This workshop will address alignment procedures for divergent-beam diffractometers as well as the alignment of parallel beam diffractometers that include multilayer optics and crystals. Development of NIST standards and the use of the standards in alignment and evaluation of instrument performance will be covered in detail as well.

W-6 Rietveld Applications II (Evergreen C)

Organizers & Instructors: **J. Faber**, International Centre for Diffraction Data, Newtown Square, PA
A. Kern, Bruker AXS GmbH, Karlsruhe, Germany

Continuation of W-3.

XRF

W-7 Specimen Preparation II—XRF (Evergreen D)

Organized by: **J. Anzelmo**, Bruker AXS Inc., Madison, WI
D. Broton, Construction Technology Laboratories, Inc., Skokie, IL

Instructors: **John Anzelmo**, Bruker AXS Inc., Madison, WI
D. Broton, **S. Nettles**, Construction Technology Laboratories, Inc., Skokie, IL
J. Pitre, Corporation Scientifique Claisse, Quebec, Canada
U. Peukert, Herzog Maschinenfabrik, GmbH & Co., Osnabrück-Lüstringen, Germany
F. Antosz, Pharmacia, Corp., Kalamazoo, MI

Continuation of W-4.

W-8 Working Close to Detection Limits—XRF (Evergreen A)

Organized by: **R. Van Grieken**, University of Antwerp, Antwerp, Belgium

Instructors: **B. Vrebos**, PANalytical, Almelo, The Netherlands
J. Heckel, Spectro Analytical Instruments, Kleve, Germany
P. Wobrauschek, **C. Strelj**, Atominstytut der Österreichischen Universitäten, Vienna, Austria
P. Van Espen, **R. Van Grieken**, University of Antwerp, Antwerp, Belgium

The theory and statistical background of the detection limit concept will be presented. Both increasing the signal and reducing the background lowers detection limits. The X-ray intensity can be enhanced by better excitation/detection geometries and more performing tubes, application of synchrotron radiation, etc. The background can instrumentally be reduced in e.g., polarized-beam and TXRF approaches. Avoiding sample contamination and introducing a chemical or physical preconcentration step may enhance the sensitivity and reduce detection limits. Each aspect will be discussed.

XRD

W-9 Two-dimensional X-ray Diffraction I (Evergreen A)

Organized by: **B.B. He**, Bruker AXS, Inc., Madison, WI
T.N. Blanton, Eastman Kodak Company, Rochester, NY

Instructors: **T.N. Blanton**, Eastman Kodak Company, Rochester, NY
R. Durst, **B.B. He**, **U. Preckwinkel**, Bruker AXS, Inc., Madison, WI
R.B. Ortega, Rigaku/MSO, The Woodlands, TX
R. Tissot, Sandia National Laboratories, Albuquerque, NM

Two-dimensional diffraction provides far more information than the conventional one-dimensional diffraction. In recent years, usage of two-dimensional diffraction has increased due to the advances in detector technology, point beam X-ray optics, software development and computing power. This workshop covers the recent progress in two-dimensional X-ray diffraction in terms of detector technology, geometry and configuration of two-dimensional diffractometer and various applications, such as phase ID, texture, stress, crystallinity, combinatorial screening and thin film analysis.

W-10 Backscatter Electron Diffraction (Evergreen B)

Organized by: **R.P. Goehner**, Sandia National Laboratories, Albuquerque, NM

Instructors: **R.P. Goehner**, **R. Tissot**, Sandia National Laboratories, Albuquerque, NM
S. Sitzman, HKL Technology Inc., Danbury, CT
S. Wright, TSL/EDAX, Darper, UT

This workshop will discuss the theory and practical applications of Electron Backscattered Diffraction (EBSD) alternately known as Kikuchi patterns in the Scanning Electron Microscope (SEM). The use of SEM for crystallographic applications will be discussed. The major applications areas that will be emphasized in the workshop are crystallographic texture (preferred orientation) measurements, crystallographic phase identification and the calculation of primitive cells from high quality EBSD. Three EBSD equipment manufactures will emphasize the applications of the EBSD technique.

XRF

W-11 Fundamentals of XRF (Evergreen C)

Organized by: **J.V. Gilfrich**, Emeritus, SFA, Inc. /NRL, Bethesda, MD

Instructors: **J.V. Gilfrich**, Emeritus, SFA, Inc. /NRL, Bethesda, MD
F. Feret, Alcan International Ltd., Alcan, Québec, Canada
S. Török, KFKI Atomic Energy Research Institute, Budapest, Hungary

This workshop is intended to provide a basic background of the principles of XRF, specifically directed to those new to the field. It will consist of a general overview of the technique, followed by more specific details of particular applications by experts in those applications, to provide an understanding of the use of the principles previously described.

Workshops, Tuesday a.m.

W-12 Quantitative Analysis I (Evergreen D)

Organized by: **M. Mantler**, Vienna University of Technology, Vienna, Austria

Instructors: **M. Mantler**, Vienna University of Technology, Vienna, Austria
B. Vrebos, PANalytical, Almelo, The Netherlands
W.T. Elam, University of Washington, Seattle, WA

The workshop will cover:

- Empirical and theoretical methods of quantitative XRF
- Basic interactions and atomic (“fundamental”) parameters
- Sources and accuracy of atomic parameters and tube spectra
- Classical fundamental parameter methods
- Computed (theoretical) influence coefficients
- Compensation Methods
- Monte Carlo Methods
- Special cases and methods:
 - Thin films
 - Inhomogeneous specimens
 - Light elements
 - Analysis without standards

Workshops Tuesday p.m.

XRD

W-13 Two-dimensional X-ray Diffraction II (Evergreen A)

Organized by: **B.B. He**, Bruker AXS, Inc., Madison, WI
T.N. Blanton, Eastman Kodak Company, Rochester, NY

Instructors: **T. N. Blanton**, Eastman Kodak Company, Rochester, NY
R. Durst, B.B. He, U. Preckwinkel, Bruker AXS, Inc., Madison, WI
R. B. Ortega, Rigaku/MSC, The Woodlands, TX
R. Tissot, Sandia National Laboratories, Albuquerque, NM

Continuation of W-9.

W-14 High Resolution XRD (Evergreen B)

Organized by: **B. Tanner**, University of Durham, Durham, United Kingdom
D.K. Bowen, Bede Scientific Inc., Englewood, CO

Instructors: **B. Tanner**, University of Durham, Durham, United Kingdom
D.K. Bowen, Bede Scientific Inc., Englewood, CO
M.S. Goorsky, UCLA, Los Angeles, CA

The workshop will provide both a basic grounding in the techniques of high-resolution X-ray diffraction and a perspective on the current state of application of the method in an industrial context. Particular attention will be paid to the qualitative interpretation of data taken in the triple axis geometry where the X-ray scattering is mapped in reciprocal space. Laboratory based applications of grazing incidence diffraction to measure in-plane strains and mosaic distribution will be discussed.

XRF

W-15 Quantitative Analysis II (Evergreen D)

Organized by: **M. Mantler**, Vienna University of Technology, Vienna, Austria

Instructors: **M. Mantler**, Vienna University of Technology, Vienna, Austria
B. Vrebos, PANalytical, Almelo, The Netherlands
W.T. Elam, University of Washington, Seattle, WA

Continuation of W-12.

W-16 Basic TXRF (Evergreen C)

Organized by: **M.A. Zaitz**, IBM, Hopewell Junction, NY
P. Wobrauschek, Atominstitut der Österreichischen Universitäten, Vienna, Austria

Instructors: **M.A. Zaitz**, IBM, Hopewell Junction, NY
P. Wobrauschek, C. Strelj, Atominstitut der Österreichischen Universitäten,
Vienna, Austria

This workshop will cover the basics of total reflection X-ray fluorescence, as well as instrumentation, calibration, and applications.

Sessions

Poster Sessions: Monday, 4 August–Wednesday, 6 August

Oral Sessions: Wednesday, 6 August–Friday, 8 August

XRD Poster Session I, Monday, 4 August

(Evergreen)

6:30 p.m.–8:30 p.m., authors present

*The XRD Poster Session I will be held in conjunction with the
PANalytical (formerly Philips Analytical) Mixer.*

Chairs: **I.C. Noyan**, IBM, Yorktown Heights, NY
S.T. Misture, NYS College of Ceramics at Alfred University, Alfred NY

Session chairs will select the two best papers for awards.

Rietveld

- D005 CRYSTAL STRUCTURES OF $(\text{Ba,Sr})_2\text{RTaO}_6$ (R = Nd, Sm, Gd, Tm, and Lu)
J. A. Kaduk, BP Chemicals, Naperville IL
W. Wong-Ng, National Institute of Standards & Technology, Gaithersburg, MD
- D003 CRYSTAL STRUCTURES AND HYDROGEN BONDING IN CELLULOSES I α , I β , and II
J.A. Kaduk, BP Chemicals, Naperville IL
P. Langan, Los Alamos National Laboratory, Los Alamos NM
- D129 CRYSTALLITE DOMAIN SIZE OF GRAPHITIC CARBON USING AN X-RAY DIFFRACTOMETER WITHOUT A PRIMARY MONOCHROMATOR
R.W. Morton, **D.E. Simon**, **J.M. Novak**, **R.L. Heald**, **R. Schmidt**, ConocoPhillips, Bartlesville, OK
- D130 MONITORING HIGH VOLUME X-RAY DIFFRACTION DATA USING RIETVELD MODELING WITH PHASE FILTERS
R.W. Morton, **D.E. Simon**, **J.J. Gislason**, **R. Schmidt**, ConocoPhillips, Bartlesville, OK
- D128 A CLOSE LOOK AT ELECTROLYTIC MANGANESE DIOXIDE AND THE γ -MnO₂ & ϵ -MnO₂ PHASES USING RIETVELD MODELING
D.E. Simon, **R.W. Morton**, **J.J. Gislason**, ConocoPhillips, Bartlesville, OK
- D046 MINIMIZATION OF ERRORS DUE TO MICROABSORPTION OR ABSORPTION CONTRAST
B.M. Pederson, **R.S. Winburn**, Minot State University, Minot, ND
- D138 COMBINED X-RAY/NEUTRON RIETVELD REFINEMENT OF RE-DOPED PZT PEROVSKITES
M.A. Rodriguez, **T.J. Boyle**, **B.A. Tuttle**, Sandia National Laboratories, Albuquerque, NM

Solid State Chemistry

- D074 IN-SITU XRD TO EVALUATE THE STABILITY OF NOVEL PROTON CONDUCTING MATERIALS
S.A. Speakman, **R.D. Carneim**, **T.R. Armstrong**, **E.A. Payzant**, Oak Ridge National Laboratory, Oak Ridge, TN
- D109 STRUCTURE ANALYSIS OF PEFC ANODE CATALYST BY XRD AND XAFS
H. Yashiro, **K. Hoshino**, Rigaku Corporation, Tokyo, Japan

- D097 STUDY OF MATERIALS IN MUDEJAR BUILDINGS FROM EXTREMADURA (SPAIN)
P. Mogollón, Extremadura University, Cáceres, Spain
J.L. Ferrero, C. Roldán, J. Carballo, Valencia University, Valencia, Spain
- D093 X-RAY POWDER DIFFRACTION DATA FOR $\text{Na}_8(\text{AlSiO}_4)_6(\text{ReO}_4)_2$
D.E. McCready, J.S. Young, Environmental Molecular Science Laboratory, Richland, WA
S.V. Mattigod, B.P. McGrail, Pacific Northwest National Laboratory, Richland, WA
- D064 PRELIMINARY ANALYSIS OF OCEAN FLOOR SEDIMENTS FROM THE VENEZUELAN ATLANTIC FRONT USING POWDER X-RAY DIFFRACTION TECHNIQUES
C. Cedeño, R. Toro, A. Vivas, D. Rosales, M. Romero, J. Contreras, G. Díaz de Delgado, J.M. Delgado, Universidad de Los Andes, Mérida, Mérida, Venezuela

Tools

- D002 STUDY OF THE POROUS STRUCTURES FRACTAL PROPERTIES BY THE SMALL-ANGLE X-RAY SCATTERING
L. Skatkov, PCB "Argo", Beer Sheva, Israel
V. Gomozov, P. Cheremskoy, E. Sobol, O. Sobol, S. Malyhin, A. Panikarsky, Kharkov Technical University, Ukraine
- D073 QUANTIFICATION OF THE CONSEQUENCES OF USING PARALLEL-BEAM OPTICS COMBINED WITH LINEAR POSITION SENSITIVE DETECTORS
S.A. Speakman, Oak Ridge National Laboratory, Oak Ridge, TN
M.J. Kirkham, The University of Tennessee, Knoxville, TN
C.J. Rawn, Oak Ridge National Laboratory, Oak Ridge, TN and The University of Tennessee, Knoxville, TN
- D058 OVERVIEW OF COLLIMATING POLYCAPILLARY OPTICS FOR X-RAY POWDER DIFFRACTION
H. Huang, W.M. Gibson, P.J. Schields, X-ray Optical Systems, Inc., East Greenbush, NY
- D006 NOVEL METHODS OF NON-DESTRUCTIVE DEPTH PROFILING
A. Broadhurst, K.D. Rogers, D.W. Lane, T.W. Lowe, Cranfield University, Wiltshire, UK
- D094 RADIOACTIVE GLOVEBOX CONTAINMENT OF A COMMERCIAL X-RAY DIFFRACTOMETER
A.R. Jurgensen, D.M. Missimer, R.L. Rutherford, Westinghouse Savannah River Site, Aiken, SC
- D096 MANAGING THE BACKGROUND IN LINEAR X-RAY DETECTION SYSTEMS
M.J. Fransen, PANalytical, Almelo, The Netherlands
- D066 A PHOTONEUTRON SOURCE FOR BULK MATERIAL STUDIES
M.A. Reda, J.F. Harmon, Idaho State University, Pocatello, ID
S.B. Sadineni, University of Nevada, Las Vegas, NV

- D010 SAMPLE PREPARATION OF THE HIGHLY RADIOACTIVE SOLID WASTE IN HANFORD WASTE TANKS
R. W. Warrant, G.A. Cooke, Fluor Hanford, Richland, WA
- D137 OPTIMIZED PERFORMANCE OF GRADED MULTILAYER OPTICS FOR X-RAY SINGLE CRYSTAL DIFFRACTION
J. Wiesmann, C. Hoffmann, A. Oehr, C. Michaelsen, Incoatec GmbH, Geesthacht, Germany
A.B. Storm, L.J. Seijbel, Bruker Nonius B.V., Delft, The Netherlands
- D118 UNIVERSAL THEORY FOR THE DETERMINATION OF BOTH SCREW AND EDGE DISLOCATION DENSITIES FOR GaN AND RELATED MATERIALS USING HIGH RESOLUTION X-RAY DIFFRACTION
S. Bates, SSCI, Inc., West Lafayette, IN

Theory

- D113 STUDY ON MEASUREMENT TECHNIQUE FOR LATTICE SPACING AT STRAIN FREE BY NEUTRON DIFFRACTION METHOD
N. Minakawa, Y. Morii, Japan Atomic Energy Research Institute, Ibaraki, Japan
T. Saito, Dalian Institute of Light Industry, Dalian, P.R. China
T. Sasaki, Y. Hirose, Kanazawa University, Kanazawa, Japan
- D001 NEW MEASUREMENT TECHNOLOGY OF SPATIAL 3-D DETECTING OF SOLITARY OR DISTANT X-SOURCES BY CORRELATION OF INTENSITY
V.I. Vysotskii, Kiev Shevchenko University, Kiev, Ukraine
- D021 DYNAMICAL THEORY OF A THREE-WAVE DOUBLE-CRYSTAL LAUE-INTERFEROMETER
T. Tchen, M.V. Lomonosov Moscow State Academy of Fine Chemical Technology, Moscow, Russia
- D020 ON THE THEORY OF X-RAYS BACKDIFFRACTION BY <<WEAKLY>> CURVED CRYSTALS WITH TAKING INTO ACCOUNT OF MULTI-WAVE EFFECTS
T. Tchen, M.V. Lomonosov Moscow State Academy of Fine Chemical Technology, Moscow, Russia
- D022 ON THE THEORY OF X-RAY SECONDARY PROCESSES IN BENT CRYSTALS. MULTI-WAVE APPROACH
T. Tchen, M.V. Lomonosov Moscow State Academy of Fine Chemical Technology, Moscow, Russia
- D018 ON THE THEORY OF A THREE-WAVE DYNAMICAL DIFFRACTION OF X-RAYS BY CRYSTALS WITH EPITAXIAL FILMS
T. Tchen, M.V. Lomonosov Moscow State Academy of Fine Chemical Technology, Moscow, Russia
- D019 DYNAMICAL THEORY OF X-RAY FOCUSING SPECTROMETERS AND MONOCHROMATORS CURVED TO THE LOGARITHMIC SPIRAL
T. Tchen, M.V. Lomonosov Moscow State Academy of Fine Chemical Technology, Moscow, Russia

- D106 A NEW ANALYSIS METHOD FOR TWO-DIMENSIONAL X-RAY DATA
J.C. Hanan, Bio-Inspired Technologies and Systems, Pasadena, CA and California Institute of Technology, Pasadena, CA
E. Üstündag, California Institute of Technology, Pasadena, CA
J.D. Almer, U. Lienert, D.R. Haeffner, Argonne National Laboratory, Argonne, IL
- D030 CERTIFIED REFERENCES MATERIALS FOR POWDER DIFFRACTOMETERS. APPLICATION FOR ADJUSTMENT AND PATTERN APPROVED
B.N. Kodess, ICS&E, Denver, CO and VNIIMS, Moscow, Russia
I.L. Kommel, G.V. Guschin, VNIIMS, Moscow, Russia
- D125 A PLUG-IN PROGRAM TO PERFORM HANAWALT OR FINK SEARCH INDEXING METHODS USING ORGANIC ENTRIES IN THE ICDD PDF-4/ORGANICS 2003 DATABASE
J. Faber, C.A. Weth, J. Bridge, International Centre for Diffraction Data, Newtown Square, PA
- D044 THE VIRTUAL BLUE BOOK
H. Jones, Pratt & Whitney, East Hartford, CT
J.M. Bennett, Radnor, PA
P. Wallace, Dos Arroyos Enterprises, Oro Valley, AZ
J. Dann, OSRAM Sylvania, Towanda, PA
A. Roberts, Geological Survey of Canada, Ontario, Canada
F. McClune, International Centre for Diffraction Data, Newtown Square, PA

6:30 p.m.–8:30 p.m., authors present

The XRD Poster Session II will be held in conjunction with the MDI and Rigaku/MSC, Inc. Mixer.

Chairs: **R. Barton, Jr.**, Emeritus, Dupont Experimental Station, Wilmington, DE
T.C. Huang, Emeritus, IBM Almaden Research Center, San Jose, CA

Session chairs will select the two best papers for awards.

Metals

- D090 CHARACTERIZATION OF CRYOGENICALLY TREATED ALLOYS
T.R. Watkins, O.B. Cavin, G.M. Ludtka, W.H. Elliott, Jr., L. Riester, Oak Ridge National Laboratory, Oak Ridge, TN
R.D. England, Cummins Engine Company, Inc., Columbus, IN
- D054 A PORTABLE X-RAY STRESS INSTRUMENT FOR INSPECTING RAILS
T. Sasaki, K. Seki, Y. Hirose, Kanazawa University, Kanazawa, Japan
Y. Sato, Railway Technical Research Institute, Tokyo, Japan
K. Hiratsuka, Kyushu Polytechnic University, Fukuoka, Japan
T. Yamane, Fuji Photo Film Co., LTD., Tokyo, Japan
- D103 A FUNDAMENTAL STUDY ON STRESS MEASUREMENTS USING PULSED SPALLATION NEUTRON DIFFRACTION
M. Gotoh, T. Sasaki, Y. Hirose, Kanazawa University, Kanazawa, Japan
T. Kawasaki, Tohoku University, Miyagi, Japan
- D102 A FUNDAMENTAL STUDY ON RESIDUAL STRESS MEASUREMENT OF THIN FILM MATERIALS USING SYNCHROTRON RADIATION
M. Gotoh, T. Sasaki, Y. Hirose, Kanazawa University, Kanazawa, Japan
S. Takago, Industrial Research Institute of Ishikawa, Ishikawa, Japan
- D101 EVALUATION OF ($\alpha + \gamma$) DUAL PHASE STAINLESS STEELS USING MISFIT OF PLASTIC STRAIN $\Delta\epsilon^P$
H. Hirose, Kinjo University, Ishikawa, Japan
T. Yano, M. Gotoh, T. Sasaki, Kanazawa University, Kanazawa, Japan
- D100 APPLICATIONS OF X-RAY STRESS MEASUREMENT FOR INTERFACE AREA OF Ni₃Al INTERMETALLIC COMPOUND COATING
T. Murotani, Dalian University, China
T. Yano, Kanazawa University, Kanazawa, Japan
A. Ikenaga, Osaka Prefecture University, Sakai, Japan
H. Hirose, Kinjo University, Ishikawa, Japan
- D079 X-RAY STUDY OF RESIDUAL STRESSES IN FERRITE AND AUSTENITE OF DUPLEX STEEL AFTER SHOT PEENING TREATMENT
V.I. Monine, J.T. Assis, S.A. Filippov, Rio de Janeiro State University, Rio de Janeiro, Brasil
J.R. Teodósio, T. Gurova, Rio de Janeiro Federal University, Rio de Janeiro, Brasil

- D078 STUDY OF MICROSTRESSES IN COLD-DRAWN PEARLITE
N.Yu. Zolotarevsky, D.M. Vasiliev, Yu.F. Titovets, St. Petersburg State Polytechnical University, St. Petersburg, Russia
J.T. Assis, V.I. Monine, S.A. Filippov, Rio de Janeiro State University, Rio de Janeiro, Brasil
- D070 APPLICATION OF IMAGE PLATE TO X-RAY STRESS MEASUREMENT OF DUAL PHASE STAINLESS STEEL WITH Cr-K α / α 211 AND Cr-K β / γ 311 DIFFRACTIONS
S. Takago, Industrial Research Institute of Ishikawa, Ishikawa, Japan
H. Hirose, Kinjo College, Ishikawa, Japan
T. Sasaki, Kanazawa University, Ishikawa, Japan
- D034 RESIDUAL STRESS DISTRIBUTION IN GRAIN-ORIENTED SILICON STEEL
M. Imafuku, T. Suzuki, Nippon Steel Corporation, Chiba, Japan
H. Suzuki, Tokyo Metropolitan University, Tokyo, Japan
K. Akita, Musashi Institute of Technology, Tokyo, Japan
- D038 STRESS ANALYSIS OF VARIOUS MATERIALS BY PRD PORTABLE DIFFRACTOMETR
A.V. Lutsao, A.V. Kotelkin, D.V. Matveev, A.D. Zvonkov, MISIS, Moscow, Russia
B.N. Kodess, ICSE, Denver, CO and VNIIMS, Moscow, Russia

Layers

- D028 X-RAY MICRO-DIFFRACTION STUDY OF THE HALF-V SHAPED SWITCHING FERROELECTRIC LIQUID CRYSTAL
K. Takada, T. Noma, T. Togano, T. Mukaide, Canon Research Center, Atsugi, Kanagawa, Japan
A. Iida, Institute of Materials Structure Science, Tsukuba, Ibaraki, Japan
- D081 X-RAY DIFFRACTION FOR PROCESS DEVELOPMENT AND CONTROL IN SEMICONDUCTOR INDUSTRY
K.J. Kozaczek, HyperNex, Inc., State College, PA
- D025 STRUCTURE CHARACTERIZATION OF LANGMUIR-BLODGETT FILMS OF PHTHALOCYANINE MATERIALS
W. Xia, M.D. Carducci, N.R. Armstrong, University of Arizona, Tucson, AZ
- D027 DIFFUSE X-RAY SCATTERING IN THE NANOMETROLOGY OF THIN FILM SYSTEMS AND INTERFACES
I. Busch, J. Stümpel, Physikalisch-Technische Bundesanstalt, Braunschweig, Germany
- D026 MICROSTRUCTURES AND STRAIN RELAXATION IN MODULATION-DOPED Al_xGa_{1-x}N/GaN HETEROSTRUCTURES
W.S. Tan, X.S. Wu, H. Sha, H.L. Cai, S.S. Jiang, Nanjing University, Nanjing, China
W.L. Zheng, Q.J. Jia, Q. He, Chinese Academy of Science, Beijing, China
- D134 THERMAL INDUCED STRESSES IN THIN ALUMINUM LAYERS GROWN ON SILICON
E. Eiper, R. Resel, Graz University of Technology, Austria
C. Eisenmenger-Sittner, University of Technology Vienna, Austria
M. Hafok, J. Keckes, University of Leoben, Austria

Organics

- D116 STRUCTURE DETERMINATION FROM POWDER DIFFRACTION DATA AND STRUCTURE VALIDATION USING SOLID STATE NMR
M. Rajeswaran, T. Blanton, N. Zumbulyadis, D.J. Giesen, Eastman Kodak Company, Rochester, NY
C. Conesa-Moratilla, Accelrys, Cambridge, UK
S. Misture, NYS College of Ceramics at Alfred University, Alfred, NY
P.W. Stephens, A. Huq, SUNY-Stony Brook, Stony Brook, NY
- D065 EVALUATION OF SEVERAL ACTIVE PHARMACEUTICAL COMPOUNDS IN SAMPLES USED IN THE PRODUCTION OF GENERIC DRUGS
R. Toro, A. Uzcátegui, C. Cedeño, G. Díaz de Delgado, J.M. Delgado, Universidad de Los Andes, Mérida, Venezuela
E. González, PROULA, Universidad de Los Andes, Mérida, Venezuela

Phase Transformations

- D015 RIETVELD ANALYSIS BASED ON XRPD AND NEUTRON DIFFRACTION DATA OF METASTABLE SOL-GEL PRODUCTS
G. Kimmel, R. Xu, P. Ari-Gur, Western Michigan University, Kalamazoo, MI
J.W. Richardson, Argonne National Laboratory, Argonne, IL
E. Guncharov, J. Zabicky, Ben-Gurion University of the Negev, Beer-Sheva, Israel
- D048 HIGH TEMPERATURE XRD STUDY OF THE REACTION SEQUENCE AND KINETICS DURING SYNTHESIS OF $\text{Bi}_4\text{Ti}_3\text{O}_{12}$
M.S. Haluska, S.T. Misture, NYS College of Ceramics at Alfred University, Alfred, NY
- D067 IN-SITU HIGH TEMPERATURE PHASE TRANSFORMATIONS IN RARE EARTH NIOBATES
K. Jurkschat, P. Sarin, L.F. Siah, W.M. Kriven, University of Illinois at Urbana-Champaign, Urbana, IL
- D033 STUDIES OF PHASE TRANSFORMATION AND INTERFACIAL REACTION BY FAST X-RAY MEASUREMENT WITH AN IMAGING PLATE
M. Imafuku, Nippon Steel Corporation, Chiba, Japan

Biological

- D055 SYNCHROTRON X-RAY MICRO-BEAM DIFFRACTION AND SMALL ANGLE SCATTERING MAPPING IN BONE AND OSSICLES
S.R. Stock, A. Veis, H.G. Simon, Northwestern University, Chicago, IL
K. Ignatiev, Georgia Institute of Technology, Atlanta, GA
J.D. Almer, Argonne National Laboratory, Argonne, IL
- D112 X-RAY EVALUATION OF FRACTURE IN DENTAL MATERIAL
X. Zhengyang, N. Lian, T. Saito, Dalian Institute of Light Industry, Dalian, China
H. Hirose, Kinjyo University, Matto, Japan
- D016 CHARACTERIZATION OF THE EVOLUTIONARY ASPECTS OF GREAT WHITE SHARK TEETH BY X-RAY DIFFRACTION METHODS AND OTHER SUPPORTING TECHNIQUES
M. Kesmez, J. Lyon, D.L. Cocke, J. Westgate, Lamar University, Beaumont, TX
H. McWhinney, T.L. Grady, Prairie View A&M University, Prairie View, TX

6:30 p.m.–8:30 p.m., authors present

The XRF Poster Session will be held in conjunction with the Bruker AXS, Inc. Mixer.

Chairs: **G.J. Havrilla**, Los Alamos National Laboratory, Los Alamos, NM
M.A. Zaitz, IBM, Hopewell Junction, NY

Session chairs will select the three best papers for awards.

Instrumentation

- F06 DEVELOPMENT AND APPLICATION OF LABORATORY X-RAY FLUORESCENCE HOLOGRAPHY EQUIPMENT
Y. Takahashi, K. Hayashi, E. Matsubara, Tohoku University, Sendai, Miyagi, Japan
- F19 XRF IN THE SEM—HOW AND WHY?
B. Cross, CrossRoads Scientific, El Granada, CA
K. Witherspoon, IXRF Systems, Inc., Houston, TX
- F20 STANDING WAVE FIELDS FOR EXCITATION IN XRF—COMPARISON OF TXRF WITH BRAGG REFLECTION ON MULTILAYERS
Th. Holz, AXO DRESDEN GmbH, Heidenau, Germany
C. Strelí, G. Pepponi, P. Wobrauschek, Atominstitut der Österreichischen Universitäten, Wien, Austria
- F28 DUAL-CAPILLARY OPTIC MXRF
G.J. Havrilla, Los Alamos National Laboratory, Los Alamos, NM
N. Gao, X-ray Optical Systems, East Greenbush, NY
- F32 WAVEGUIDE-RESONATOR APPLICATION FOR TXRF ANALYSIS OF SURFACE AND FOR XRF ANALYSIS OF GASEOUS MIXTURES
V.K. Egorov, E.V. Egorov, IPMT RAS, Moscow, Russia
S.E. Egorov, Del Mar Ventures, San Diego, CA
- C10 PECULIARITIES OF X-RAY BEAM FORMATION AND PRACTICAL APPLICATION FIELDS FOR THE COMPOSITE WAVEGUIDE-RESONATOR
V.K. Egorov, E.V. Egorov, IPMT RAS, Moscow, Russia
S.E. Egorov, Del Mar Ventures, San Diego, CA
- F34 A NEW TXRF VACUUM CHAMBER WITH SAMPLE CHANGER FOR CHEMICAL ANALYSIS
C. Strelí, P. Wobrauschek, N. Zöger, G. Pepponi, Atominstitut der Österreichischen Universitäten, Wien, Austria
- F41 DESIGN OF EDXRF EQUIPMENT FOR THE NONDESTRUCTIVE STUDY OF ENGRAVINGS
J.L. Ferrero, C. Roldán, J.L. Lluch, Universidad de Valencia, Valencia, Spain
D. Juanes, Desarrollo y Aplicaciones Científicas y Tecnológicas S.L. Parque Tecnológico, Paterna, Spain

Applications

- F38 EDXRF ANALYSIS OF THE HOLY SPIRIT TRIPTYCH FROM THE SAN PEDRO DE MIRAGAIA CHURCH (PORTO, PORTUGAL)
J.L. Ferrero, C. Roldán, J.L. Lluch, D. Juanes, J. Carballo, Universidad de Valencia, Valencia, Spain
A. Calvo, M. Aguiar, Universidad Católica Portuguesa Escola das Artes, Porto, Portugal
- F02 PORTABLE XRF ANALYSIS OF JAPANESE HISTORICAL OBJECTS
Y. Hayakawa, National Research Institute for Cultural Properties, Tokyo, Japan
- F07 DISTRIBUTION AND OVERALL CONTENT OF CHLORINE IN FLAME HYDROLYSIS QUARTZ USING MICRO-XRF, NEUTRON ACTIVATION ANALYSIS, AND PROMPT GAMMA ACTIVATION ANALYSIS
W.J. Heward, Y. Gao, F.J. Klug, GE Global Research Center, Niskayuna, NY
H.H. Chen-Mayer, R.L. Paul, National Institute of Standards & Technology, Gaithersburg, MD
- F15 IDENTIFICATION OF HOT PARTICLES IN THE ENVIRONMENT USING SINGLE PARTICLE X-RAY EMISSION AND ABSORPTION ANALYSIS
S. Török, J. Osán, B. Alföldy, KFKI Atomic Energy Research Institute, Budapest, Hungary
L. Vincze, KFKI Atomic Energy Research Institute and University of Antwerp, Antwerp, Belgium
M. Betti, Institute for Transuranium Elements, Karlsruhe, Germany
C.A. Pérez, Laboratório Nacional de Luz Síncrotron, Campinas, Brazil
G. Falkenberg, HASYLAB at DESY, Hamburg, Germany
- F43 IDENTIFICATION OF COMPLEX COMPOSITION MATERIALS WITH THE HELP OF A PORTABLE X-RAY SPECTROMETER
I.A. Brytov, R.I. Plotnikov, A.A. Rechinski, M.A. Sokolov, Bourestnik, Ltd., Saint-Petersburg, Russia

Miscellaneous

- C02 A PRIORI ESTIMATE OF X-RAY ANALYSIS METROLOGICAL PARAMETERS
I.A. Brytov, B.D. Kalinin, R.I. Plotnikov, Bourestnik, Ltd., Saint-Petersburg, Russia
- F11 NANOLITER DRIED SPOTS: A MEANS FOR QUICKER, MORE REPRODUCIBLE SAMPLE PREPARATION AND ELEMENTAL ANALYSIS
T.C. Miller, G.J. Havrilla, Los Alamos National Laboratory, Los Alamos, NM
- F31 ELEMENTAL CORRELATIONS AND PHASE IDENTIFICATION USING X-RAY FLUORESCENCE AND AUTOMATED SPECTRAL IMAGE ANALYSIS SOFTWARE
G.J. Havrilla, T. Miller, Los Alamos National Laboratory, Los Alamos, NM
M. Keenan, P. Kotula, Sandia National Laboratory, Albuquerque, NM

- F14 XRF ANALYSIS FOR REFRACTORY SAMPLES BY FUSION BEAD METHOD IN VARIOUS DILUTION RATIO WITH SYNTHETIC CALIBRATION STANDARDS AND DILUTION RATIO'S CORRECTION
H. Inoue, S. Shoji, Y. Yamada, Rigaku Industrial Corporation, Osaka, Japan
J.E. Martin, Rigaku/MSU, The Woodlands, TX
- F16 IMPROVED DESCRIPTION OF X-RAY TUBE SPECTRA FOR FUNDAMENTAL PARAMETER PROGRAMS
H. Ebel, J. Wernisch, W. Dietrich, A. Ghassemi, R. Svagera, M. Waas, Institut für Festkörperphysik, Vienna University of Technology, Vienna, Austria
- F17 A TUNABLE FOCUSING MONOCHROMATOR
H. Ebel, J. Wernisch, R. Dietersdorfer, R. Svagera, M. Waas, Institut für Festkörperphysik, Vienna University of Technology, Vienna, Austria
- F18 QUANTITATIVE TOTAL ELECTRON YIELD (TEY)
H. Ebel, Institut für Festkörperphysik, Vienna University of Technology, Vienna, Austria
- F33 EXPERIMENTAL STUDY OF MODE STRUCTURE PECULIARITIES IN X-RAY BEAMS FORMED BY PLANAR WAVEGUIDE-RESONATORS
V.K. Egorov, E.V. Egorov, IPMT RAS, Moscow, Russia

**Plenary Session
Wednesday, 6 August
(Evergreen)**

X-ray Studies of Art and Archaeological Objects

8:30 a.m.–12:10 p.m.

Organized by: **M. Mantler**, Vienna University of Technology, Vienna, Austria

8:30 Welcoming Remarks

V.E. Buhrke, Chairman, Denver X-ray Conference, Consultant, Portola Valley, CA

T. Fawcett, Executive Director, International Centre for Diffraction Data,
Newtown Square, PA

Presentation of Awards

◆ 2003 Barrett Award to **Hugo M. Rietveld**, Alkmaar, The Netherlands
presented by: R.L. Snyder, Georgia Institute of Technology, Atlanta, GA

◆ 2003 Jenkins Award to **John V. Gilfrich**, Emeritus, SFA, Inc./NRL, Bethesda, MD
presented by: R.P. Goehner, Sandia National Laboratories, Albuquerque, NM

◆ Announcement of the 2003 Jerome B. Cohen Student Award
presented by: I. Cev Noyan, IBM, Yorktown Heights, NY

◆ 2003 Distinguished Fellows Award to **W. Frank McClune**, International Centre for
Diffraction Data, Newtown Square, PA
presented by: C. Hubbard, Oak Ridge National Laboratory, Oak Ridge, TN

Plenary Session Remarks

M. Mantler, Vienna University of Technology, Vienna, Austria

The following are the invited papers to be presented during the plenary session:

- 9:00 F53 USE OF CONVENTIONAL AND SYNCHROTRON X-RAY MICRO BEAMS FOR NON-DESTRUCTIVE CHARACTERIZATION OF ARCHAEOLOGICAL AND ARTISTS MATERIALS
K. Janssens, University of Antwerp, Antwerp, Belgium
- 9:40 C15 X-RAYS IN ART AND ARCHAEOLOGY—HISTORY, PRESENT STATE AND PERSPECTIVES
M.R. Schreiner, Academy of Fine Arts, Vienna, Austria
- 10:20 Break
- 10:50 D87 APPLICATIONS OF X-RAY DIFFRACTION IN CONSERVATION SCIENCE AND ARCHAEOOMETRY
M.C. Corbeil, Canadian Conservation Institute, Ottawa, Canada
- 11:30 F24 PORTABLE X-RAY FLUORESCENCE ANALYSIS OF NEOLITHIC STONE AXES—OPENING A WINDOW ON PREHISTORY
P.J. Potts, The Open University, Milton Keynes, United Kingdom

XRD & XRF

Session C-1 NEW DEVELOPMENTS IN XRD & XRF INSTRUMENTATION

Organized by: V.E. Buhrke, Consultant, Portola Valley, CA

- 1:30 F49 CHARACTERIZATION TECHNIQUES FOR MINIATURE LOW-POWER X-RAY TUBES
D. Clark Turner, A. Reyes-Mena, M. Moras, C. Jensen, S.D. Liddiard, MOXTEK, Inc., Orem, UT
- 1:50 D039 RECENT DEVELOPMENTS OF CURVED GRADED MULTILAYERS AND MULTILAYER MONOCHROMATOR SYSTEMS FOR APPLICATION ON POINT AND LINE FOCUS X-RAY SOURCES
T. Holz, R. Dietsch, AXO DRESDEN GmbH, Heidenau, Germany
D. Weißbach, S. Braun, T. Böttger, Fraunhofer IWS, Dresden, Germany
- 2:10 D009 RETRACTABLE KNIFE-EDGE FOR XRD COMBINATORIAL SCREENING
B.B. He, F.F. Jin, B. Litteer, U. Preckwinkel, K.L. Smith, Bruker AXS, Madison, WI
- 2:30 D122 X-RAY DIFFRACTION STUDIES OF GRAIN NANOSTRUCTURES IN SINGLE TIN OXIDE NANOBELTS
Z. Cai, Y. Xiao, Argonne National Laboratory, Argonne, IL
Z. Wang, Georgia Institute of Technology, Atlanta, GA
- 2:50 D047 A HIGH-TEMPERATURE POWDER DIFFRACTION FURNACE II
M.D. Dolan, S. Zdzieszynski, S.T. Misture, NYS College of Ceramics at Alfred University, Alfred, NY
- 3:10 Break
- 3:30 D080 X-RAY DIFFRACTION METROLOGY TOOL FOR MICROSTRUCTURE CONTROL ON 300MM WAFERS FOR SILICON BASED SEMICONDUCTORS
K.J. Kozaczek, P.R. Moran, D.S. Kurtz, R.I. Martin, L.Y. Huang, A. Stratilatov, HyperNex, Inc., State College, PA
- 3:50 D068 THREE-DIMENSIONAL X-RAY DIFFRACTION MICROSCOPY OF GRAIN BOUNDARIES
W. Liu, G.E. Ice, W. Yang, J.Z. Tischler, B.C. Larson, Oak Ridge National Laboratory, Oak Ridge, TN
- 4:10 D031 FAST X-RAY MAPPING OF LARGE AREA SAMPLES
G. Vittiglio, P. Klinger, J. Heckel, D. Wissman, Spectro Analytical Instrument GmbH & Co. KG, Kleve, Germany
- 4:30 D095 TOWARDS SYNCHROTRON-QUALITY X-RAY DIFFRACTION DATA WITH A LABORATORY INSTRUMENT
M.J. Fransen, PANalytical, Almelo, The Netherlands
- 4:50 F50 X-RAY COINCIDENCE SPECTROMETRY FOR QUANTITATIVE DETERMINATION OF BONE LEAD MEASUREMENT
W. Guo, R.P. Gardner, North Carolina State University, Raleigh, NC

SESSION D-1 RIETVELD APPLICATIONS

Organized by: J.A. Kaduk, BP Chemicals, Naperville, IL

- 1:30 D110 COMBINING MULTIPLE OBSERVATIONS FOR POWDER DIFFRACTION CRYSTALLOGRAPHY—*Invited*
B.H. Toby, National Institute of Standards & Technology, Gaithersburg, MD
- 2:00 D108 SMART CRYSTALLOGRAPHIC IMAGING FOR CHEMICAL ENGINEERING BY MEM/RIETVELD METHOD—*Invited*
M.Takata, Nagoya University, Nagoya, Japan and JASRI, Hyougo, Japan
M.Sakata, Nagoya University, Nagoya, Japan
- 2:30 D007 SOLVING NEIGHBORING ELEMENT PROBLEMS IN TYPE-I CLATHRATES USING RESONANT DIFFRACTION: SUCCESSES AND PROBLEMS—*Invited*
A.P. Wilkinson, Georgia Institute of Technology, Atlanta, GA
Y. Zhang, P.L. Lee, Argonne National Laboratory, Argonne, IL
G.S. Nolas, University of South Florida, Tampa, FL
- 3:00 D069 REVEALING STRUCTURAL CHANGE BY THE TEMPERATURE DEPENDENCE OF ATOMIC DISPLACEMENT PARAMETERS—*Invited*
B.C. Chakoumakos, Oak Ridge National Laboratory, Oak Ridge, TN
- 3:30 Break
- 3:50 D120 STRUCTURE-PROPERTY RELATIONSHIPS OF SUPERCONDUCTING AND HEAVY FERMION INTERMETALLICS—*Invited*
J. Chan, Louisiana State University, Baton Rouge, LA
- 4:20 D045 RESIDUAL STRAIN DETERMINATION BY RIETVELD REFINEMENT OF TOF NEUTRON-DIFFRACTION MEASUREMENTS ON DEFORMED URANIUM
D. Balzar, G. Stefanic, University of Denver, Denver, CO
S. Vogel, D. Brown, M. Bourke, B. Clausen, Los Alamos National Laboratory, Los Alamos, NM
N.C. Popa, Joint Institute for Nuclear Research, Dubna, Russia
- 4:40 D036 COMBINED X-RAY AND NEUTRON DIFFRACTION RIETVELD REFINEMENTS OF THREE-LAYER AURIVILLIUS CERAMICS
M.S. Haluska, S.T. Misture, NYS College of Ceramics at Alfred University, Alfred, NY
- 5:00 D040 ROUTINE TEXTURE ANALYSIS OF NEUTRON TOF DATA USING THE RIETVELD METHOD
S. Vogel, R.B. Von Dreele, Los Alamos National Laboratory, Los Alamos, NM
L. Lutterotti, H.-R. Wenk, University of California at Berkeley, Berkeley, CA

SESSION D-2 HIGH RESOLUTION

Organized by: B. Tanner, University of Durham, Durham, United Kingdom

- 1:30 D136 X-RAY SCATTERING FOR SEMICONDUCTOR HETEROSTRUCTURE ANALYSIS—
Invited
M. Goorsky, UCLA, Los Angeles, CA
- 2:00 FROM THE LAB TO THE FAB: AUTOMATED HIGH-RESOLUTION X-RAY
METROLOGY FOR THE SILICON SEMICONDUCTOR INDUSTRY—*Invited*
M. Wormington, Bede Scientific, Inc., Denver, CO
- 2:30 D012 INVESTIGATION OF THE MESOSCOPIC INTERFACE STRUCTURE OF THIN FILMS
WITH DIFFUSE X-RAY SCATTERING
J. Stümpel, I. Busch, Physikalisch-Technische Bundesanstalt, Braunschweig,
Germany
- 2:50 D092 STRUCTURAL CHARACTERIZATION OF SiGe AND SiGe:C HETEROSTRUCTURES
USING A COMBINATION OF X-RAY METHODS
J.F. Voitok, PANalytical B.V., Almelo, The Netherlands
- 3:10 Break
- 3:40 D121 STRUCTURE INVESTIGATIONS OF THIN FILMS AND LATERAL NANOSTRUCTURES
BY MEANS OF X-RAY GRAZING INCIDENCE DIFFRACTION—*Invited*
J. Grenzer, U. Pietsch, University of Potsdam, Potsdam, Germany
- 4:10 D086 HIGH-RESOLUTION GRAZING INCIDENCE IN-PLANE DIFFRACTION IN THE
LABORATORY
B.K. Tanner, T.P.A. Hase, University of Durham, Durham, United Kingdom
T.A. Lafford, Bede Scientific Instruments Ltd., Durham, United Kingdom
M.S. Goorsky, UCLA, Los Angeles, CA
- 4:30 D041 HIGH RESOLUTION X-RAY DIFFRACTION STUDIES OF EPITAXIALLY GROWN
GaN/SiC(0001)—GROWTH CONDITIONS, DEFECT DENSITY AND STRESS
N. Faleev, H. Temkin, I. Ahmad, M. Holtz, Texas Tech University, Lubbock, TX
Yu. Melnik, TDI, Inc., Gaithersburg, MD

SESSION F-1 SYNCHROTRON APPLICATIONS

Organized by: K.W. Jones, Brookhaven National Laboratory, Upton, NY

- 2:00 F47 PERFORMANCE AND APPLICATION OF MIRROR-BASED X-RAY FLUORESCENCE MICROPROBES AT THE ADVANCED PHOTON SOURCE AND THE NATIONAL SYNCHROTRON LIGHT SOURCE—*Invited*
S.R. Sutton, M. Newville, P. Eng, M. Rivers, A. Lanzirotti, University of Chicago, Chicago, IL
- 2:30 F13 APPLICATION OF FLUORESCENT MICROTOMOGRAPHY AND OTHER X-RAY FLUORESCENCE TECHNIQUES—*Invited*
A. Simionovici, ENS—Lyon, Lyon, France and European Synchrotron Radiation Facility, Grenoble, France
B. Golosio, A. Somogyi, European Synchrotron Radiation Facility, Grenoble, France
L. Lemelle, ENS—Lyon, Lyon, France
- 3:00 Break
- 3:30 F52 CHARACTERIZATION OF METALLOPROTEIN METAL SITES: HIGH THROUGH-PUT APPROACHES TO BIOLOGICAL X-RAY ABSORPTION SPECTROSCOPY—*Invited*
J.E. Penner-Hahn, C.P. McClure, T.C. Weng, S. Haldar, The University of Michigan, Ann Arbor, MI
- 4:00 C03 OBSERVATION OF ATOMIC ARRANGEMENTS IN $\text{Si}_{1-x}\text{Ge}_x$ CRYSTALS BY X-RAY FLUORESCENCE HOLOGRAPHY
K. Hayashi, Y. Takahashi, E. Matsubara, I. Yonenaga, Tohoku University, Sendai, Japan
- 4:20 F35 VARIATION OF Pb AND Ca CONCENTRATION IN COMPACT AND SPONGY BONE DETERMINED BY $\mu\text{SR-XRF}$ AT HASYLAB, BEAMLIN L
P. Wobrauschek, N. Zöger, G. Pepponi, C. Streli, Atominstitut der Österreichischen Universitäten, Wien, Austria
G. Falkenberg, HASYLAB, Hamburg, Germany
W. Osterode, Universitätsklinik für Innere Medizin IV, Wien, Austria
- 4:40 D119 FROM BASIC SCIENCE TO NEW FLAT PANEL DISPLAYS: SOLVING THE LC-ALIGNMENT PUZZLE USING NEXAFS SPECTROSCOPY—*Invited*
J. Lüning, Stanford Synchrotron Radiation Laboratory, Menlo Park, CA

SESSION C-2 Detectors & Sources

Organized by: V.E. Buhrke, Consultant, Portola Valley, CA

- 9:00 F22 RECENT ADVANCES IN HIGH-RESOLUTION SOURCES AND HIGH-RESOLUTION DETECTORS FOR SOFT X-RAY FLUORESCENCE ANALYSIS: TXRF-NEXAFS AND STJs—*Invited*
B. Beckhoff, Physikalisch-Technische Bundesanstalt, Berlin, Germany
- 9:30 F44 IMPROVEMENTS IN LOW-POWER END-WINDOW TRANSMISSION-TARGET X-RAY TUBES
C. Jensen, S.D. Liddiard, A. Reyes-Mena, M. Moras, D.C. Turner, MOXTEK, Inc., Orem, UT
S.M. Elliott, Thin Film Consulting, Longmont, CO
- 9:50 C08 STATUS OF COMPACT AND PORTABLE LASER-COMPTON SCATTERING SOURCE AT THE IDAHO ACCELERATOR CENTER
K. Chouffani, D. Wells, F. Harmon, Y. Toyoda, Idaho Accelerator Center, Pocatello, ID
J. Jones, G. Lancaster, Idaho National Engineering and Environmental Laboratory, Idaho Falls, ID
- 10:10 Break
- 10:40 C04 STATE-OF-THE-ART SILICON DETECTORS FOR X-RAY SPECTROSCOPY
P. Lechner, R. Hartmann, P. Holl, H. Soltau, PNSensor GmbH, München, Germany
N. Meidinger, G. Schaller, F. Schopper, L. Strüder, MPI für Physik, München, Germany
G. Lutz, R.H. Richter, MPI für extraterrestrische Physik, Garching, Germany
- 11:00 C05 SILICON DRIFT DETECTORS FOR HIGH RESOLUTION, HIGH COUNT RATE X-RAY SPECTROSCOPY AT ROOM TEMPERATURE
P. Lechner, H. Soltau, PNSensor GmbH, München, Germany
C. Fiorini, A. Longoni, Politecnico di Milano, Milano, Italy
G. Lutz, MPI für Physik, München, Germany
L. Strüder, MPI für extraterrestrische Physik, Garching, Germany
- 11:20 C13 1- AND 2-DIMENSIONAL DETECTION SYSTEMS AND THE PROBLEM OF SAMPLE FLUORESCENCE IN X-RAY DIFFRACTOMETRY
M.J. Fransen, A.C. Vermeulen, PANalytical, Almelo, The Netherlands
- 11:40 D111 A NEW “VORTEX” DETECTOR SYSTEM FOR X-RAY POWDER DIFFRACTOMETRY
G. Fuginawa, M. Kuribayashi, J. Harada, Rigaku Corporation, Tokyo, Japan
S. Barkan, J.S. Iwaczyk, B.E. Patt, L. Feng, C.R. Tull, Photon Imaging, Inc., Northridge, CA
- 12:00 C16 NOVEL, PHOTON COUNTING X-RAY DETECTORS—*Invited*
R.D. Durst, Y. Diawara, D. Khazins, S. Medved, B. Becker, T. Thorson, Bruker AXS, Inc., Madison, WI

SESSION D-3 SYNCHROTRON APPLICATIONS: X-RAY DIFFRACTION & SCATTERINGOrganized by: **C. Lavoie**, IBM, Yorktown Heights, NYCo-chair: **S. Eisebitt**, BESSY GmbH, Berlin, Germany

- 8:30 D071 COHERENT X-RAY SCATTERING ON MAGNETIC NANOSTRUCTURES—*Invited*
S. Eisebitt, BESSY GmbH, Berlin, Germany
- 9:00 D017 TEXTURE AND MICROSTRUCTURE ANALYSIS WITH HIGH-ENERGY SYNCHROTRON RADIATION—*Invited*
H.J. Bunge, Technical University of Clausthal, Clausthal-Zellerfeld, Germany
- 9:30 D035 DEPTH RESOLVED STRAIN ANALYSIS OF LATERAL NANOSTRUCTURES PRODUCED BY FOCUSED Ga ION IMPLANTATION IN GaAs
J. Grenzer, **U. Pietsch**, Institut of Physics, University of Potsdam, Potsdam, Germany
B. Köhler, Fraunhofer Institute for Nondestructive Testing, Dresden, Germany
- 9:50 D107 MEASUREMENT OF STRAIN FIELDS AROUND DOMAINS IN BaTiO₃ USING X-RAY MICRODIFFRACTION
R.C. Rogan, **E. Üstündag**, **M. Motahari**, California Institute of Technology, Pasadena, CA
N. Tamura, Lawrence Berkeley National Laboratory, Berkeley, CA
- 10:10 Break
- 10:30 D062 FATIGUE CRACK STUDY USING X-RAY PHASE CONTRAST AND MULTIPLE ANGLE STEREOMETRY METHODS
K. Ignatiev, Georgia Institute of Technology, Atlanta, GA
S.R. Stock, Northwestern University, Chicago, IL
- 10:50 D043 PHASE IDENTIFICATION AND SEQUENCE CHARACTERIZATION IN Ni-Si THIN FILMS AT LOW TEMPERATURE
C. Coia, **P. Desjardins**, École Polytechnique de Montréal, Montréal, Canada
C. Lavoie, **C. Detavernier**, IBM, T.J. Watson Research Center, Yorktown Heights, NY
- 11:10 D013 THE USE OF X-RAY SCATTERING FOR MEDICAL DIAGNOSIS
K.D. Rodgers, **A. Round**, Cranfield University, Swindon, U.K.
C.J. Hall, Synchrotron Radiation Dept., SRS, Cheshire, U.K.
R.A. Lewis, Monash University, Australia
A. Hufton, Christie Hospital, Manchester, U.K.
- 11:30 D060 SYNCHROTRON X-RAY PHASE RADIOGRAPHY AND ABSORPTION MICRO-CT OF REGENERATING NEWT LIMBS
S.R. Stock, **M. Gradassi**, **H.G. Simon**, Northwestern University, Chicago IL
K. Ignatiev, Georgia Institute of Technology, Atlanta GA
I. Smolsky, **H. Tsuruta**, Stanford Synchrotron Radiation Lab., Stanford CA
F. De Carlo, Advanced Photon Source, Argonne IL
- 11:50 C07 SYNCHROTRON APPLICATIONS IN ARCHAEOLOGICAL METALLURGY: ANALYSIS OF HIGH ZINC BRASS ARTIFACTS
B. Newbury, **M. Notis**, **G.S. Cargill, III**, Lehigh University, Bethlehem, PA
B. Stephenson, Adler Planetarium & Astronomy Museum, Chicago, IL
J. Almer, **D. Haeffner**, **B. Stephenson**, Argonne National Laboratory, Argonne, IL

SESSION D-4 STRESS ANALYSIS I

Organized by: **C.C. Goldsmith**, IBM Microelectronics, Hopewell Junction, NY
 Co-chair: **T.R. Watkins**, Oak Ridge National Laboratory, Oak Ridge, TN

- 9:00 D037 IN SITU MEASUREMENT OF GROWTH STRESS IN ALUMINA SCALE—*Invited*
E.D. Specht, P.F. Tortorelli, K.L. More, Oak Ridge National Laboratory,
 Oak Ridge, TN
P. Zschack, University of Illinois at Urbana-Champaign, Argonne, IL
- 9:30 D075 PRECIPITATION KINETICS AND DEFORMATION BEHAVIOR OF TiAl-W ALLOYS
 AT ELEVATED TEMPERATURES—*Invited*
H. Choo, University of Tennessee, Knoxville, TN and Oak Ridge National
 Laboratory, Oak Ridge, TN
D. Seo, Institute for Aerospace Research, National Research Council, Ottawa,
 Ontario, Canada
J. Beddoes, Carleton University, Ottawa, Ontario, Canada
M.A.M. Bourke, Los Alamos National Laboratory, Los Alamos, NM
- 10:00 D051 SHOCK-INDUCED DEFORMATION OF TUNGSTEN POWDER
D.W. Richards, M.P. Kramer, J.W. House, D.P. Shea, D.A. Cunard, Air Force
 Research Laboratory, Eglin AFB, FL
R.J. De Angelis, University of Florida GERC, Shalimar, FL
- 10:20 Break
- 10:50 D053 RELAXATION OF RESIDUAL STRESS IN SHOT PEENED Ti-6Al-4V DUE TO
 FRETTING FATIGUE
S.A. Martinez, S. Sathish, S. Mall, M.P. Blodgett, Air Force Research Laboratory,
 Wright Patterson Air Force Base, OH
- 11:10 D099 POWDER DIFFRACTION PATTERN OF ORIENTED MAGNETIC PARTICLES
 INDUCED BY MAGNETIC FIELD
X. Luo, Fuzhou University, Fuzhou, China and East China Institute of Technology,
 Jiangxi, China
S. Liu, Fuzhou University, Fuzhou, China
- 11:30 D123 STRAIN EFFECTS IN THIN FILM / Si SUBSTRATES REVEALED BY X-RAY
 MICRODIFFRACTION
C.E. Murray, I.C. Noyan, IBM, Yorktown Heights, NY
B. Lai, Z. Cai, Argonne National Laboratory, Argonne, IL
- 11:50 D082 RESIDUAL STRESSES IN THIN TaN_x/Ta BILAYERS: ORIGIN AND EVOLUTION
K.J. Kozaczek, HyperNex, Inc., State College, PA

SESSION F-2 TXRF

Organized by: M.A. Zaitz, IBM, Hopewell Junction, NY

- 9:00 F45 THE PERSPECTIVE OF TXRF FOR ENVIRONMENTAL ANALYSIS—*Invited*
S. Török, J. Osán, KFKI Atomic Energy Research Institute, Budapest, Hungary
B. Beckhoff, G. Ulm, Physikalisch-Technische Bundesanstalt, Berlin, Germany
E. Curis, Laboratoire de Biomathématique, Faculté de Pharmacie, Paris, France
- 9:30 F36 FOCUSED BEAM TXRF SYSTEM USING DOUBLY CURVED CRYSTALS—*Invited*
Z.W. Chen, X-ray Optical Systems, Inc., East Greenbush, NY
- 10:00 Break
- 10:30 F04 CHARACTERIZATION OF URBAN AIR POLLUTION BY TOTAL REFLECTION
X-RAY FLUORESCENCE
M. Schmeling, Loyola University Chicago, Chicago, IL
- 10:50 F09 TXRF ANALYSIS USING NANOLITER DROPLET METHODOLOGY IN
SEMICONDUCTOR APPLICATIONS
T.C. Miller, G.J. Havrilla, Los Alamos National Laboratory, Los Alamos, NM
C. Sparks, M. Beebe, International Sematech, Austin, TX
- 11:10 F23 A NOVEL TXRF INSTRUMENTATION FOR CONTAMINATION CONTROL ON
300 mm SILICON WAFERS EMPLOYING SYNCHROTRON RADIATION
B. Beckhoff, R. Fliegau, G. Ulm, J. Weser, Physikalisch-Technische Bundesanstalt,
Berlin, Germany
T. Ehmann, L. Fabry, C. Mantler, S. Pahlke, Wacker Siltronic AG, Burghausen,
Germany

SESSION C-3 X-RAY OPTICS

Organized by: G.J. Havrilla, Los Alamos National Laboratory, Los Alamos, NM

- 1:30 F01 DEPTH SENSITIVE X-RAY FLUORESCENCE ANALYSIS WITH X-RAY OPTICS—
Invited
B. Kanngießer, W. Malzer, Technical University of Berlin, Berlin, Germany
- 2:00 C12 X-RAY OPTICS: THE DRIVING FORCE OF NEW TECHNOLOGIES FOR X-RAY
ANALYSIS—*Invited*
N. Gao, D. Gibson, X-ray Optical Systems, Inc., East Greenbush, NY
- 2:30 F26 STEREOVIEW ELEMENTAL X-RAY IMAGING
G.J. Havrilla, T.C. Miller, Los Alamos National Laboratory, Los Alamos, NM
R.W. Morton, K.G. Huntley, ConocoPhillips, Bartlesville OK
- 2:50 C11 BEAM INTENSITY/DETECTOR CONFIGURATION OPTIMIZATION WITH
NUMERICAL METHODS
D. Kenning, KeyMaster Technologies, Kennewick, WA
- 3:10 Break
- 3:30 F27 ELEMENTAL IMAGING OF SEA URCHIN TOOTH
G.J. Havrilla, T.C. Miller, Los Alamos National Laboratory, Los Alamos, NM
S. Stock, Northwestern University, Chicago, IL
- 3:50 D032 MICROFOCUSING SOURCE AND MULTILAYER OPTICS BASED SAXS CAMERA
L. Jiang, S. Seshadri, B. Verman, B. Kim, Y. Platonov, Osmic, Inc.,
Auburn Hills, MI
- 4:10 D042 INTENSITY VS. RESOLUTION AND PEAK SHAPE IN X-RAY DIFFRACTION;
SINGLE AND DOUBLE GOEBEL MIRROR CONFIGURATIONS COMPARED TO
STANDARD PARAFOCUSING OPTICS
E.J. Peterson, W.L. Hults, J.A. Valdez, Los Alamos National Laboratory,
Los Alamos, NM
H. Cordes, J.B. Litteer, Bruker AXS, Madison, WI
- 4:30 D052 EVALUATION OF XRPD DATA FROM REFLECTION AND TRANSMISSION
GEOMETRY INSTRUMENTS WITH MULTILAYER AND CRYSTAL OPTICS
EMPLOYING POINT AND POSITION-SENSITIVE DETECTORS
S.T. Misture, M.D. Dolan, NYS College of Ceramics at Alfred University, Alfred, NY
- 4:50 D083 THE ART OF X-RAY ANALYSIS OF ART: IDENTIFYING PAINT PIGMENTS IN
ANCIENT MASTERPIECES
J. te Nijenhuis, M.J. Fransen, PANalytical B.V., Almelo, The Netherlands

SESSION D-5 STRESS ANALYSIS II

Organized by: **C.C. Goldsmith**, IBM Microelectronics, Hopewell Junction, NY
 Co-chair: **T.R. Watkins**, Oak Ridge National Laboratory, Oak Ridge, TN

- 1:40 D029 X-RAY STRESS ANALYSIS METHOD BASED ON LAUE SYMMETRIES FOR THIN FILMS
R. Yokoyama, J. Harada, Rigaku Corporation, Tokyo, Japan
K. Tanaka, Nagoya University, Nagoya, Japan
- 2:00 D061 STRAIN RELAXATION CALCULATIONS AND ERROR ANALYSIS: HIGH RESOLUTION X-RAY DIFFRACTION RECIPROCAL SPACE MAPS
E.D. Meserole, A.M. Noori, M.S. Goorsky, UCLA, Los Angeles, CA
- 2:20 D077 COMPUTER SIMULATION OF DIFFRACTION TECHNIQUE APPLIED TO MEASUREMENTS OF SURFACE STRESS GRADIENTS
J.T. Assis, V.I. Monine, S.A. Filippov, A. Merendaz, Rio de Janeiro State University, Rio de Janeiro, Brazil
- 2:40 D085 SELFCONSISTENT DETERMINATION OF THE X-RAY ELASTIC STRESS FACTORS OF POLYCRYSTALLINE MATERIALS FOR ARBITRARY CRYSTAL SYMMETRY AND GRAIN SHAPE
H. Wern, T. Brissier, M. Kreutzer, HTW des Saarlandes, Saarbrücken, Germany
- 3:00 D084 A NEW AND EFFICIENT METHOD TO DETERMINE STRAIN/STRESS DEPTH PROFILES FROM DIFFRACTION EXPERIMENTS
H. Wern, Ch. Klein, HTW des Saarlandes, Saarbrücken, Germany
- 3:20 Break
- 3:40 D105 EFFECT OF BEAM DIVERGENCE ON STRAIN DATA FROM NEUTRON DIFFRACTION
E. Üstündag, R.A. Karnesky, California Institute of Technology, Pasadena, CA
I.C. Noyan, IBM, Yorktown Heights, NY
B. Clausen, Los Alamos National Laboratory, Los Alamos, NM
M.R. Daymond, Rutherford Appleton Laboratory, Oxon, United Kingdom
J.W. Richardson, Jr., Argonne National Laboratory, Argonne, IL
- 4:00 D023 STRESS ERRORS ASSOCIATED WITH MINIATURIZATION OF PUSAI ASSEMBLY X-RAY STRESS ANALYZER
T. Goto, Fukui University of Technology, Fukui, Japan
- 4:20 C09 DEVELOPMENT OF A NEW POSITRON LIFETIME SPECTROSCOPY TECHNIQUE FOR STRESS AND DEFECT CHARACTERIZATION IN THICK MATERIALS
F.A. Selim, D.P. Wells, J.F. Harmon, J. Kwofie, Idaho State University, Idaho Accelerator Center, Pocatello, ID
- 4:40 D132 UPGRADES OF THE X-RAY AND NEUTRON DIFFRACTION RESIDUAL STRESS MAPPING FACILITIES AT ORNL
C.R. Hubbard, T.R. Watkins, S. Spooner, S. Craig, M.C. Wright, Oak Ridge National Laboratory, Oak Ridge, TN

SESSION D-6 INDUSTRIAL APPLICATIONS

Organized by: **R.L. Snyder**, Georgia Institute of Technology, Atlanta, GA
C.R. Hubbard, Oak Ridge National Laboratories, Oak Ridge, TN

- 1:30 D126 XRD FOR INDUSTRY: SELECTED EXAMPLES FROM A SMALL PRIVATE LABORATORY—*Invited*
H.E. Goebel, Emeritus, Siemens AG, Munich, Germany
- 2:00 D072 X-RAY DIFFRACTION AT DUPONT CENTRAL RESEARCH AND DEVELOPMENT—*Invited*
T.G. Amos, **M.K. Crawford**, Experimental Station, DuPont Central R&D, Wilmington, DE
W.E. Guise Jr., DuPont Central R&D, Advanced Photon Source, Argonne National Laboratory, Argonne, IL
- 2:30 D024 X-RAY DIFFRACTION AND MORE AT GE GLOBAL RESEARCH CENTER—*Invited*
Y. Gao, GE Global Research Center, Niskayuna, NY
- 3:00 D059 ROCKING CURVE ANALYSIS OF ZINC OXIDE THIN FILMS—*Invited*
G.R. Kowach, Bell Laboratories, Lucent Technologies, Murray Hill, NJ
- 3:30 Break
- 3:50 D115 MATERIALS CHARACTERIZATION USING A NOVEL SIMULTANEOUS NEAR INFRARED/X-RAY DIFFRACTION INSTRUMENT
T. Blanton, **C. Barnes**, **J. Putrelo**, **A. Yeboah**, **S. Switalski**, Eastman Kodak Company, Rochester, NY
- 4:10 D131 TEXTURE MEASUREMENTS ON LONG-LENGTHS OF HIGH TEMPERATURE SUPERCONDUCTORS
J.L. Reeves, **V. Selvamanickam**, SuperPower Inc., Schenectady, NY
H. Huang, **J. Burdett**, X-Ray Optical Systems, East Greenbush, NY
R.L. Snyder, Georgia Institute of Technology, Atlanta, GA
- 4:30 D014 A COMPARISON OF NEW AND TRADITIONAL ROUTES FOR PROSTHETIC COATING FABRICATION
K.D. Rogers, **S.E. Etok**, Cranfield University, Swindon, UK
R. Scott, Biomet-Merck, Swindon, Wiltshire, UK
- 4:50 D133 X-RAY DIFFRACTION AT IBM—*Invited*
C.C. Goldsmith, **I.C. Noyan**, IBM, Yorktown Heights, NY

SESSION F-3 QUANTITATIVE XRFOrganized by: **J. Gilfrich**, Emeritus, SFA, Inc./NRL, Bethesda, MDCo-chair: **W.T. Elam**, University of Washington, Redmond, WA

- 2:00 F03 QUANTITATIVE ANALYSIS BY X-RAY INDUCED TOTAL ELECTRON YIELD (TEY) COMPARED TO XRFA—*Invited*
H. Ebel, Institut für Festkörperphysik, Vienna University of Technology, Vienna, Austria
- 2:30 F51 CONSIDERATIONS FOR OPTIMIZING PRECISION AND ACCURACY OF MULTILAYER THIN FILM MEASUREMENTS BY EDXRF—*Invited*
A. Wittkopp, Thermo Noran, Middleton, WI
- 3:00 F05 STANDARDLESS FP ANALYSIS OF THIN FILMS AND MULTIPLE LAYER COATINGS
W.T. Elam, R.B. Shen, B. Scruggs, J. Nicolosi, EDAX, Inc., Mahwah, NJ
- 3:20 Break
- 3:50 F25 IMPROVEMENTS IN XRF SPECIMEN PREPARATION USING THE DRIED RESIDUE METHOD: GALLIUM IN PLUTONIUM
C.G. Worley, Los Alamos National Laboratory, Los Alamos, NM
- 4:10 F37 HALF ABSORPTION PEAK—A SPECTRAL ARTIFACT
D. Kenning, KeyMaster Technologies, Kennewick, WA

SESSION C-4 CEMENT ANALYSIS

Organized by: R. Yellepeddi, Thermo ARL, Ecublens, Switzerland

- 8:30 PROCESS AND QUALITY CONTROL IN THE CEMENT INDUSTRY USING X-RAY INSTRUMENTS: CHALLENGES AND SOLUTIONS—*Invited*
J. Hook, Lehigh Cement Company, Union Bridge, MD
- 9:00 D089 ADVANCES IN QUANTITATIVE XRD ANALYSIS FOR CLINKER, CEMENT (CEM I, CEM II, CEM III) AND CEMENTITIOUS ADDITIONS—*Invited*
G. Walenta, Lafarge Central Research Laboratories, France
T. Füllmann, Swiss Federal Institute of Technology, Lausanne, Switzerland
- 9:30 F48 NON-ROUTINE ANALYSIS IN CEMENT INDUSTRY: ENVIRONMENTAL CONTROL, ALTERNATIVE FUELS AND OTHER CENTRAL LAB APPLICATIONS USING STANDARD-LESS ANALYSIS PROGRAMS—*Invited*
A. Buman, R. Yellepeddi, Thermo ARL, Dearborn, MI
- 10:00 Break
- 10:20 D049 DEVELOPING AN ASTM STANDARD TEST FOR QUANTITATIVE X-RAY POWDER DIFFRACTION ANALYSIS OF PORTLAND CEMENTS AND CLINKER
P. Stutzman, National Institute of Standards & Technology, Gaithersburg, MD
- 10:40 D050 THE USE OF XRD PATTERNS TO EVALUATE THE COMPRESSIVE STRENGTH OF STABILIZED AGGREGATES
N.N. Khoury, M. Zaman, J.G. Laguros, University of Oklahoma, Norman, OK
- 11:00 F46 BEADS OR PRESSED PELLETS? WHY NOT USE BOTH!
J.-P. Gagnon, Corporation Scientifique Claisse, Inc., Sainte-Foy, Quebec, Canada
F. Slim, Ciment Quebec, Inc., St-Basile, Quebec, Canada
- 11:20 D008 EXTERNAL SULFATE ATTACK ON CEMENT EXAMINED BY SPATIALLY RESOLVED ENERGY DISPERSIVE SYNCHROTRON X-RAY DIFFRACTION AND COMPUTED MICROTOMOGRAPHY
A.P. Wilkinson, A.C. Jupe, K.E. Kurtis, N.N. Naik, Georgia Institute of Technology, Atlanta, GA
S.D. Shastri, P.L. Lee, Advanced Photon Source, Argonne National Laboratory, Argonne, IL
S.R. Stock, Northwestern University, Chicago, IL

Friday a.m.

(Evergreen B)

XRD & XRF

SESSION C-5 SOFTWARE (¼ DAY)

Organized by: **T.C. Huang**, Emeritus, IBM Almaden Research Center, San Jose, CA

- 8:30 D104 INDEXING POWDER DIFFRACTION PATTERNS WITH THE DICHOTOMY METHOD, NEW DEVELOPMENTS
D. Louër, Université de Rennes I, Rennes cedex, France
A. Boultif, Université Mentouri de Constantine, Algeria
- 8:50 D117 FULLPAT: A FULL-PATTERN QUANTITATIVE ANALYSIS PROGRAM AND METHOD FOR X-RAY POWDER DIFFRACTION
S.J. Chipera, **D.L. Bish**, Los Alamos National Laboratory, Los Alamos, NM
- 9:10 D098 EVALUATING EXPERIMENTAL METHODS AND TECHNIQUES IN X-RAY DIFFRACTION USING 280,000 DATA SETS IN THE POWDER DIFFRACTION FILE
T.G. Fawcett, **S. Kabekkodu**, **J. Faber**, **F. Needham**, **F. McClune**, International Centre for Diffraction Data, Newtown Square, PA
- 9:30 F39 DIRECTLY FROM EDX SPECTRUM TO CONCENTRATIONS—A NEW APPROACH TO STANDARDLESS ANALYSIS
K. Behrens, Bruker AXS GmbH, Karlsruhe, Germany
B. Burton, Bruker AXS, Inc., Madison, WI
- 9:50 C01 $L\alpha$ SATELLITES IN X-RAY EMISSION SPECTRA OF ELEMENTS $_{41}\text{Nb}$, $_{45}\text{Rh}$, $_{47}\text{Ag}$ AND $_{49}\text{In}$
S. Poonia, Central Arid Zone Research Institute, Rajasthan, India

Friday a.m.

(Evergreen B)

XRD & XRF

SESSION C-6 PHARMACEUTICALS (¼ DAY)

Organized by: **T.C. Huang**, Emeritus, IBM Almaden Research Center, San Jose, CA

- 10:30 D114 NEW APPLICATIONS OF XRD FOR R&D AND QUALITY CONTROL OF PHARMACEUTICAL COMPOUNDS—*Invited*
A. Kishi, T. Kubo, Rigaku Corporation, Tokyo, Japan
- 11:00 D135 USE OF X-RAY POWDER DIFFRACTOMETRY TO MONITOR PHASE TRANSITIONS DURING PROCESSING—*Invited*
R. Suryanarayanan, University of Minnesota, Minneapolis, MN
- 11:30 D063 PHARMACEUTICAL TABLET MAPPING USING PARALLEL BEAM X-RAY DIFFRACTION
S. Bates, C.H. Russell, Bede Scientific Incorporated, Englewood, CO
D.A. Engers, K.R. Morris, Purdue University, West Lafayette, IN
- 11:50 D127 STRUCTURE DETERMINATION OF TWO ORGANIC COMPOUNDS FROM LABORATORY X-RAY DATA COLLECTED WITH THE X'CELERATOR DETECTOR
C.A. Reiss, PANalytical, Almelo, The Netherlands
K. Goubitz, H. Schenk, University of Amsterdam, Amsterdam, The Netherlands

Friday a.m.

(Evergreen C)

XRD

SESSION D-7 CATALYSIS

Organized by: **C. Lowe-Ma**, Ford Motor Research Labs, Dearborn, MI

Co-chairs: **A.Z. Ringwelski**, UOP LLC, Des Plaines, IL

A. Drews, Ford Motor Research Labs, Dearborn, MI

- 9:00 C14 COMBINATORIAL METHODS IN CATALYSIS RESEARCH: HIGH SPEED CHARACTERIZATION AND TESTING OF MATERIALS—*Invited*
A.Z. Ringwelski, M.J. Cohn, D.B. Galloway, R.D. Gillespie, UOP LLC, Des Plaines, IL
- 9:30 C06 FINDING MATERIAL DESCRIPTORS IN X-RAY DATA OF CATALYSTS
C.K. Lowe-Ma, A.R. Drews, A.E. Chen, Ford Motor Company, Dearborn, MI
C. Gilmore, G. Barr, University of Glasgow, Scotland, United Kingdom
- 9:50 D091 CHARACTERIZATION OF A Ce/Zr MIXED OXIDE MATERIAL—A COMPARISON OF OFF-LINE AND IN-SITU HIGH TEMPERATURE REDUCTION TREATMENTS—*Invited*
S.D. Gotshall, D.J. Hetro, D.S. Roehner, P. Shady, Johnson Matthey Catalytic Systems Division—North America, Wayne, PA
- 10:20 Break
- 10:40 D004 STRUCTURE OF NANOPHASE CATALYSTS BY THE ATOMIC PAIR DISTRIBUTION FUNCTION TECHNIQUE
V. Petkov, Central Michigan University, Mt. Pleasant, MI
- 11:00 D124 STATIC AND DYNAMIC NANO-CHARACTERIZATION OF HETEROGENEOUS CATALYSTS—*Invited*
P.A. Crozier, Arizona State University, Tempe, AZ

SESSION F-4 PROBLEM SOLVING/INDUSTRIAL APPLICATIONSOrganized by: **J. Anzelmo, Bruker AXS, Inc., Madison, WI**

- 8:30 F12 APPLICATIONS OF XRF IN THE PLASTICS INDUSTRY—*Invited*
J.T. Henderson, GE Plastics, Mt. Vernon, IN
A. Seyfarth, Bruker AXS, Madison, WI
- 9:00 F29 MONITORING SOLDER BUMP COMPOSITION ON C4 FLIP CHIP PROCESS LINE FOR THE SEMICONDUCTOR PACKAGING INDUSTRY
T. He, InstroTek, Inc., Raleigh, NC
- 9:20 F08 USING WDXRF ANALYSIS TO DEVELOP A HIGH-TECH BUSINESS
D.L. Wertz, The University of Southern Mississippi, Hattiesburg, MS
C.D. Deaton, OMNI Instruments, Inc.
- 9:40 F21 ASSESSING AIR POLLUTION IN MUSEUMS AND CATHEDRALS: THE ROLE OF XRS
R. Van Grieken, L. Bencs, R. Godoi, V. Kontozova, Z. Spolnik, University of Antwerp, Antwerp, Belgium
- 10:00 F10 MEASURING SOME ENVIRONMENTALLY SENSITIVE ELEMENTS USING WAVELENGTH DISPERSIVE X-RAY SPECTROMETRY
D.L. Wertz, A. Winters, T. Craft, D. Patrick, The University of Southern Mississippi, Hattiesburg, MS
R.A. Lemire, Mississippi Army National Guard, MS
- 10:20 Break
- 10:40 F30 CHARACTERIZATION OF A METAL ALLOY AND THIN FILM COATING USING ELEMENTAL IMAGING BY MICRO X-RAY FLUORESCENCE
G.J. Havrilla, T.C. Miller, Los Alamos National Laboratory, Los Alamos, NM
E. Doering, Rose-Hulman Institute of Technology, Terre Haute, IN
- 11:00 F40 OPTIMISED PROCEDURES FOR THE XRF ANALYSIS OF LUBRICANTS AND FUELS
A. Bühler, Bruker AXS GmbH, Karlsruhe, Germany
- 11:20 F42 ON-STREAM XRF ANALYSIS OF PPM CONCENTRATIONS OF HEAVY METALS IN MINERAL SLURRIES
G. Roach, J. Tickner, CSIRO Minerals, Sydney, Australia

Local Attractions*

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Molly Brown House Museum, (303) 832-4092

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The Denver Zoo, (303) 331-4100
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Coors Field, (303) 762-5437
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Fiddler's Green Outdoor Amphitheater, (303) 220-7000

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C-470 & Broadway, (303) 790-4262
Mann Theaters, Tamarac Square
7777 E. Hampden, (303) 755-5100
United Artists, Continental
Hampden & I-25, (303) 758-2345
United Artists, Greenwood Plaza
8141 E. Arapahoe Road, (303) 741-1200

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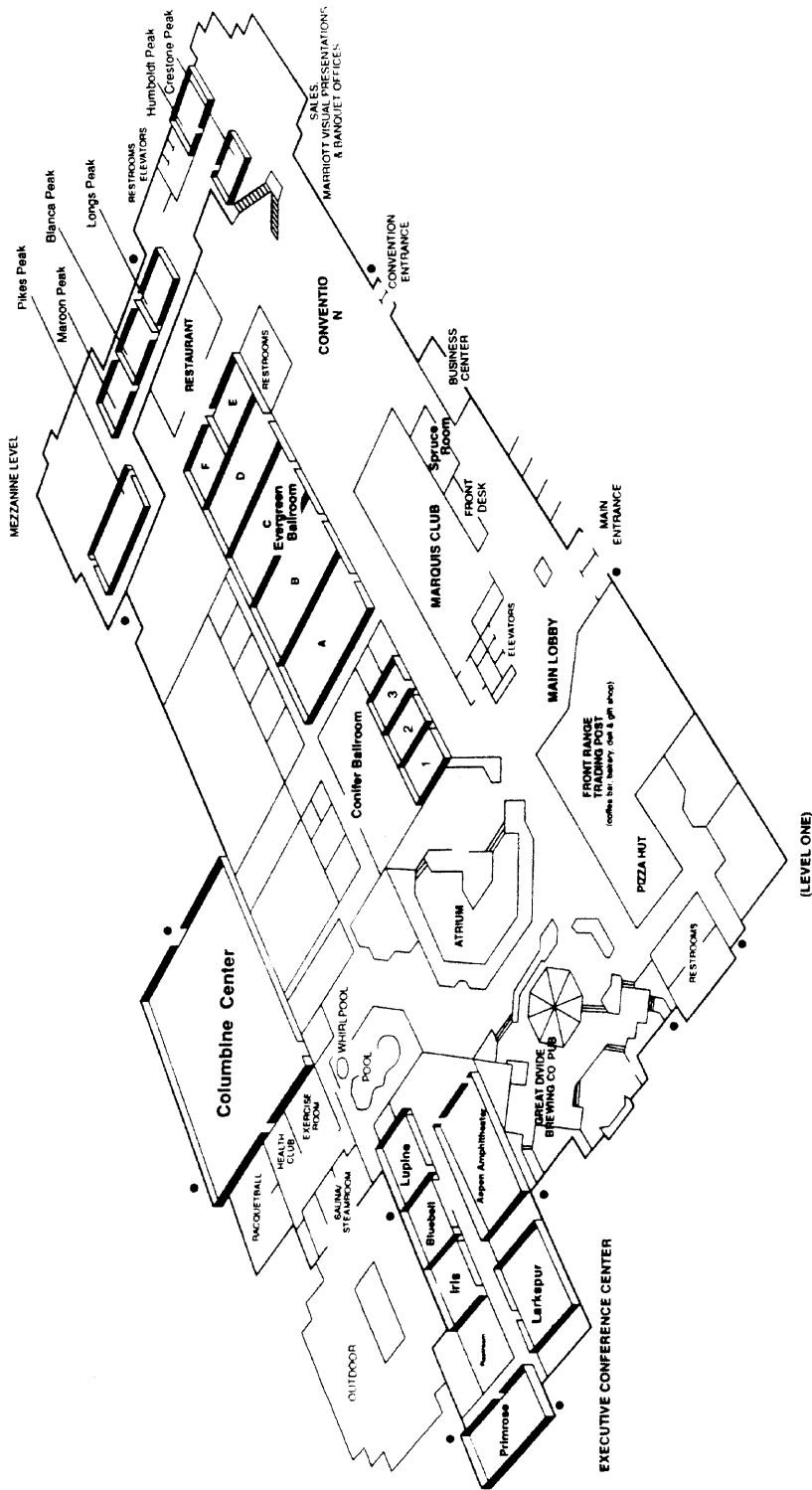
Directions from DIA Airport

Pena Blvd. to I-70 West
 I-70 to I-225 South
 I-225 to Yosemite (Exit 2)
 Yosemite (west along frontage rd.) to DTC Blvd.
 Left on DTC Blvd.
 Right on Union Ave.
 Left on Syracuse St.
 Hotel is on right

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Denver Marriott Tech Center*

Hotel Layout



DENVER MARRIOTT TECH CENTER

HOTEL LAYOUT

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Denver X-ray Conference Program-at-a-Glance 4–8 August 2003			
Sun. eve.: 5:30–7:30 Welcoming Reception Sponsored by: Bede Scientific, SPEX CertiPrep & Claisse Scientifique (Atrium)			
Day & Time	XRD & XRF	XRD	XRF
Mon. am: Workshops	W-1 Technical Communication (Kaduk/Noyan) (A) W-2 Optics (Misture/Cline) (B)	W-3 Rietveld Applications I (Kern/Faber) (C)	W-4 Specimen Preparation I – XRF (Broton/Anzelmo) (D)
Mon. pm: Workshops		W-5 Alignment & Standards (Misture/Cline) (B) W-6 Rietveld Applications II (Kern/Faber) (C)	W-7 Specimen Preparation II – XRF (Broton/Anzelmo) (D) W-8 Working Close to Detection Limits – XRF (Van Grieken) (A)
Mon. eve.: 5:00–6:00 ICDD Kick-off Announcement. Sponsored by ICDD (Evergreen E & F) 6:30–8:30 PANalytical (formerly Philips Analytical) Reception and XRD Poster Session I (Noyan/Misture). Sponsored by PANalytical (Evergreen)			
Tue. am: Workshops		W-9 Two-Dimensional XRD I (He/Blanton) (A) W-10 Backscatter Electron Diffraction (Goehner) (B)	W-11 Fundamentals of XRF (Gilfrich) (C) W-12 Quantitative Analysis I (Mantler) (D)
Tue. pm: Workshops		W-13 Two-Dimensional XRD II (He/Blanton) (A) W-14 High Resolution – XRD (Tanner/Bowen) (B)	W-15 Quantitative Analysis II (Mantler) (D) W-16 Basic TXRF (Zaitz/Wobruschek) (C)
Tue. eve.: 6:30–8:30 MDI and Rigaku/MSI, Inc. Reception and XRD Poster Session II (Barton/Huang). Sponsored by: MDI and Rigaku/MSI, Inc. (Evergreen)			
Wed. am: 8:30–12:10 Plenary Session: “X-ray Studies of Art & Archaeological Objects” (Mantler) (Evergreen)			
Wed. pm: Sessions	C-1 New Developments in XRD & XRF Instrumentation (Buhrke) (A)	D-1 Rietveld Applications (Kaduk) (B) D-2 High Resolution – XRD (Tanner) (C)	F-1 Synchrotron Applications – XRF (Jones) (D)
Wed. eve: 6:30–8:30 Bruker AXS, Inc. Reception and XRF Poster Session (Havrilla/Zaitz). Sponsored by: Bruker AXS, Inc.			
Thurs. am: Sessions	C-2 Detectors & Sources (Buhrke) (A)	D-3 Synchrotron Applications XRD & Scattering (Lavoie/Eisebitt) (B) D-4 Stress Analysis I (Goldsmith/Watkins) (C)	F-2 TXRF (Zaitz) (D)
Thurs. pm: Sessions	C-3 X-ray Optics (Havrilla) (A)	D-5 Stress Analysis II (Goldsmith/Watkins) (C) D-6 Industrial Applications XRD (Snyder/Hubbard) (B)	F-3 Quantitative XRF (Gilfrich/Elam) (D)
Fri. am: Sessions	C-4 Cement Analysis (Yellepeddi) (A) C-5 Software – 1/4 day (Huang) (B) C-6 Pharmaceuticals – 1/4 day (Huang) (B)	D-7 Catalysis (Lowe-Ma/ Ringwelski/Drews) (C)	F-4 Problem Solving/Industrial Applications – XRF (Anzelmo) (D)

All sessions and workshops will be held in a section of the Evergreen Ballroom – Sections A, B, C or D. Any changes to the Program will be reflected in the *Book of Abstracts* and on the Denver X-ray Conference web page: <http://www.dxcicdd.com>.

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Denver Marriott Tech Center, Denver, Colorado, U.S.A.

4-8 August 2003

Please circle the workshops that you plan to attend:

W-1 W-2 W-3 W-4 W-5 W-6 W-7 W-8 W-9 W-10 W-11 W-12 W-13 W-14 W-15 W-16

The reduced registration fee will only be applied if **registration form and payment** are received on or before 7 July 2003.

Registration Fees:	by July 7	after July 7
Full week: exhibits, workshops, sessions [†]	\$350	\$425
Monday & Tuesday: exhibits, workshops [†]	\$300	\$375
Wed., Thurs. & Friday: exhibits, sessions [†]	\$300	\$375
Session organizers, invited speakers and workshop instructors [†]	\$100	\$100
Students, unemployed X-ray people, and persons 65 and older [‡] : full week—exhibits, workshops, sessions	\$75	\$75

[†]Includes a copy of Volume 47 of *Advances in X-ray Analysis* on CD-ROM

[‡]Students and those unemployed must have their status confirmed by phone or letter to the Conference Coordinator (see information at bottom of page). Students registering at the conference are required to show I.D.

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^{*}See further information regarding *Powder Diffraction* on page 2 of this program

Please check this box if you do not want your name included on the attendee list.

Are you primarily interested in XRD or XRF topics?

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