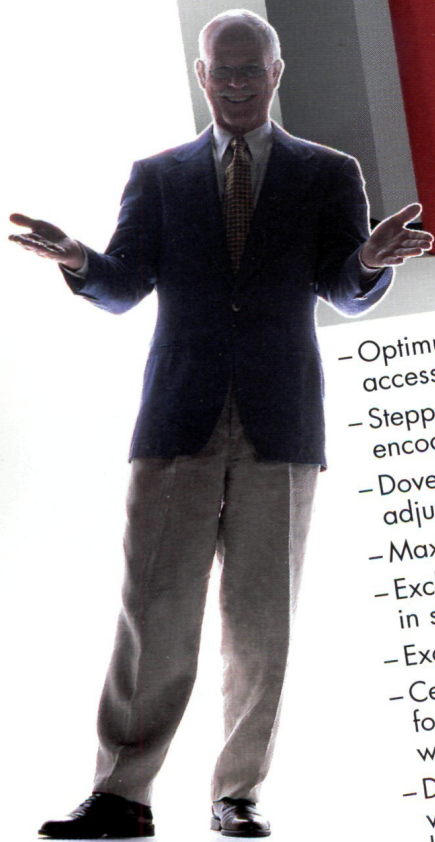


Volume 16 . Number 4 . December 2001

Powder Diffraction

AN INTERNATIONAL JOURNAL OF MATERIALS CHARACTERIZATION



- Optimum goniometer and sample accessibility and visibility
- Stepper motors with optical encoders for highest precision
- Dovetail-tracks for continuously adjustable measurement circle
- Maximum modularity
- Exchange of optical components in seconds
- Exchange of detectors in seconds
- Ceramic X-ray tube with reproducible focus position - 100% compatible with glass tubes
- Dynamic Scintillation Detector with large dynamic range, low background, and long lifetime
- DIFFRAC^{plus} - complete suite of WINDOWS NT based software

U.S. and Canada:

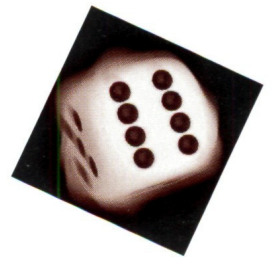
Tel. (+1) 608/276-3000
Fax (+1) 608/276-3006

Germany:

Tel. (+49) 721/595-2888
Fax (+49) 721/595-4587

BRUKER ADVANCED X-RAY SOLUTIONS

D8 ADVANCE –
DON'T GAMBLE WITH
YOUR ANALYTICAL
RESULTS!



find out
what's inside



crystallographica searchmatch

The makers of *Crystallographica* are proud to announce the launch of *Crystallographica Search-Match*, an all-new search-match program for Windows 95/98/NT.

- ◆ Works with all versions of the Powder Diffraction File including the new cPDF
- ◆ Search using full powder diffraction pattern and/or peak list
- ◆ Automatic residual search for multi-phase identification
- ◆ Unique integrated Boolean card retrieval and display
- ◆ Single / multi-phase full pattern powder simulations
- ◆ Reads common file formats
- ◆ Built-in tools include peak finding and background / $k\text{-}\alpha_2$ stripping
- ◆ Report writing directly to Microsoft Word
- ◆ Full 32-bit technology delivering unrivalled speed and power

**Visit our new web site for details
or contact us for a free demo CD!**



OxfordCryosystems

3 Blenheim Office Park, Lower Road, Long Hanborough
Oxford · OX8 8LN · UK
Tel: +44 (0)1993 883488 · Fax: +44 (0)1993 883988
E.mail: info@OxfordCryosystems.co.uk

Search-Match?

Upgrade to the state-of-the-art

www.crystallographica.co.uk



Speed and resolution

X'Celerator redefines X-ray diffraction recording speed

The sea eagle spots its prey from far above the water's surface – compensating for the diffraction of light in water – dives with breathtaking pace and catches it with amazing accuracy. A solution demanding both speed and resolution.

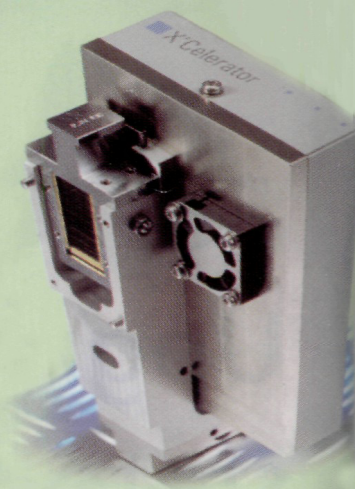
The X'Celerator, based on RTMS (Real Time Multiple Strip) detection technology, brings the same benefits in X-ray powder diffractometry. It's up to one hundred times faster than a traditional detection system – without any compromise on data quality or ease of use.

Why wait for hours of data collection while you could have your results in only a few minutes?

For more information:

Philips Analytical
Lelyweg 1,
7602 EA Almelo,
The Netherlands
Tel. : +31 (546) 534444
Fax : +31 (546) 534592

www.analytical.philips.com



Let's make things better.

<http://dx.doi.org/10.1017/S088455000200115> Published online by Cambridge University Press



PHILIPS

Editor-in-Chief

Ting C. Huang
6584 Radko Drive
San Jose, CA 95119-1924 U.S.A.
huang@icdd.com

Managing Editor

Shannon Mattaboni
JCPDS-International Centre for Diffraction Data
12 Campus Blvd.
Newtown Square, PA 19073-3273 U.S.A.
mattaboni@icdd.com

Editor for New Diffraction Data

William E. Mayo
Rutgers University
Ceramics Department
Piscataway, NJ 08855-0909 U.S.A.
edisonjam@aol.com

Editors:

Norberto Masciocchi
Dipartimento di Scienze Chimiche
Fisiche e Matematiche
Università dell'Insubria
via Valleggio 11
22100 Como, Italy
norbert@fis.unico.it

Jaroslav Fiala
SKODA Research Ltd.
31600 Plzeň, Czech Republic
jaroslav.fiala@vsb.cz

Brian H. O'Connor
Curtin University
GPO Box U 1987, Perth 6001
Western Australia, Australia
toconnorb@cc.curtin.edu.au

Hideo Toraya
Ceramics Research Lab
Nagoya Institute of Technology
Asahigaoka, Tajimi 507 Japan
toraya@crl.nitech.ac.jp

José Miguel Delgado
Universidad de Los Andes
Facultad de Ciencias
Departamento de Química
Laboratorio Nacional de Difracción de Rayos-X
Mérida 5101, Venezuela
miguel@ciens.ula.ve

International Reports Editor

Winnie Wong-Ng
National Institute of Standards and Technology
100 Bureau Drive Stop 8520
Gaithersburg, MD 20899-8520 U.S.A.
winnie.wong-ng@nist.gov

On the cover: Dr. Deane K. Smith and the isometric drawing of the uranyl silicate sheet. Used with permission from the Mineralogical Society of America. Smith, Jr., Deane K., Gruner, John W., and Lipscomb, William N. (1957). "The Crystal Structure of Uranophane $[\text{Ca}(\text{H}_3\text{O})_2(\text{UO}_2)_2(\text{SiO}_4)_2 \cdot 3\text{H}_2\text{O}]$," *American Mineralogist* **42**, 594–618.

AIP Production

Doug Parker, *Team Manager*
Thomas Thrash, *Team Coordinator*
Kelly Quigley, *Chief Production Editor*

Powder Diffraction is a quarterly journal published by the JCPDS-International Centre for Diffraction Data through the American Institute of Physics (AIP). *Powder Diffraction* is a journal of practical technique, publishing articles relating to the widest range of application—from materials analysis to epitaxial growth of thin films and to the latest advances in software. Although practice will be emphasized, theory will not be neglected, especially as its discussion will relate to better understanding of technique.

Submit manuscripts (3 copies) to the most appropriate *Powder Diffraction* Editor listed on this page. The Editors will consider all manuscripts received, but assume no responsibility regarding them. Materials will be returned only when accompanied by appropriate postage. There is no publication charge. See *Powder Diffraction Notes for Authors* for additional information.

Proofs and all correspondence concerning papers in the process of publication should be addressed to: Editorial Supervisor, *Powder Diffraction*, AIP, Suite 1NO1, 2 Huntington Quadrangle, Melville, NY 11747-4502.

For advertising rates and schedules contact AIP Advertising Department. Orders, advertising copy, and offset negatives should be sent to: Advertising Department, American Institute of Physics, Suite 1NO1, 2 Huntington Quadrangle, Melville, NY 11747-4502; phone: (516) 576-2440; fax: (516) 576-2481.

Subscription Prices 2001

	Print & Online	Print	Online
Individual (U.S. & Canada)	\$70	\$60	\$60
Individual (outside U.S. & Canada)	\$100	\$85	\$60
Institutional or Library	\$120	\$105	\$90

Subscription rates to Eastern Hemisphere include air freight service.

Back-Number Prices. 2001 single copies: \$30. Prior to 2001 single copies: \$30.

Subscription, renewals, and address changes should be addressed to *AIP Circulation and Fulfillment Division (CFD)*, Suite 1NO1, 2 Huntington Quadrangle, Melville, NY 11747-4502. Allow at least six weeks advance notice. For address changes please send both old and new addresses and, if possible, include a mailing label from the wrapper of a recent issue.

Claims, Single Copy Replacement and Back Volumes: Missing issue requests will be honored only if received within six months of publication date (nine months for Australia and Asia). Single copies of a journal may be ordered and back volumes are available in print or microform. Individual subscribers please contact AIP Circulation and Fulfillment Division (CFD) at (516) 576-2288; (800) 344-6901. Institutional or library subscribers please contact AIP Subscriber Services at (516) 576-2270; (800) 344-6902.

Reprint Billing: Contact: AIP Circulation and Fulfillment Division, Melville, NY 11747-4502; (516) 576-2230; (800) 344-6909.

Copying: Single copies of individual articles may be made for private use or research. Authorization is given (as indicated by the Item Fee Code for this publication) to copy articles beyond the use permitted by Sections 107 and 108 of the U.S. Copyright Law, provided the copying fee of \$18 per copy per article is paid to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, USA. Persons desiring to photocopy materials for classroom use should contact the CCC Academic Permissions Service. The Item Fee Code for this publication is 0885-7156/2001 \$18.00.

Authorization does not extend to systematic or multiple reproduction, to copying for promotional purposes, to electronic storage or distribution, or to republication in any form. In all such cases, specific written permission from AIP must be obtained.

Permission for Other Use: Permission is granted to quote from the journal with the customary acknowledgment of the source. To reprint a figure, table, or other excerpt requires the consent of one of the authors and notification to AIP.

Requests for Permission: Address requests to AIP Office of Rights and Permissions, Suite 1NO1, 2 Huntington Quadrangle, Melville, NY 11747-4502; Fax: 516-576-2450; Telephone: 516-576-2268; E-mail: rights@aip.org.

Document Delivery: Copies of journal articles can be ordered for online delivery from DocumentStore, AIP's online document delivery service (<http://ojps.aip.org/documentstore/>).

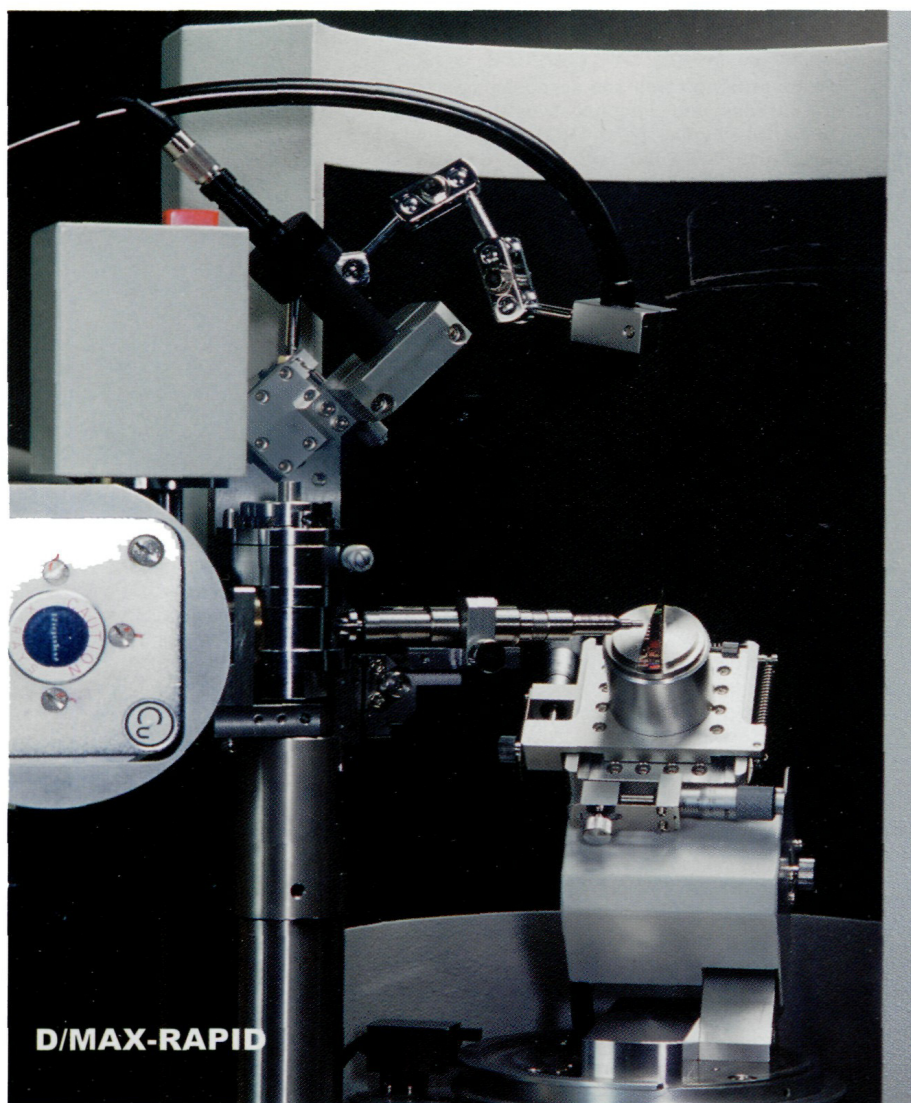
Reprints: Reprints can be ordered with or without covers only in multiples of 50 (with a minimum of 100 in each category) from AIP, Circulation & Fulfillment/Reprints, Suite 1NO1, 2 Huntington Quadrangle, Melville, NY 11747-4502; Fax: 516-349-9704; Telephone: 800-344-6909 (in U.S. and Canada), or 516-576-2234.

Powder Diffraction (ISSN: 0885-7156) is published quarterly (4X annually) by the JCPDS-International Centre for Diffraction Data through the American Institute of Physics. 2001 Subscription rates: US\$105. POSTMASTER: Send address changes to *Powder Diffraction*, AIP Circulation & Fulfillment Division, Suite 1NO1, 2 Huntington Quadrangle, Melville, NY 11747-4502. Periodicals postage paid at Huntington Station, NY 11746, and additional mailing offices.

Online Availability: Abstracts of journal articles published by the AIP and Member Societies (and several other physics publishers) are available from AIP's SPIN database, via AIP's Online Journal Publishing Service (OJPS) (<http://ojps.aip.org>).

Copyright © 2001 JCPDS-International Centre for Diffraction Data, 12 Campus Blvd., Newtown Square, PA 19073-3273. All rights reserved.
www.icdd.com/products/journals.htm

0-160 *in 12 seconds..!*



High-sensitivity **High-resolution** **Curved Image Plate** **Microdiffraction System**

Rigaku/MSM presents another technological breakthrough with the D/MAX-RAPID microdiffraction system. The D/MAX-RAPID's curved image plate technology offers higher sensitivity, higher resolution, higher speed and larger area mapping compared to traditional multiwire and CCD technology.

In reflection mode, a 0-160° 2 θ scan obtained with an average azimuthal angle of 30° can be collected **in 12 seconds** with an optional ultraX rotating anode. The D/MAX-RAPID covers large areas of the Debye cones with its 465mm by 256mm image plate.

The system can be used with Cu, Mo, Cr, or Co X-ray sources and can be configured with either sealed tube X-ray generators or with the Rigaku ultraX 18kW rotating anode generator. With a high-dynamic range of 1 x 10⁶, the D/MAX-RAPID overcomes the limitations of other 2-D detectors.

Advanced features of the D/MAX-RAPID include:

- Fast phase identification
- Polymer and fiber diffraction
- Texture and orientation
- Percent crystallinity
- Crystallite size
- Microdiffraction
- Selected-area diffraction (Diffraction-function mapping)
- Stress
- Forensics
- Inclusions
- High-pressure diamond anvil studies
- Single crystal diffraction (with optional single crystal software/hardware package)

Rigaku
MSC

9009 New Trails Drive
The Woodlands, Texas 77381 USA
Tel: (281) 363-1033
Fax: (281) 364-3628
E-mail: info@rigaku.com
www.rigaku.com

EDITORIAL

- | | | |
|--|--|-----|
| Ting C. Huang | Professor Deane K. Smith and the journal <i>Powder Diffraction</i> | 179 |
| Camden R. Hubbard, Ron Jenkins, and Robert L. Snyder | Obituary—Deane K. Smith | 179 |

REPRINTS

- | | | |
|---|--|-----|
| Deane K. Smith, Gerald G. Johnson, Jr., and Clayton O. Ruud | Clay mineral analysis by automated powder diffraction analysis using the whole diffraction pattern | 181 |
| Deane K. Smith | Particle statistics and whole-pattern methods in quantitative X-ray powder diffraction analysis | 186 |

TECHNICAL ARTICLES

- | | | |
|--|---|-----|
| Deane K. Smith | Review of questionnaire to AIHA accredited laboratories for the analysis of silica | 192 |
| C. K. Lowe-Ma, W. T. Donlon, and W. E. Dowling | Comments on determining X-ray diffraction-based volume fractions of retained austenite in steels | 198 |
| S. N. Tripathi, R. Mishra, M. D. Mathews, and P. N. Namboodiri | X-ray powder diffraction investigation of new high temperature polymorphs of CaTeO_3 and CaTe_2O_5 | 205 |
| X. S. Wu, F. Z. Wang, and S. S. Jiang | Structure determination and Rietveld refinement of $\text{Y}_{0.8}\text{Ca}_{0.2}\text{Ba}_{1.8}\text{La}_{0.2}\text{Cu}_3\text{O}_y$ | 212 |

NEW DIFFRACTION DATA

- | | | |
|--|--|-----|
| Paolo Ballirano, Adriana Maras | Improved powder X-ray data for cancrinites IV: Franzinite | 216 |
| Hrudananda Jena, R. Asuvathraman, M. V. Krishnaiah, and K. V. Govindan Kutty | X-ray powder diffraction of $\text{RE}_6\text{UO}_{12}$ (RE=Eu, Gd, and Dy) | 220 |
| G. Vanhoyland, M. K. Van Bael, J. Mullens, and L. C. Van Poucke | Structure determination of anhydrous acid strontium oxalate by conventional X-ray powder diffraction | 224 |
| S. A. Ivanov, R. Tellgren, H. Rundlöf, and V. G. Orlov | Structural studies of $\alpha\text{-Bi}_2\text{O}_3$ by neutron powder diffraction | 227 |
| Yu PuLan, Ding Shuang, Qiao Yuan Yuan, Yao XinKan, Zhang HaiYue, and Lin ShaoFan | X-ray powder diffraction studies of multipyrazole series compounds | 231 |

INTERNATIONAL REPORTS

- | | |
|--|-----|
| Regional Reports | 236 |
| Calendar of Meetings | 237 |
| Short Courses & Workshops | 240 |
| Index to Volume 16 | |
| PACS® Headings Used in the Present Index | 242 |
| Subject Index to Volume 16 | 243 |
| Author Index to Volume 16 | 247 |



X-Ray

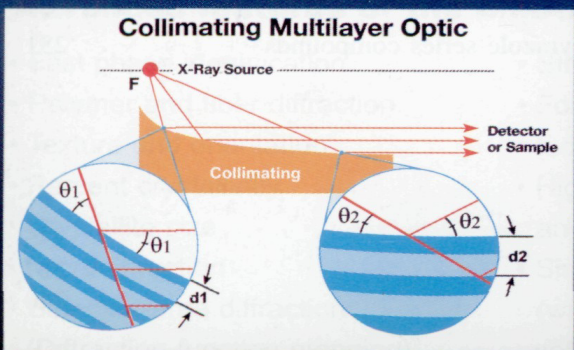
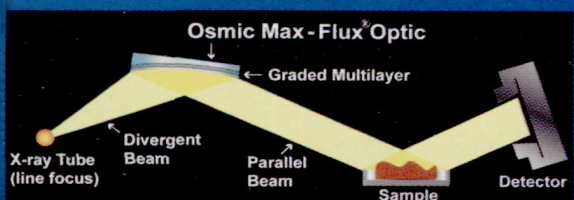
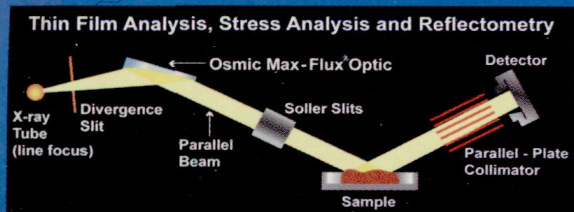
Diffraction

Max-Flux[®] Optic Retrofit

Improve Your Existing Diffractometer

- Higher flux
- Easy alignment
- Suppressed $K\beta$
- Lower background
- Lower beam divergence
- Monochromatizes the beam
- Measure irregular shaped samples
- Reduce sample displacement errors

Some Applications Using Max-Flux[®] Optics



Focusing optics also available



Model (PS60)

- The Max-Flux[®] solution retrofits to any commercial X-ray diffractometer (**Phillips, Bruker, Scintag, Rigaku, etc.**)
- Available for **Cu, Cr, Co, Mo, Ti, and W-L β** radiation

Applications:

- High Resolution X-ray Diffraction
- Stress/Strain Measurement
- Thin Film Analysis
- Texture Analysis
- Reflectometry
- Phase Analysis



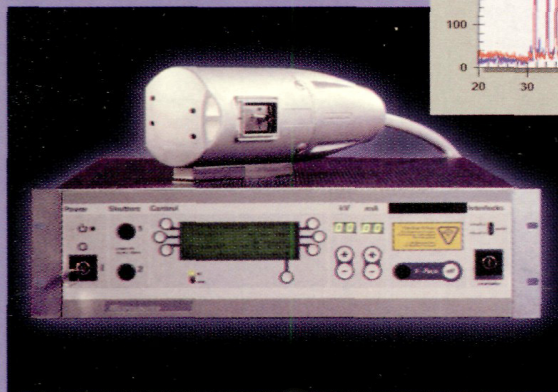
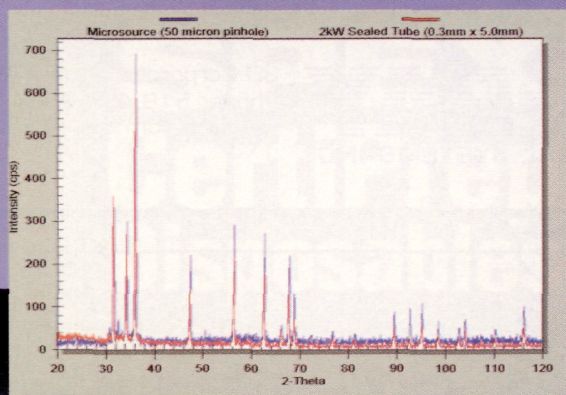
a **Rigaku** company

www.osmic.com

working in partnership with you

to deliver **solutions**
in **powder diffraction**

The Natural History Museum, London, UK, have been evaluating the Microsource[®] X-ray generator for micro diffraction – the ability to examine small powder samples and small regions within a larger sample.



Zinc Oxide powder standard was examined in reflection geometry using both the Microsource[®] running at 80W, and a standard sealed tube running at 2kW. The Microsource[®] beam was directed through a 50µm pinhole, giving a beam of cross-section of only 0.002mm². The 2kW sealed tube X-ray output was collimated by slits 0.3x5mm giving a beam cross section of 1.5mm².

As can be seen in the above graph, comparing the intensities and irradiated areas in the two cases shows that the Microsource[®] is over 1000 times brighter than the sealed tube source.

Bright collimated source for demanding applications in powder diffraction.

Examples include:-

- microdiffraction
- sample mapping
- mineralogy
- corrosion science
- forensic science
- high temperatures
- high pressures
- real time monitoring
- **your experiment**

The Microsource[®] is available as an upgrade to existing diffractometers.

Bede plc comprises:

- bede scientific instruments ltd
- microsource division
- bede scientific incorporated
- reflex sro

contact Graham Fraser

contact Keith Bowen

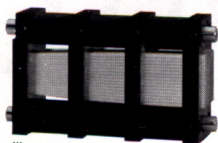
solutions
partnership
expertise

microsource^{plc} division

Bede Scientific Instruments Ltd
Bowburn South Ind. Est. Bowburn Co Durham DH6 5AD UK
T +44 (0)191 377 2476 F +44 (0)191 377 9952
E microsource@bede.co.uk W www.bede.co.uk

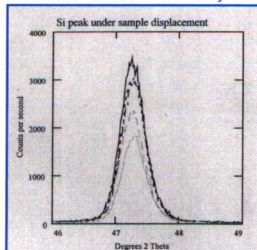
Bede Scientific Incorporated 14 Inverness Drive East
Suite H-100 Englewood CO 80112 USA
T +1 (303)790 8647 F +1 (303)790 8648
E sales@bede.com W www.bede.com

Enhance instrument **PERFORMANCE** with X-ray collimating lenses for parallel beam powder diffraction from **X-RAY OPTICAL SYSTEMS.**



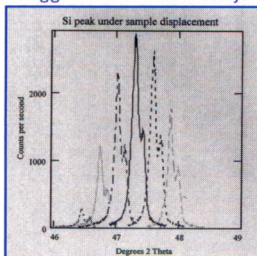
x-ray collimator
(10x10 mm² output beam)
©XOS 1996

Parallel Beam Geometry



— 0mm
- - 2mm
- - 4mm
- - 2mm
- - 4mm

Bragg-Brentano Geometry



— 0mm
- - 1mm
- - 2mm
- - 1mm
- - 2mm
- - 3mm

Outstanding Performance in **Stress and Texture Applications**

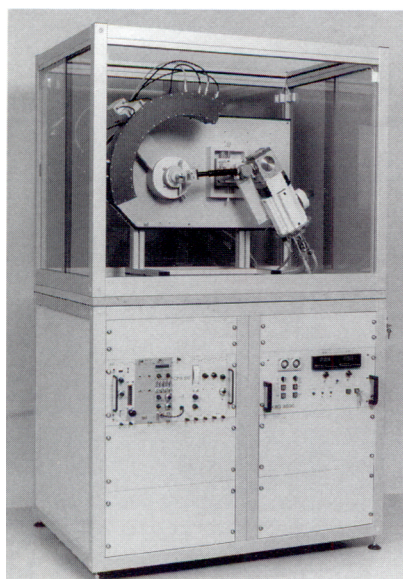
Elimination of all defocusing errors	No sample preparation needed
Large beam size	Improved particle statistics
Intensity gain up to 40 X	Improved counting statistics
2-D collimated quasi parallel beam	Increased orientation statistics
Constant peak profile and width over whole 2θ range	Ideally suited for industrial applications and full pattern analysis

Also available, X-ray focusing lenses for Micro X-Ray Fluorescence.
Call J.Phillip Bly, Sales and Application Engineer today.



30 Corporate Circle • Albany, NY 12203
Phone: 518.464.3334 • Fax: 518.464.3335
www.xos.com • email: info@xos.com

inel REAL TIME XRD



MPD Multi-Purpose X-ray
Diffractometer

Versatile diffractometers designed to take advantage of the rapid, real time data collection our patented CPS X-ray detectors offer.

- *No scanning feature - acquire up to 120° 2θ simultaneously
 - Unique capillary devices for analysis of air sensitive materials
 - Identify materials even if only micro amounts are available
 - Parallel beam with Ge monochromator or Max-Flux®* mirror optics
- *Max-Flux is a registered trademark of Osmic, Inc.

for information on our complete product line please contact us

inel - Z.A - CD 405 - 45410 ARTENAY (FRANCE)

Tel. (33) 0 2 38 80 45 45 Fax. (33) 0 2 38 80 08 14

E.MAIL: inel@valcofim.fr-INTERNET: http://www.valcofim.fr/inel

inel Inc. P.O. Box 147, STRATHAM, NH 03885 (USA)

TEL. (603) 778-9161 FAX. (603) 778-9171

E-MAIL: inelinc@aol.com

The Most Important Materials In XRF Spectroscopy...Next To Your Samples

Binder & Grinding Aid

Roll Film

Plastic Vials & Balls

Pellet Caps

XRF Sample Cups

Pre-Cleaned Bottles

Pre-Cut Film

Fusion Flux

SPEX CertiPrep Disposables

For accurate and uniform analytical results, you need reliable and consistent sample preparation. SPEX CertiPrep has been supplying XRF spectroscopists with quality sample preparation and handling products for over forty years.

Whether you press powders in dies or fuse them into glass discs, or if you use sample cells to run liquids, powders, pastes, or other materials, we have the supplies and equipment to get the job done. We can help you choose the proper binder, grinding aid, or borate flux for your particular sample. SPEX CertiPrep also provides the most complete line of mills, presses, dies, and fusion fluxers.

Our commitment to Total Customer Satisfaction means: "Serving our customers promptly and courteously, with unsurpassed technical and

applications support, and top quality, reliable SPEX CertiPrep products." Call, FAX, or e-mail for your copy of our catalog, *The Handbook of Sample Preparation and Handling*. **1 800 LAB-SPEX**

SPEX
CertiPrep

203 Norcross Avenue ■ Metuchen, NJ 08840 USA ■ 732-549-7144
Fax 732-603-9647 ■ SamplePrep@spexcsp.com ■ <http://www.spexcsp.com>

2002 ICDD X-ray Clinics

Sharpen your analysis skills and enhance lab performance with...

- ❖ basic theory
- ❖ valuable reference materials
- ❖ tricks of the trade from experts
- ❖ shared experiences of peers in the field
- ❖ and much more!



Digital Imagery copyright 2000 PhotoDisc, Inc.

Practical X-ray Fluorescence Spectrometry

29 April – 3 May 2002

X-ray Powder Diffraction

Fundamentals: 3–7 June 2002
Advanced: 10–14 June 2002

Register today online at

WWW.ICDD.COM

International Centre for Diffraction Data

12 Campus Boulevard, Newtown Square, PA 19073-3273 U.S.A.

Tel: + 610.325.9814

❖ Fax: + 610.325.9823



E-mail: clinics@icdd.com

❖ Web: www.icdd.com

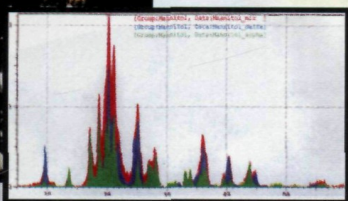
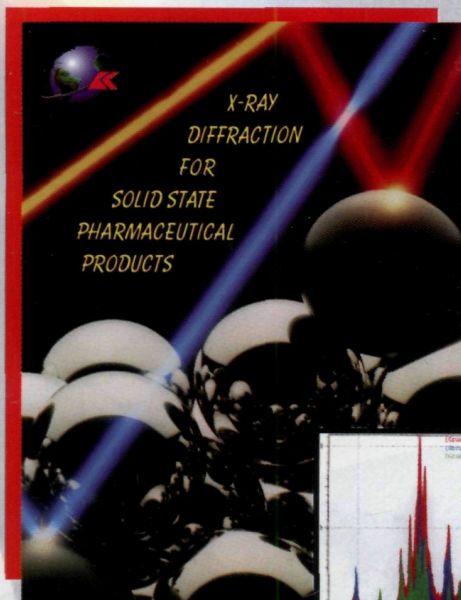
Expand your x-ray diffraction capabilities — not your overhead.

Whether you just need services or your XRD lab is on "overload," IC Laboratories provides every testing service and advanced capability you need in qualitative or quantitative x-ray diffraction analysis — from austenite to zeolites, from air filters to thin films. You are assured of rapid turn-around of results — as little as 48 hours — because IC Labs is one of the most highly automated commercial labs in the U.S., with knowledgeable personnel ready to address all your applications. For a copy of our technical prospectus, contact IC Laboratories.

IC Laboratories

Post Office Box 721
Amawalk, New York 10501
(914) 962-2477 www.ICLABS.com

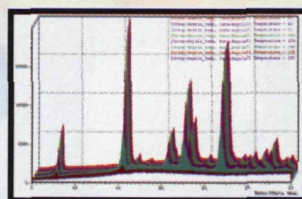
We're the Specialists in XRD



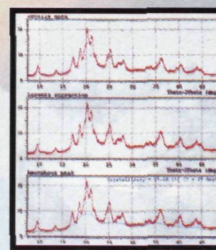
PHASE ANALYSIS
65/45 MIX OF ALPHA & DELTA
POLYMORPHS OF MANNITOL



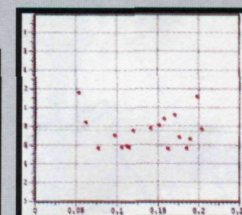
Kratos/Shimadzu XRD-6000



NON-AMBIENT STUDY
ASPIRIN OVER A TEMPERATURE
RANGE OF 40°C - 180°C STEPS



PERCENT CRYSTALLINITY
CALCULATED BY TOTAL
PATTERN FITTING



FULL PATTERN HALL METHOD
SHOWING VARIATION OF
CRYSTAL SIZE

X-Ray Diffraction is a unique analytical tool for solid state pharmaceutical products to unambiguously characterize their solid state nature. Many parameters required by the FDA, legal patent issues and drug performance are only accessible by utilizing X-Ray Diffraction.

X-Ray Diffraction is a direct result of crystal structures being present in the pharmaceutical under study. As such, the parameters typically associated with crystal structure can be simply assessed. For example, once an active drug has been isolated, an indexed X-Ray powder diffraction pattern is required to secure a patent and protect a company's investment. Additionally, analysis of the drug under most environmental conditions reveals the formation of any polymorphs which could adversely effect the drug's performance and toxicity.

With the introduction of new systems specifically designed for the pharmaceutical industry, Kratos and Shimadzu have made X-Ray Diffraction cost effective and easy to use.

**XRD-6000 Designed for
Pharmaceutical Research**

- ◆ Polymorph Screening
- ◆ Percentage Crystallinity
- ◆ Morphology
- ◆ Crystal Structure Analysis
- ◆ Excipient Quantification
- ◆ Non-Ambient & Humidity Variation

Call or Write Today for More Information:



Kratos Analytical, Inc.

Phone: (914)426-6700

E-Mail: info@kratos.com

Internet: <http://www.kratos.com>

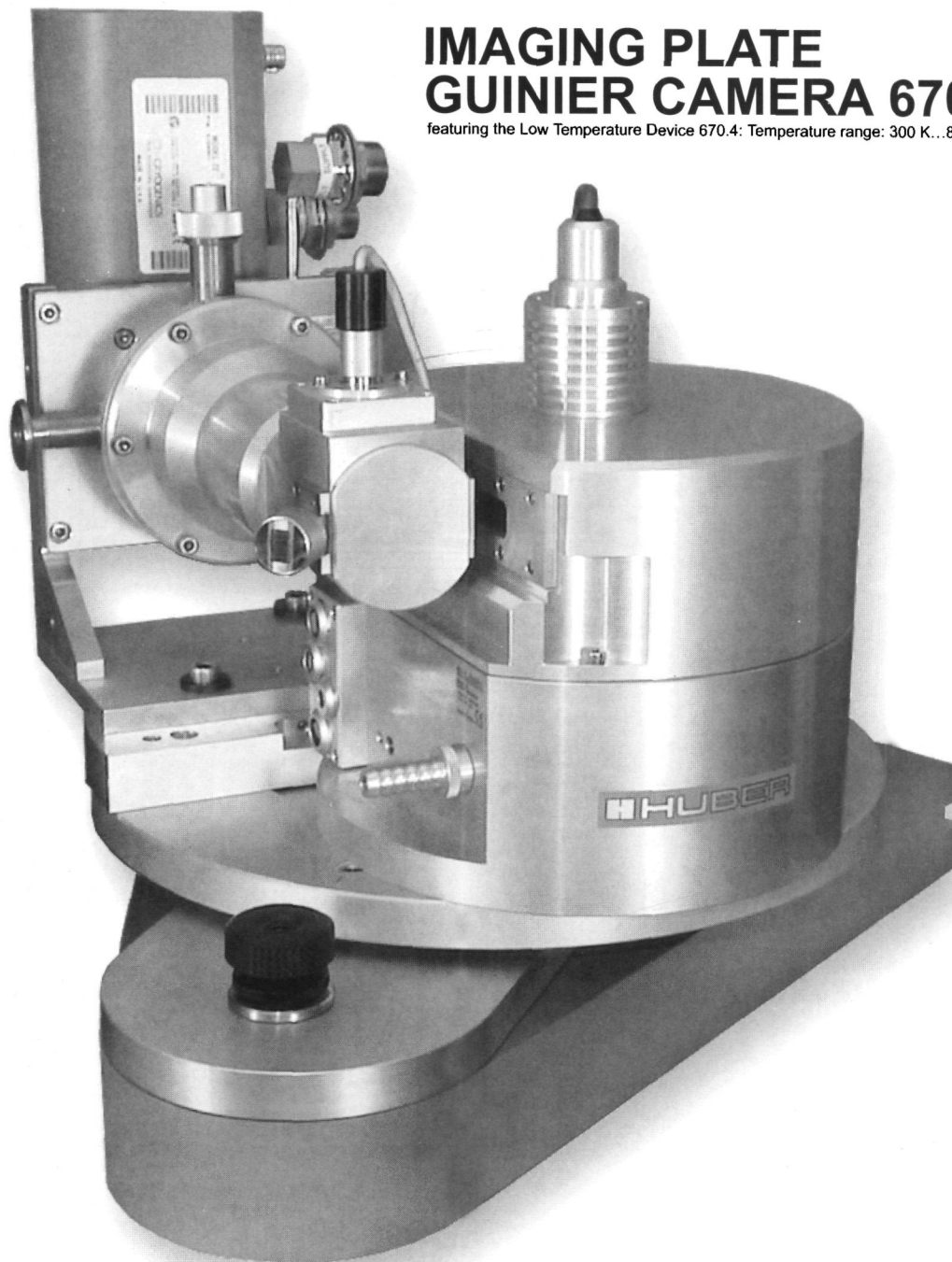
**Call Today to Request Your Copy of
X-Ray Diffraction for
Solid State Pharmaceutical Products**

SPEED

IN POWDER DIFFRACTION

IMAGING PLATE GUINIER CAMERA 670*

featuring the Low Temperature Device 670.4: Temperature range: 300 K...8 K



* FAST, FLEXIBLE & FREE OF $K\alpha_2$

HUBER
X-RAY DIFFRACTION EQUIPMENT

HUBER Diffraktionstechnik GmbH
Sommerstrasse 4
D-83253 Rimsting
Germany

Tel.: +49 (0) 80 51 - 68 78 - 0
Fax: +49 (0) 80 51 - 68 78 - 10
e-Mail: info@xhuber.com
URL: www.xhuber.com

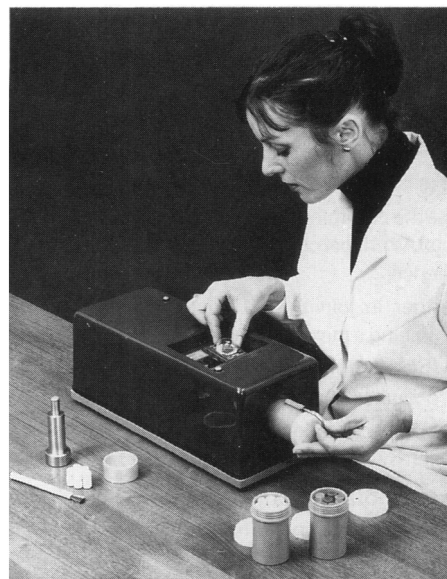
**X-ray
Diffraction
Reference Standards
and Zero-background
Sample Plates
Custom Designed
and Built for any
Application**

Your first step to improved x-ray diffraction results should be to contact The Gem Dugout for quality diffraction alignment standards and zero-background plates. And the next step is successful x-ray diffraction results.

The Gem Dugout
1652 Princeton Drive
State College, PA 16803
(814) 238-4069



**Rapid particle size reduction
for XRD, XRF and IR**



MCCRONE MICRONISING MILL

- Reproducible mean particle size - narrow distribution
- Unique grinding action (not a ball mill)
- Wet grinding minimises damage to sample crystallinity
- Choice of grinding elements (agate or corundum)

McCrone Scientific Ltd.

McCrone House, 155A Leighton Rd.
London NW5 2RD. U.K.

tel: 020 7267 7199 fax: 020 7267 3383

e-mail: saramark@mccronescientific.sagehost.co.uk

USA Distributor:

McCrone Accessories & Components

850 Pasquinelli Drive

Westmont, Illinois 60559-5531

phone: 630 887 7100 fax: 630 887 7764

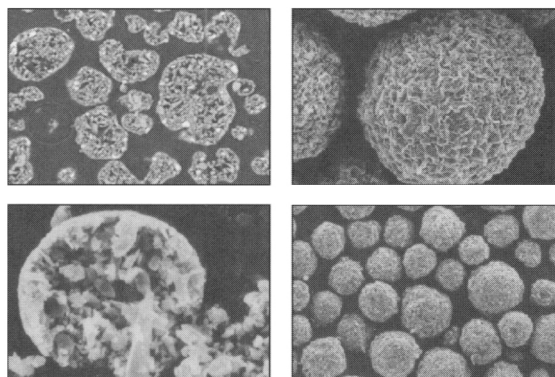
e-mail: MAC@mccrone.com

**Prefer to eliminate
orientation?**

**Try the Macaulay
Spray Drying Kit**

Find us at

www.mluri.sari.ac.uk/newcommercialservices/spray



Images of spray dried materials



MACAULAY
LAND USE
RESEARCH
INSTITUTE

Craigiebuckler, Aberdeen, AB15 8QH Tel: +44 (0) 1224 498200
Fax: +44 (0) 1224 311556 email: enq@mluri.sari.ac.uk

Get specialty beryllium prototypes with production processing in mind.

Driven to perform? Come to us. We'll put the metal to the metal.

When your production schedule is short, you want to get it done right the first time. You can eliminate a major uncertainty when you entrust your custom beryllium fabrication, joining and coating to us. We'll help you shine.

Here's what we can do for you:

- Depend on us as the only fully integrated source for beryllium sheet and foil products. All critical operations are performed in-house for seamless excellence.
- We're your partner in joining and coating metals. When your project involves joining a metal to a metal, you can count on us.
- Come to us for all your UHV beryllium product needs: x-ray windows, chambers, beam pipes and more.
- Rely on our expert engineering. We like challenges. Taking your design concept into reality would be our pleasure.

Count on us for your tough jobs. Keep in mind that we're the only fully integrated source for beryllium products for the analytical, medical, and scientific industries. Challenge us with your "cutting edge" requirements. We look forward to hearing from you.

TEL: 510-623-1500 • FAX: 510-623-7600

E-Mail: Electrofusion@BrushWellman.com

44036 South Grimmer Boulevard • Fremont, California 94538 • USA



BRUSHWELLMAN

ELECTROFUSION PRODUCTS

We're the beryllium window folks.

ADM V6

ADM is one of the most common modular software packages for powder diffraction. The completely new designed 32bit base module with more, new and unique features is available now !

Single Scan Processing

- ✓ Measuring curve and result table are shown side by side and simultaneously.
- ✓ Multiple methods for exact determination of peak position and intensities.
- ✓ Effective and user friendly correction tools for background, peak position and intensities.
- ✓ Instant recalculation with simultaneous graphical and textural feedback if one of the parameter is changed.

Multi Scan Processing

- ✓ 2D graphs
- ✓ 3D graphs

New and Unique

- 2 θ /I sections through an arbitrary number of scans to analyze the
- ✗ thermodynamics of chemical reactions and phase transitions.
 - ✗ kinetics of transformation processes.
 - ✗ variation of certain sample properties.

Conversions

- ✓ $K\alpha_2$ - stripping,
- ✓ ADS/FDS conversion,
- ✓ Combined intensities/diffractograms from an arbitrary number of scans,
- ✓ Subtraction diffractograms.

a.wassermann

röntgenanalytik • meßsysteme • software

P.O. 2631, D-87416 Kempten, Germany, Tel. +49 831 79515, FAX +49 831 79930, Email: info@RMSKempten.de, www.RMSKempten.de