AXAA e-newsletter

Issue 1, 2015 **Australian X-ray Analytical Association**

President's Address

Dear AXAA Members and Friends,

After a few months of relative calm following AXAA-2014, the National Council is now ramping up its efforts in securing fantastic venues for the next instalment of our National Conference, AXAA-2017. As announced in the final Newsletter of 2014, Melbourne has been selected as the host city for AXAA-2017, and in the coming weeks the National Council will be visiting a number of candidate venues in order to find a great combination for AXAA. We'll keep you posted as to where and when AXAA-2017 will be held.

Focusing back on AXAA-2014 for a moment, we are extremely excited that the special AXAA-2014 Conference Proceedings issue of Powder Diffraction Journal is available online. We anticipate that this exciting publishing opportunity will also be offered for participants at AXAA-2017, and we encourage everyone to keep this in mind in the lead-up to our next conference in order to make our Conference Proceedings even bigger and better than the AXAA-2014 issue.

As an attendee at the 2014 Australian Synchrotron User Meeting I was pleased with the exposure that AXAA received as a Bronze Sponsor of that event. In an effort to continue to increase AXAA's visibility, especially to students and early-career researchers and analysts, we will be sponsoring the poster session at the 2nd Asia-Oceania Conference on Neutron Scattering (AOCNS 2015) to be held from 19-23 July at the Novatel Manly Pacific in Sydney.

We have also recently established a link with the National Committee for Materials Science and Engineering (NCMSE), which is a committee of the Australian Academy of Science with the broad aim of serving as a link between the Academy and materials scientists and engineers both in Australia and internationally. From time to time we will circulate information about the activities of NCMSE, as well as other international and national materials science and engineering issues and events.

Finally, the National Council met recently and it is my great pleasure to let you know that Ian Madsen, a long-time AXAA Member, a former AXAA President, the winner of the inaugural Bob Cheary Award for Excellence in X-ray Diffraction Analysis, and mentor to many in the X-ray analysis community all over the globe, was elected as a Life Member of AXAA in appreciation and recognition of his contributions over a career spanning 46 years. A more extensive article will follow in a subsequent Newsletter but for now, congratulations (and thank-you) Ian!

Nathan Webster
AXAA President

Matters for Scatterers: Electric field and stress induced phase transformations in polycrystalline $BaTiO_3$

In situ high-energy synchrotron X-ray diffraction measurements were recently performed at the European Synchrotron Radiation Facility (ESRF) to investigate the effect of electrical and mechanical fields on the phase transformation behaviours in a prototypical ferroelectric material $BaTiO_3$ at various temperatures above the Curie point (T_C) [1,2]. Diffraction patterns with the scattering vector aligned from parallel to perpendicular to the applied field direction were collected simultaneously during application of unipolar electric fields and uniaxial compressive stresses using a large area flat panel detector. Figure 1 shows a typical dataset collected at zero and 400 MPa stress at T_C + 1 °C, demonstrating the ability of the technique used to observe the field-induced structural change. The results clearly show the transformations from the high temperature cubic paraelectric/ paraelastic phase to a ferroelectric/ ferroelastic tetragonal phase induced by the electric field and compressive stress.

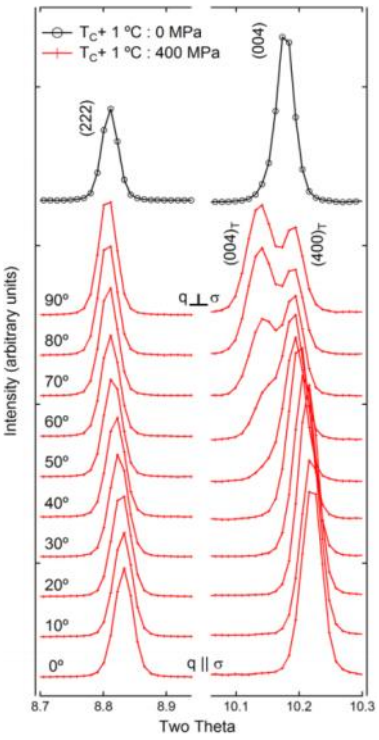

Figure 1: Representative diffraction peaks of $BaTiO_3$ at T_C + 1 °C. (top, black) Paraelectric cubic 222 and 400 diffraction peaks at zero stress. (lower, red) Ferroelectric tetragonal 222 and 004/400 peaks at 400 MPa as a function of scattering vector (q) angle to the applied load (σ).

Figure 2 shows a representative and more informative *in situ* observation result during electrical loading at various temperatures above T_C. We reveal from these observations that, in both electrical and mechanical cases, the nature of the observed transitions was influenced by the proximity of the temperature to T_C. With increasing temperature above T_C, the transition electric field and stress both increased while the rate of the transitions tended to decrease. Through texture analysis we were also able to evaluate the domain texture development behaviour in the induced phase.

This work provides insights into the general paraelectric/paraelastic to ferroelectric/ferroelastic phase transition behaviours and has important implications for the future development of high-strain lead-free electromechanical materials. Moreover, the obtained knowledge on the electric-field- and stress-induced phase changes is essential for understanding the electro- and mechano-caloric behaviours which have extensive applications in solid state refrigeration technologies.

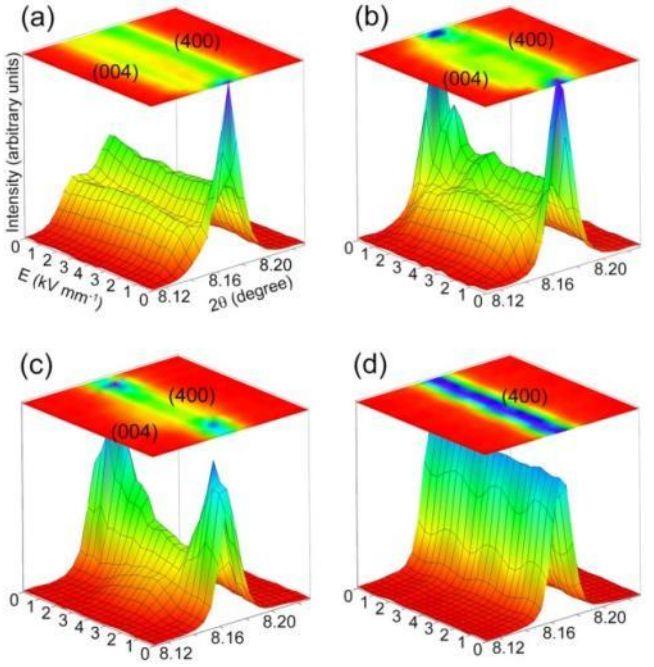

Figure 2: Representative diffracted intensities of the 004 and 400 peaks of $BaTiO_3$ during application of a triangular electric field waveform at (a) T_C + 1, (b) T_C + 2, (c) T_C + 4, and (d) T_C + 5 °C. Here, the scattering vector is parallel to the applied electric field vector.

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[1]School of Materials Science and Engineering, UNSW
[2]Powder diffraction beamline, Australian Synchrotron

[1] Daniels JE *et al.*, *Appl. Phys. Lett.*, 2013;**103**;122902.
[2] Wang Z *et al.*, *Appl. Phys. Lett.*, 2014;**105**(16);161903.

Microdiffraction Seminar

AXT recently finished installing a Rigaku DMAX Rapid II Microdiffractometer in a brand new, purpose designed laboratory at the Mawson Institute at the University of South Australia. To coincide with the installation, a seminar was held on November 27 2014 to showcase the benefits and applications of microdiffraction. Interest in the seminar was excellent with 46 attendees including people flying in from Sydney and Melbourne. The audience comprised academics, students and members of industry.

The system that was installed at the Mawson Institute is a dual wavelength microdiffractometer with a high powered rotating anode X-ray source. This RAPID II was particularly significant as it is the first in the world to combine copper and cobalt radiation sources. While copper is the most popular anode material choice for most applications, the Mawson Institute elected to use this in conjunction with cobalt for the analysis of iron-rich minerals, which tend to fluoresce under copper radiation.

Rigaku flew in Keigo Nagao, one of their applications scientists with expertise in microdiffraction from the XRD Analysis Group at the Rigaku Applications Laboratory in Tokyo, to present the seminar.

Prof. Andrea Gerson from the Mawson Institute introducing Keigo Nagao from Rigaku

Nagao-san explained how microdiffraction is able to analyse areas down to 20 µm in diameter compared to several millimetres for conventional systems allowing it to be used to identify impurities and inclusions by zeroing in on them. Using conventional XRD these may even be undetectable due to their relatively small volume. Samples surfaces can be mapped to show compositional variations across their surface and where impurity phases exist. He also showed the differences in hardware including the 2-dimensional imaging plate detector which provides increased sensitivity and simultaneous detection across the entire angular range compared to more conventional detectors.

Another key feature that was discussed was the rotating anode X-ray generator, a development pioneered and refined by Rigaku over the last 40 years. This provides a high X-ray flux which translates to faster analysis time and the ability to accurately resolve minor amounts of material. Furthermore, in combination with the small spot size, background noise is also minimised allowing minor phases to be more easily identified.

To illustrate the applications of microdiffractometry Nagao-san used a series of case studies including the analysis of fishing line, polypropylene (relaxed and stretched), changes in grain size as a result of welding, paint flakes, mapping of a printed circuit board, iron phosphate crystals on the surface of a rice root and various residual stress scenarios.

The seminar also included a tour of the lab so people could view the instrument to get a better idea of how it would relate to their work and applications. The tour generated many positive and enthusiastic discussions with attendees who were interested in how microdiffraction could be used to benefit their specific scenarios. In parallel with the tour, attendees were given a presentation on the latest technological advances in X-ray technology from Rigaku, presented by Dr. Nav Dhaliwal, AXT's XRD/XRF Product Manager.

Keigo Nagao and Tomikatsu Kubo from Rigaku, Richard Trett from AXT and Prof. Andrea Gerson from the Mawson Institute (L to R) pictured with the DMAX Rapid II microdiffractometer

If anyone is interested in how microdiffraction may be of relevance to their work, please feel free to contact Prof. Andrea Gerson (andrea.gerson@unisa.edu.au) at the Mawson Institute. AXT would like to thank the Mawson Institute at the University of South Australia, Materials Australia and the Australian Institute of Non-Destructive Testing for their assistance in organising this highly successful event.

Cameron Chai
AXT Pty Ltd

A Highly Versatile X-ray Platform at Monash University

Modern X-ray instruments are often quite specialised, and are dedicated to a single technique such as XRF or XRD. However, over the last 24 months a highly versatile X-ray facility has been constructed in the School of Physics and Astronomy at Monash University, capable of implementing a wide range of analytical and imaging techniques on the one instrument. At the heart of this system is a Rigaku FRE+ Superbright X-ray generator, featuring rotating anode technology. This system is one of the brightest microfocus X-ray sources currently available, providing the smallest focal spot and excellent flux density with outstanding reliability. Furthermore, the FRE+ X-ray generator has two ports that effectively provide two beam lines that are available for simultaneous use. The flexible instrument enclosures attached to the two beamlines allow several different techniques to be implemented.

Beamline 1 (parallel beam)

- Diffractometry (XRD) - Including standard techniques such as powder diffraction, single crystal and stress analysis.
- X-ray reflectivity (XRR) – For thin films interfaces or multilayer characterisation.
- Reciprocal space mapping and ultra-small angle x-ray scattering (USAXS) – For characterisation of micro and nanostructures on surfaces, or dispersed in solution.

Beamline 2 (focused beam)

- X-ray microscopy (XRM) – 1µm resolution x-ray imaging of small samples (2-3 mm thick).
- X-ray micro-CT – Similar to XRM with 3D reconstruction.
- Small and wide-angle scattering (SAXS and WAXS) - For nano-structural characterisation (up to about 20° collection angle).

This variety of techniques allows this system to cater for both biomedical and materials characterisation, two vastly different fields of research.

Case Study 1: Characterisation of nanoparticles by ultra-small angle scattering (USAXS). By using X-ray scattering, the size of the particles can be measured indirectly, providing information about their size, shape and orientation. Ultra-small angle scattering can be measured using the parallel and monochromatic beam available on beamline 1. This system can measure the full reciprocal space map of the scattering with a 2D detector, then extract the quantitative information by averaging. Figure 1 is an example of USAXS from Ag nanoparticles with average diameter of 100 nm.

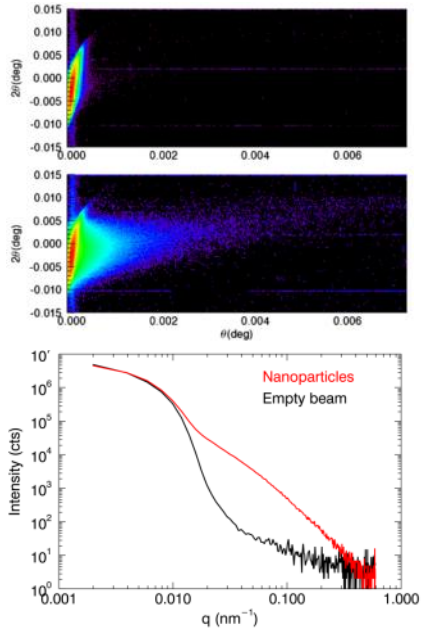

Figure 1: Example of a reciprocal space mapping obtained at beamline 1. Top) Empty beam for normalization. Middle) scattering from gold nanoparticles (100 nm average diameter). Bottom) Ultra-small angle scattering pattern derived from the measurement shown in the middle.

Case Study 2: Multi-contrast imaging and microscopy. The high brilliance of the source enables new and exciting imaging modalities. On the one hand the system can provide scanning transmission and full-field X-ray microscopy with resolution approaching 1 µm. Both attenuation and phase contrast capabilities are available, as shown in Figure 2 (left). On the other hand it is possible to combine traditional analytical techniques such as SAXS or XRF with imaging capabilities. Two examples are shown in the figures below. Figure 2 (right) shows multi-contrast imaging of a fly abdomen where SAXS spatial distribution can be measured across the sample. Figure 3 shows attenuation, refraction and elemental maps of a dry twig, obtained by raster scanning the sample across the micro-beam.

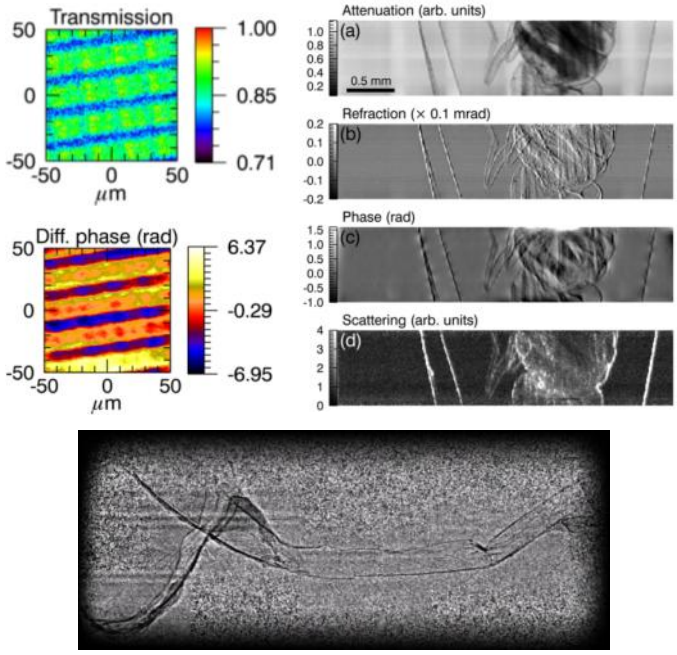

Figure 2: Top left) Scanning transmission and differential phase X-ray microscopy of a TEM grid (1000 lines per inch). Bottom) Full-field projection microscopy of a spider leg. Top right) Multimodal imaging of a fly abdomen. Multiple sources of contrast are detected in a single measurement.

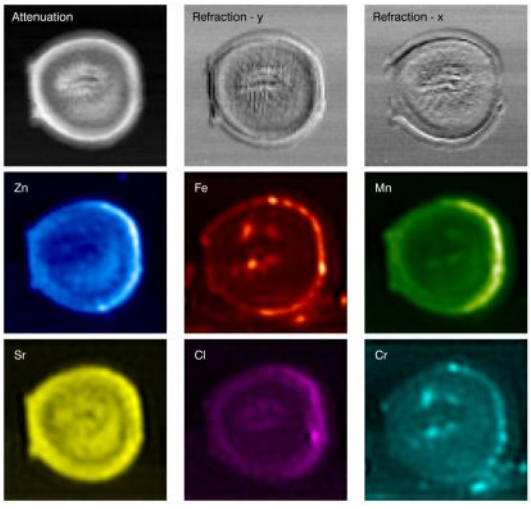

Figure 3: Attenuation, refraction and elemental maps of a dry twig. Image size 4x4 mm^2.

If you think this unique instrument maybe of use to you, please feel free to contact Dr Daniele Pelliccia. His laboratory is available for external users, so don't hesitate to contact him at daniele.pelliccia@monash.edu or at au.linkedin.com/in/danielepelliccia.

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Please visit our website, www.axaa.org, for further information.

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Please email contributions for Issue 1 of the 2015 AXAA Newsletter to Mark Styles by Friday the 7th of August. Any comments or feedback about the Newsletter are welcome.

Upcoming Events

2nd Asia-Oceania Conference on Neutron Scattering

19-23 July 2015
Novotel Sydney Manly Pacific

This conference is aimed at those who use (or would like to use) neutron scattering facilities in the Asia-Oceania region. AOCNS provides an opportunity for researchers to share and discuss their findings as well as the latest developments in neutron scattering techniques. More information can be found on the conference website. AXAA is a proud sponsor of the poster session at AOCNS.

9th Asia Oceania Forum for Synchrotron Radiation Research, and Australian Synchrotron Users Meeting

25-27 November 2015
National Centre for Synchrotron Science, Melbourne

The Australian Synchrotron is proud to host the 9th Asia Oceania Forum for Synchrotron Radiation Research (AOFSRR 2015), in conjunction with User Meeting 2015. The two meetings will share a joint program across three days, on 25-27 November, at the National Centre for Synchrotron Science in Melbourne. AOFSRR 2015 brings together the synchrotron community from across the Asia Oceania Region, enhancing co-operation and collaboration opportunities for the advancement of synchrotron science and technology. Our annual User Meeting will again showcase the best research from the Australian Synchrotron, and update our 5000-strong user community on the latest techniques and application developments. See the website for more information.

X-ray Materials Analysis Internet Courses – Wavelength Dispersive XRF and Powder XRD

Mode of Instruction for XRF and XRD Courses

These internet-delivered courses provide XRF and XRD analysts, particularly those new to x-ray analysis, with on-site and/or at-home instruction on the underlying principles and principal analytical methods. Features of the two courses -

- Start at any time
- Self-paced instruction to accommodate the needs of busy people
- Study materials transmitted as e-mail attachments in the form of a set of modules; with an assignment being set for each module.
- Feedback on the assignments provides excellent mentoring.

The courses have a substantial cohort of international and local participants, and are being used by companies as vehicles for in-house XRF and XRD training.

Courses Director: Dr Brian O'Connor

Internet XRF Course: Series 8, 2015

The Internet XRF Course comprises modules on - XRF Overview; X-ray Excitation of the Specimen; X-ray Dispersion and Detection; XRF Data Measurement; Data Analysis Basics; Methods of Quantitative Analysis; Absorption-Enhancement Corrections; Specimen Preparation; Major Component Analysis Using Fusion Buttons; Trace Element Analysis Using Powders; and Analysis of Sub-Milligram Environmental Samples.

Course fee: $2,850 including GST

Internet XRD Course: Series 3, 2015

The internet XRD Course comprises modules on - XRD Overview; Essential XRD Fundamentals; XRD Measurement Strategies (I); XRD Measurement Strategies (II); Search/Match Identification Analysis (I); Search/Match Identification Analysis (II); Case Studies in Search/Match identification Analysis; Phase Composition Analysis Using Line Intensities; and Introduction to Advanced Methods (indexing, Rietveld phase analysis, structure solution, etc.)

Course fee: $2,850 including GST

Further Information and Enrolment Procedure:

brian_oconnor@iprimus.com.au (Tel 08 9291 7067)

Analytical X-ray Jobs

Technical Support Officer – X-ray Diffraction

Department of Chemical and Biomolecular Engineering
University of Melbourne School of Engineering

The University of Melbourne is currently seeking a technical support officer experienced in X-ray diffraction. The appointee will prepare and run samples for clients, analyse XRD data, prepare short reports, and take responsibility for ensuring the safe operation of the XRD laboratories, including the training of students and researchers, from both within the University and external collaborators. This is a part-time, fixed term position available for 12 months. For more information, please visit the University of Melbourne careers website.

AXAA Membership

All registered participants of the AXAA-2014 conference are automatically granted AXAA membership for 3 years. Alternatively, new memberships can be obtained free of charge, by making an application to the National Council. Candidates should provide their CV and a short statement about how they intend to contribute to the organisation. Please send these to the National Council Secretary Natasha Wright (see AXAA contacts) if you would like to apply.

PANalytical introduces GaliPIX3D – the new detector of choice for X-ray diffraction with hard radiation

PANalytical, a world leader in state-of-the-art pixel detector technologies, announces a new detector for X-ray diffraction (XRD) at PITTCON 2015. The new GaliPIX^{3D} will be featured in PANalytical's flagship X-ray diffractometer, Empyrean - the flexible and future-proof multipurpose laboratory instrument for an ever-changing materials landscape. GaliPIX^{3D} is intended to further expand the range of X-ray scattering applications that are available with the Empyrean platform.

With resolution comparable to that of PIXcel^{3D}, GaliPIX^{3D} boasts pixel dimensions of 60 microns x 60 microns and an overall sensor dimension of 30.7 mm x 24.8 mm. The high-quality CdTe sensor provides an unrivalled stopping power for X-rays, dramatically improves the detector efficiency for all laboratory wavelengths, and is responsible for close to 100% efficiency for higher energy radiation such as Ag and Mo. This positions GaliPIX^{3D} as the new detector of choice for computed tomography (CT) and pair distribution function (PDF) analysis on the Empyrean.

PANalytical demonstrates excellent PDF data quality using GaliPIX^{3D} on the Empyrean, for the combined analysis of crystalline, nanocrystalline and amorphous materials. This new capability will find application in crystallization studies, process chemistry, catalysis and nanocrystallography. By bringing PDF analysis from synchrotrons into the lab, PANalytical adheres to its vision to support laboratory chemists with the materials challenges of the 21st century.

GaliPIX^{3D} takes CT on the multipurpose Empyrean diffractometer to the next level by supporting higher energy radiation, such as silver. The range of engineered components, archeological artifacts and pharmaceuticals that can now be non-destructively examined is considerably increased, opening the way for CT in areas that were once considered the domain of dedicated instruments only.

Following this restless innovation, we can expect more advances in detection technology to be unveiled by PANalytical in the future. For more information, please contact your local PANalytical representative.

GaliPIX^{3D} – highest efficiency detector for hard radiation

New: Multiple X-ray technologies integrated for the first time in groundbreaking Zetium spectrometer from PANalytical

In a significant announcement at Pittcon 2015, PANalytical has revealed a completely new type of analytical X-ray fluorescence (XRF) spectrometer. With up to four complementary technologies on one multi-functional XRF platform, the new Zetium is set to change the way scientists think about XRF analysis. The measurement platform of Zetium incorporates both wavelength dispersive (WD) and energy dispersive (ED) cores for the first time in one instrument. Zetium can also include a small spot analysis tool for fast element distribution mapping, and the innovative THETA free lime channel for dedicated cement applications.

This unique combination of technologies not only matches the traditional needs of XRF users, but offers a range of new possibilities. For example, measuring ED- and WDXRF simultaneously collects all the data on a sample in one run, cutting experimental time in up to half compared to running two sequential analyses. For industry-specific challenges such as those found in cement production, the ability to make traditional XRF measurements and assess free lime in the same system delivers clear advantages. Importantly, whatever the application, Zetium is designed to set new standards in terms of analytical power, usability and sustainability, to users in process optimization, quality control and research. Zetium is the successor to PANalytical's highly successful Axios range of spectrometers and this heritage of proven technology underpins the new analytical platform.

To make system selection straightforward, PANalytical has created a series of dedicated Zetium editions. There are five specific Industry editions: Cement, Polymers, Petro, Metals and Minerals, as well as an 'Ultimate' edition. Each is available with a choice of four enhanced performance packages for: improved speed and throughput, performance enhancement, robustness and uptime, and flexibility.

The hardware advances in Zetium have been matched by an enhanced software framework and user interface. SumXcore technology is the software and hardware at the heart of Zetium, integrating the system's cores to deliver advanced performance coupled with maximum task flexibility. Ease of use for even non-expert users has been prioritized through the intuitive, task-oriented user interface and the integrated intelligence of the Virtual Analyst™, which provides guidance on the optimal setup for each experiment.

"Zetium offers a unique combination of possibilities that put it in a class of its own for analytical power, speed and task flexibility," said Simon Milner, Product Marketing Manager for XRF, PANalytical. "And the system has been designed from the ground up to allow customers to take full advantage of all our innovations. Zetium is a great demonstration of PANalytical's philosophy of elemental excellence – our focus is firmly on providing the best tools to help our users excel within their businesses."

For more information about Zetium, visit www.panalytical.com/zetium or contact your local PANalytical representative.

Zetium spectrometer provides elemental excellence in material insight

Bruker Announces the New S2 PUMA™ Bench-top X-ray Fluorescence Spectrometer for Elemental Analysis

Bruker is proud to announce the S2 PUMA™ bench-top multi-element analyzer. The **new S2 PUMA is an energy-dispersive X-ray fluorescence spectrometer** (ED-XRF) for quantitative analysis of the elemental composition of a large variety of samples from pressed pellets, fused beads, powders to liquids and even large and bulky samples. The S2 PUMA complements the well-established S2 RANGER in Bruker's bench-top XRF product offerings.
With the S2 PUMA Bruker introduces HighSense™ technology for EDXRF. Low detection limits and short measurement times are achieved using a high-power X-ray tube. Best-in-class detection of light elements is realized by the combination of optimized excitation, detection and vacuum mode. Expensive purge gases like helium can be avoided assuring low cost of ownership.

The compact and robust design of the S2 PUMA matches the needs of industrial customers in geology, minerals and mining, cement production, metals processing, petro-chemistry and consumer product safety applications. High sample throughput demands are satisfied with either the 20-position EasyLoad™ sample tray or via the automation interface to a conveyor belt. The S2 PUMA is easily integrated into existing or new lab automation systems. Customers with lower sample throughput requirements will benefit from the economic single-loader option of the S2 PUMA.

In addition to its perfect fit for industrial applications, the new S2 PUMA is also a very valuable and flexible tool for the academic and research environment, because it accepts a wide range of sample types, shapes, and sizes. The large flat sample table option accommodates samples up to 16 by 16 inches (~ 40 by 40 cm). The measurement spot can also be changed from a couple of centimeters down to a few millimeters to allow for measurements of small spots on the samples. A video camera is provided for exact sample positioning, and the sample image can be saved along with the XRF measurement data and results for easy reference.

All users will enjoy the instrument's ease of use. The S2 PUMA comes with an integrated computer and touchscreen without the need for an external PC. Data input and system operation is intuitive with the multilingual TouchControl™ user interface. The S2 PUMA is equipped with a standard TCP/IP port for extended networking needs, data export and interfacing.

"With the S2 PUMA, Bruker offers the most versatile energy-dispersive XRF bench-top spectrometer available on the market. The S2 PUMA can be optimally configured for high sample throughput, automated measurement processes, large samples, small spot sizes, and state-of-the-art light element detection - all integrated into a robust industrial-grade housing. Key benefits are the rugged design, the large sample magazine, and the low cost of ownership. Customers responsible for consumer product safety will find the S2 PUMA's option to measure large products and work pieces non-destructively extremely useful." stated Frank Portala, XRF Product Manager of Bruker AXS.

For further information, please contact Neil Hughes in the Melbourne Bruker office – Ph (03) 9474-7000 or email neil.hughes@bruker.com

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NEW

D2 PHASER

The Second Generation Benchtop X-Ray Diffractometer

The new D2 PHASER is the next generation benchtop diffractometer for all X-ray powder diffraction applications. The new D2 PHASER is equipped with an integrated PC and a flat screen monitor. The new version of the DIFFRAC.SUITE software allows measurement and analysis right out of the box. Equipped with a LYNXEYE™ compound silicon strip detector, the D2 PHASER is able to collect high quality data with unprecedented speed.
The new sample changer allows to run batches of up to 6 samples.

We implemented innovative technologies to make the D2 PHASER the most compact and fastest, all-in-one phase analyzer available on the market. The unit is mobile and easy to install with only the need for standard electrical power. It is therefore ideal for laboratory or on-location operation, in other words, it is a true Plug'n Analyze system.

Ease-of-use, high performance and low cost of ownership are the key features of the D2 PHASER. The diffractometer was developed to open new applications and markets beyond traditional XRD analysis. D2 PHASER – the price/performance leader for XRPD in laboratories and QC/PC applications for e.g. cement, industrial minerals, geology, chemistry, pharmaceuticals, as well as for educational purposes.

Plug'n Analyze™

On-Site Ready

Hand Carry Weight

No Water Supply

No High Power

No PC & Peripherals

Applications / Performance

DIFFRAC.EVA

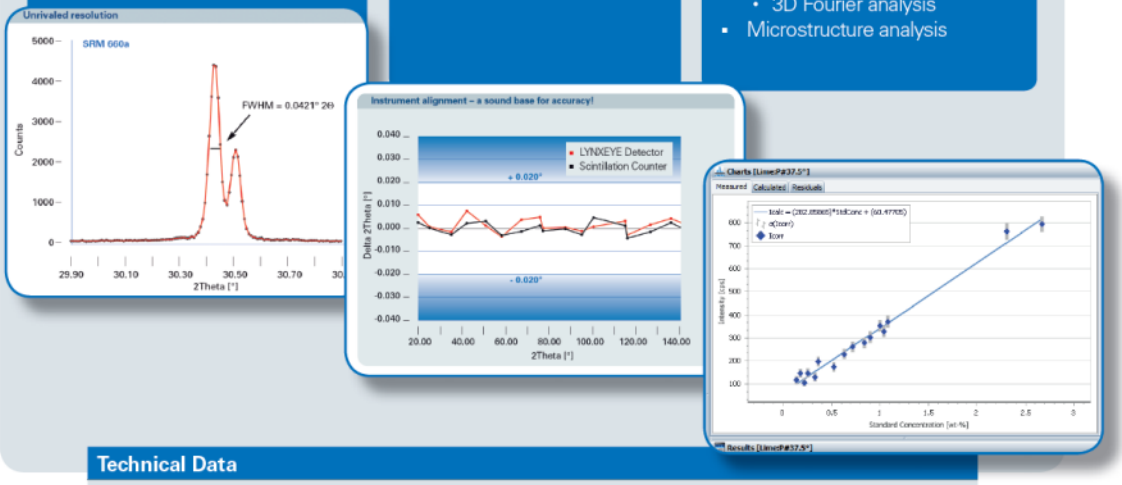
- Qualitative phase identification
  - ICDD PDF2 and PDF4
  - User-defined databases
- Semi-quantitative phase analysis
  - RIR method
  - Combined XRD-XRF analysis
- Publication-ready reporting

DIFFRAC.TOPAS or DIFFRAC.DQUANT

- Calibration method
- Addition method
- Ratio method
- Reach compliant methods
- Degree of crystallinity
- Spiking method
- PONKCS method

DIFFRAC.TOPAS Structure Analysis

- Indexing (LSI and LP-Search methods)
- Pawley and LeBail fitting
- Rietveld structure refinement
- Ab-initio structure determination
  - Simulated annealing
  - Charge Flipping
  - 3D Fourier analysis
- Microstructure analysis



Technical Data	
Geometry	Theta / Theta (sample remains horizontal)
Max. useable angular range	-3 … 160 ° 2Theta (depending on detector)
Accuracy	± 0.02° throughout the entire measuring range
Achievable peak width	< 0.05°
Alignment	Not needed, factory aligned
X-ray wavelengths	Cr / Co / Cu, standard ceramic sealed tube
X-ray generation	30 kV / 10 mA
Radiation level	<< 1µSv/h
Detectors	Scintillation counter, 1-dimensional LYNXEYE
Sample stages	- single sample stage for 51.5 mm Ø sample rings - automatic 6 position sample changer for 32 mm Ø sample rings
Sample motion	Spinning with user defined speed
Instrument type	Mobile, benchtop
Exterior Dimension	61 x 60 x 70 cm (h x d x w), 24.02" x 23.62" x 27.56"
Weight	95 kg
Power supply	90 – 250 V
External cooling water supply	None
Computer	Built-in, optional additional PC connected via LAN interface
Interfaces	2 x USB and 1 x LAN

Goniometer: US 7,852,983 B2

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Combination Mill and Press for XRF Applications

Automated sample prep for pressed powder XRF could not be easier. Simply place a sample into a vial, place it onto the 20 position magazine and press start.

The HP-MP will automatically pulverize the sample (typically to less than 45 microns), add a binder and press the pulverized sample into a steel ring ready for the XRF. Optionally the ring can be transported directly to the XRF for analysis and with the optional ring cleaning device the ring can be cleaned automatically ready for the next sample.

A rigorous cleaning regime ensures no cross contamination between samples. The HP-MP dramatically improves health and safety aspects when compared to manual processes as the operators are not exposed to dust, noise and heavy handling. Precision and accuracy can be improved as every sample is treated in exactly the same way and the machine is ALWAYS properly cleaned between samples. Human error such as sample mix-up is avoided with direct transport of the samples to the XRF.

The process is very fast thus improving efficiency, reducing turnaround times and increasing throughput. This is particularly beneficial for process control applications where rapid turnaround times are required. The HP-MP can operate as a stand-alone system and a semi-automatic linear system where it is connected to the XRF or can be integrated into a robotic solution.

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Challenging Conventional Sample Processing!

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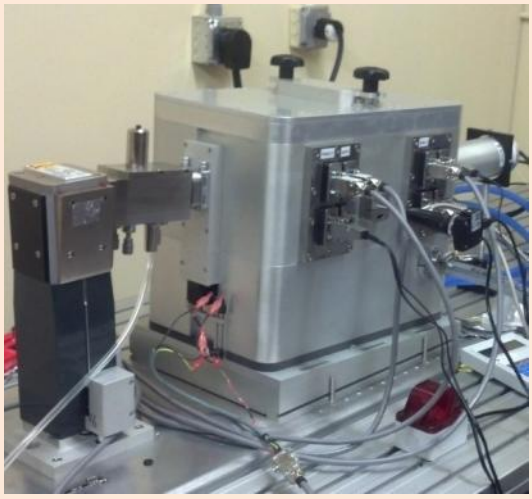
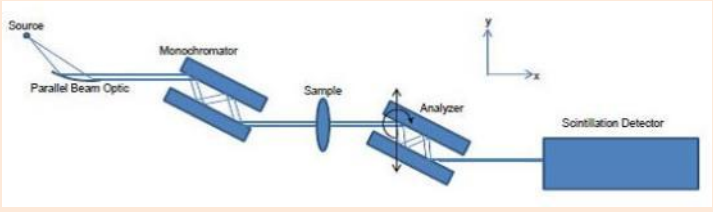
Now represent SAXSLAB and Molmex Scientific range of Small and Ultra-small angle X-ray scattering systems.

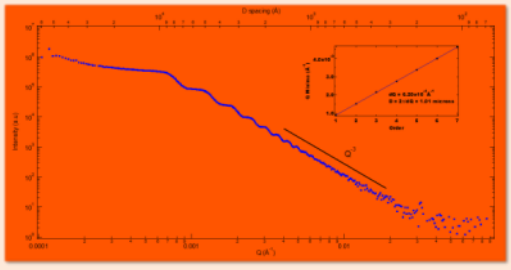
SAXSLAB Ganesha
The ultimate SAXS system

2D SAXS system with improved optics, scatterless slits, DECTRIS 300K photon counting detector, adjustable scattering range, fully motorized, and automated tasks. Can be equipped with many different sources, can be fitted with a Bonse-Hart USAXS, GISAXS, WAXS. Q range ~ 0.002 to 2.5 A^{-1} (Features 0.25 nm to 300 nm)



The ARGES fully automated Bonse-Hart USAXS
For isotropic samples, Choice of detector, Flexible sample holding, All -Vacuum path. Q range ~ 0.0001 to 0.1 A^{-1} (Features 1 nm to 2.5 μm).





Bonse - Hart geometry with 4-bounce monochromator and analyser crystals

Contact Rod Clapp
Diffraction Technology,
Phone 03 9787 3801
diffraction@bigpond.com , www.diffraction.com.au

New Product Releases

Leading the way forward in XRF fusion technology

xrWeigh Automatic Flux Weigher

The xrWeigh can be set up to dispense flux for high speed and high accuracy operation. In laboratory trials it has demonstrated speed improvements over the manual method of more than 75%. The control system can be set to meet the particular needs of your sample environment.

Key Features:

- Broad range of fluxes
- Fast accurate operation, up to 100 samples an hour
- Simple user interface
- Easy to use
- Limited or no training required

Ausmon Drift Monitors

In November 2014 XRF Scientific acquired the Coltide XRF Drift Monitors business from Dr Keith Norrish. Manufacturing has since been transferred to our lab in Melbourne that is continuing with the production of the full range of Ausmon monitors. Drift monitors are available in 40mm or 32mm sizes, with the popular Silicates & General Ausmon covering a full range of 52 different elements.

Phoenix Gas Fusion Machine

Following over 20 successful years and more than 1000 units having being sold, we are excited to announce the launch of the **next generation Phoenix fusion machine**.

Key Features:

- High reliability and low maintenance costs
- Accurate temperature control with newly developed, patent pending flame control
- Safe operation with new case design
- Simple user operation via new touch screen interface
- Low contamination fusion environment

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