AXAA

Australian X-ray Analytical Association

Newsletter Issue 3 2018

President's Address

Dear AXAA Members and Friends,

The AXAA National Council is excited to announce that the AXAA-2020 Conference and Exhibition will be held from 27th April to 1st May 2020 at Bond University on the Gold Coast! The conference website will go live in the New Year, with details of important dates and sponsorship opportunities. Details will also become available on the AXAA-2020 Facebook page and on Twitter (@axaa_org). The Conference Committee will meet in April 2019 to begin the design of an exciting and stimulating scientific, educational and social programme. Please get in touch (see list of AXAA Contacts later in the Newsletter) if you would like be part of this Committee and play a significant role in shaping AXAA-2020.

September and October saw AXAA Student Seminars events held in NSW, VIC and WA. The response that we received for each event was fantastic, with the quality of the presentations very high, and cash prizes awarded to the three best presentations in each state. Thanks to PANalytical and AXT for their sponsorship of the NSW and WA events, respectively. These events are an excellent opportunity for students to present their work in a friendly, collegial atmosphere and meet others in the X-ray and neutron scattering community. Next year, as we gear up for AXAA-2020, the prizes at our Student Seminars events will be registration, travel and accommodation bursaries to attend AXAA-2020. Please put these events on the radar of Honours, Masters and PhD students working in the fields of X-ray and associated techniques of analysis. Please read on for a full wrap-up of each 2018 event.

Finally, I wish everyone an enjoyable festive season and a happy and healthy 2019.

Nathan Webster
AXAA President

AXAA Student Seminars

A key part of the AXAA calendar is a series of AXAA Student Seminar events, and 2018 was another bumper year, with outstanding presentations given at all the three events held in NSW, VIC and WA. This year 9 prize winners received up to $250 in cash for their fine work. Thanks to all who helped make the 2018 events a huge success!

Post-seminar drinks and pizza (sponsored by Malvern Panalytical).

NSW – "Scattering Matters"

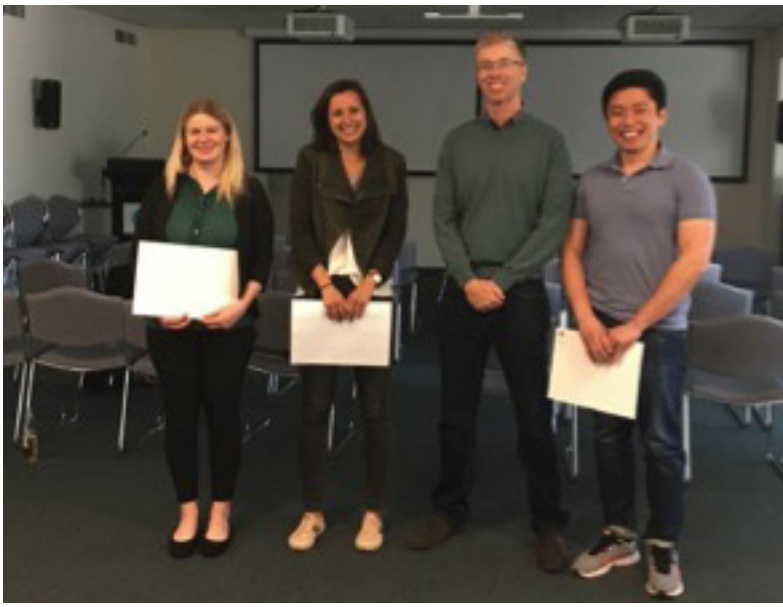
This year the AXAA student seminars kicked off with the NSW event held at the University of New South Wales, where ten PhD candidates from an impressive number of Universities (Newcastle, Wollongong, Sydney and NSW) presented their work. Levi Tegg's (University of Newcastle) presentation "Observation of fully-occupied cubic $Na_{1.0}WO_3$ at elevated temperatures using in-situ X-ray diffraction" was judged to be the best presentation, with two runners-up being Scarlet Kong (UNSW, "Characterisation of Anomalous Surface Structure in Piezoelectric $Bi_{0.5}Na_{0.5}TiO_3$ - 6%$BaTiO_3$") and Larissa Fedunik-Hofman, (University of Newcastle,

In-situ XRD analysis of CaO-Based Sorbents for Calcination-Carbonation Thermochemical Energy Storage). Thank you to the 25 people who attended, as well as Malvern Panalytical for sponsoring the post-seminar pizzas, and Dr Susan Neville (University of NSW) for helping to organise the event.

First prize winner Levi Tegg (right) with Susan Neville (left).

VIC – "Something to Bragg About"

The AXAA VIC student seminars took place on the 23rd October at the CSIRO Laboratories in Clayton. Presentations were given by six PhD students from Swinburne and Monash Universities to an audience of 20 members of the AXAA community, on topics ranging from minerals and minerals processing to functional materials. The standard of all of the talks was outstanding, with a diverse range of analysis techniques being used at a very high level. Prizes were awarded to Kira Rundel, Scarlett Southall and Wen Liang Tan for their presentations on molecular packing and photovoltaic performance of thin-film organic semiconductors, Fe(II)-catalysed recrystallisation of goethite, and chlorine-induced orientation transformation in hybrid perovskite films, respectively.



Prize winners (left to right) Scarlett Southall (Monash University, runners-up prize), Kira Rundel (Monash University, first prize for best presentation) and Wen Liang Tan (Monash University, runners-up prize), with AXAA President Nathan Webster (second from right).

WA – "Bright Scatterers"

WA held their student seminar day on the 25th of October at Curtin University in Perth. The promise of doughnuts, cake and coffee ensured the event was very well attended though the real feast was the magnificent X-ray science presented in the 5 student talks. Kate Putman (Curtin University Honours student) won the prize for best presentation for an excellent talk on the high temperature treatment of carbon involving some novel XRD analysis. Xizhi Yao and Sana Zahid (both Murdoch University PhD students) were the runners up for the prize. The event was followed by a sundowner where students and researchers merrily discussed the highs and lows of x-ray analysis.

First prize winner Kate Putman (right) with Melissa Narbey (AXT, left).

Comparison of Rietveld-compatible analysis methods for accurate quantification of carbon dioxide fixation in ultramafic mine tailings.

Connor Turvey (University of British Columbia, formerly Monash University)

With the release of anthropogenic CO_2 emissions being linked to large scale changes to the Earth's atmosphere and environment, solutions are increasingly being sought to remove CO_2 from the atmosphere.[1] The weathering of ultramafic rocks, which can combine released Mg^{2+} with CO_3^{2-} from the atmosphere offers a potential way to sequester large amounts of atmospheric CO_2 within the comparatively stable form of carbonate minerals such as hydromagnesite [$Mg_5(CO_3)_4(OH)_2{\cdot}4H_2O$], pyroaurite [$Mg_6Fe_3^{+2}(CO_3)(OH)_{16}{\cdot}4H_2O$] and nesquehonite [$Mg(HCO_3)(OH){\cdot}2H_2O$].[2] Research into understanding and enhancing these reactions is being conducted in waste materials produced by ultramafic-hosted mine sites, which may act of feedstocks for these reactions.[1,2]

Quantitative X-ray diffraction (XRD) using the Rietveld method has previously been employed to estimate the amount of carbon sequestered by carbonate minerals that form as a result weathering of ultramafic rocks.[2,3] However, the presence of structurally disordered phases such as serpentine minerals, which are common in many ultramafic ore bodies such as at the Woodsreef chrysotile mine (NSW, Australia), results in samples that cannot be analyzed using typical Rietveld refinement strategies. Previous investigations of carbon sequestration at Woodsreef and other ultramafic mine sites typically used modified Rietveld refinement methods that apply structureless pattern fitting for disordered phases; however, no detailed comparison of the accuracy of these methods for carbon accounting had been undertaken, making it difficult to determine the most appropriate analysis method for large scale carbon accounting. We assessed and compared the accuracy of three different non-traditional Rietveld refinement methods for carbon accounting: (1) the PONKCS method,[4] (2) the use of a Pawley fit for serpentine minerals with an internal standard (Pawley/internal standard method)[5] and (3) the combined use of PONKCS and Pawley/internal standard methods, to determine which method would give the most accurate estimates of carbonate mineral content and would be the most appropriate method for carbon accounting using quantitative XRD.[6]

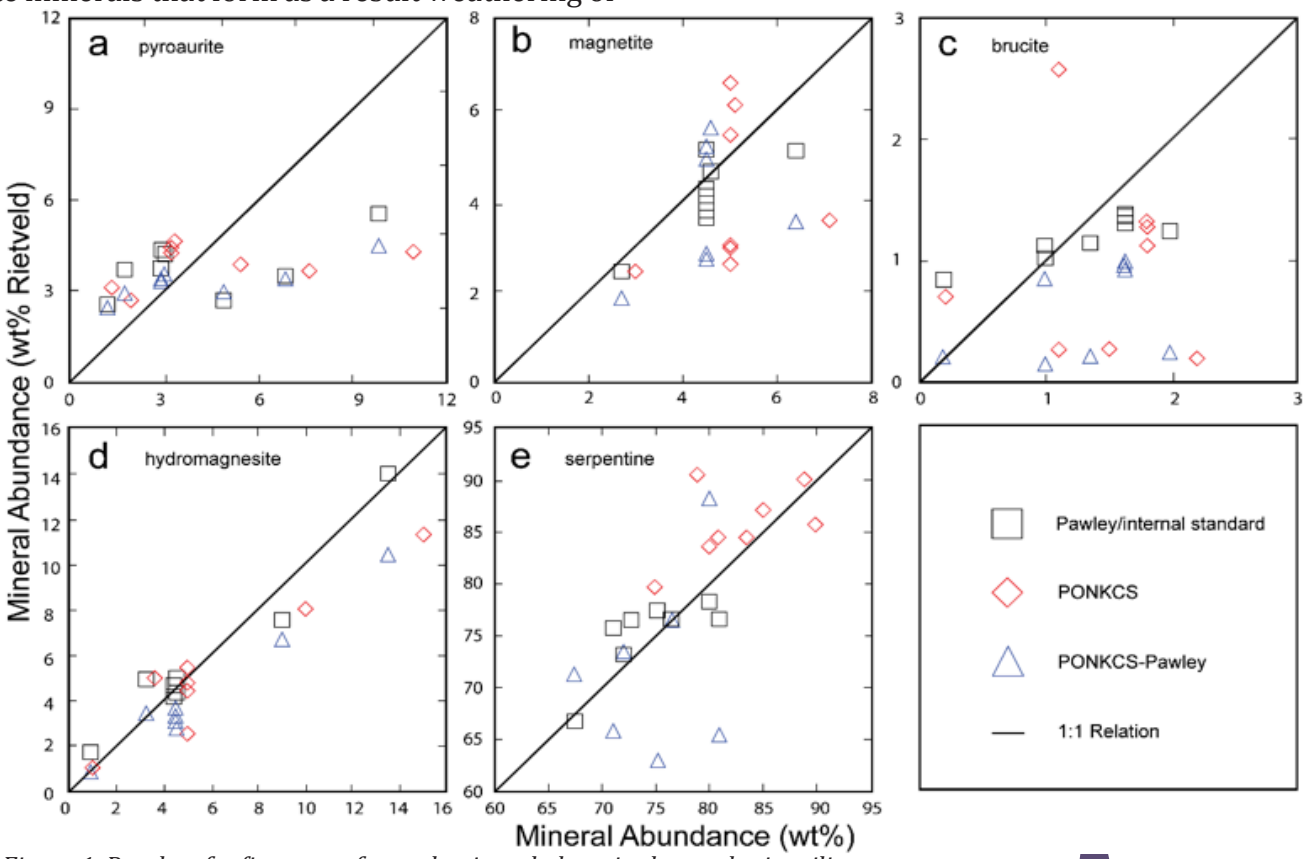


Figure 1. Results of refinements for each mineral phase in the synthetic tailings using the PONKCS, Pawley and combined methods.

Eight artificial tailings samples with known mineralogical compositions were prepared to reflect the natural variation found within the tailings at the Woodsreef chrysotile mine.[6] Refinement results using the three methods were compared with the known compositions of each sample to calculate absolute and relative error values and to evaluate the accuracy of the three methods, including whether they produce systematic under- or overestimates of mineral abundance. Results found that the abundance of serpentine minerals, the major mineral in the tailings samples, was systematically overestimated when using both the PONKCS and Pawley/internal standard methods.[6] The refined abundances of minor phases (<15 wt%) were systematically underestimated using both methods. Refined abundances of hydromagnesite, a mineral formed from atmospheric CO2 during weathering of ultramafic rocks, was consistently underestimated by both methods, with the highest underestimation being 3.7 wt% absolute (or 25% relative) for a sample containing 15 wt% hydromagnesite. Refined abundances of pyroaurite, another mineral phase capable of sequestering atmospheric CO_2, were found to be increasingly underestimated to error with increasing abundance, with the highest underestimation of 6.6 wt% absolute for a sample containing 10.9 wt% pyroaurite (60.6% relative). These significant errors are due to difficulties in mitigating preferred orienta¬tion of hydrotalcite minerals during sample preparation as well as modeling its effects on XRD patterns.

Overall, the Pawley/internal standard method produced more accurate results than the PONKCS method, with an average bias per refinement of 6.7 wt%, compared with 10.3 wt% using PONKCS and 12.9 wt% for the combined PONKCS-Pawley/internal standard method.[6] Furthermore, the values for the refined abundance of hydromagnesite obtained from refinements using the Pawley/internal standard method were significantly more accurate than those for refinements done with the PONKCS method, with relative errors typically <25% for hydromagnesite abundances between 5 and 15 wt%.[6] The simpler and faster sample preparation makes the PONKCS method well-suited for rapid carbon accounting, for instance in the field using a portable XRD; however, the superior accuracy gained when using an internal standard make the Pawley/internal standard method the preferable means of undertaking a detailed laboratory-based study. As both methods displayed an underestimation of carbonate phases, applying these methods to natural samples will likely produce an underestimate of hydromagnesite and hydrotalcite group mineral abundances. As such, crystallographic accounting strategies that use modified non-Rietveld refinement methods produce a conservative estimate of the carbon sequestered in minerals.

1. Power et al. (2013) Elements, 9, 115-121. 2. Turvey et al. (2018a) IJGGC, in press. 3. Turvey et al. (2017) Am. Mineral, 102, 1302-1310. 4. Wilson et al. (2006) Am. Mineral, 91, 1331-1341. 5. Scarlett and Madsen (2006) Powder Diffr. 21 (4), 278-284. 6. Turvey et al. (2018b) Am. Mineral, 103, in press.

Examination of Bauxite Dehydroxylation Using In Situ XRD

Hong Peng[1], James Vaughn[1] and Cameron Chai[2]
[1] School of Chemical Engineering, University of Queensland
[2]AXT Pty Ltd

Introduction

Bauxite is the primary raw material used in the manufacture of aluminium. Australia produced 74.9 million tonnes of bauxite in 2011 accounting for 32% of global production in 2011, making us the largest producer in the world.[1]

To make aluminium, bauxite is first converted to alumina *via* the Bayer Process. Alumina can then be smelted into aluminium using the Hall-Heroult electrochemical process.[2] The Bayer Process involves multiple steps to convert bauxite to alumina. One of these steps is digestion of the bauxite in hot caustic soda. It has been proposed that thermal activation of bauxite could enable this digestion process to take place at a lower temperature and that it would also reduce the organic content of resultant liquor.

Dr. Hong Peng and Dr. James Vaughn from University of Queensland recently published "In Situ XRD Investigation of Bauxite Dehydroxylation" (Characterisation of Minerals, Metals and Materials 2018, The Minerals, Metals and Materials Series) which examines the behaviour of the minerals in bauxite, specifically gibbsite [$Al(OH)_3$], boehmite (AlOOH)

and kaolinite ($Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$). While studies into the phase transformations of gibbsite and kaolinite are readily available, similar data for bauxite using in situ XRD is more difficult to obtain. This project is funded by Rio Tinto and Queensland Government (Grant ID 2015003035) through Dr. Peng's Advance Queensland Research Fellowship.[3]

Experimental Procedure

Samples examined were AR grade gibbsite, boehmite and kaolinite, as well as two bauxite samples (denoted A and B) provided by Rio Tinto. The chemical composition of the bauxite samples was determined by XRF.

In situ XRD was carried out in a 9kW Rigaku SmartLab. Powdered samples were put in a corundum container that was placed on the sample holder and sealed by the dome. Samples were then heated at 50°C/min and then held for 10 minutes at each temperature (typically every 100°C from 100°C to 700°). XRD scans were performed from 10-60° 2θ at a speed of 0.05°/sec using Cu Kα radiation at 40kV.

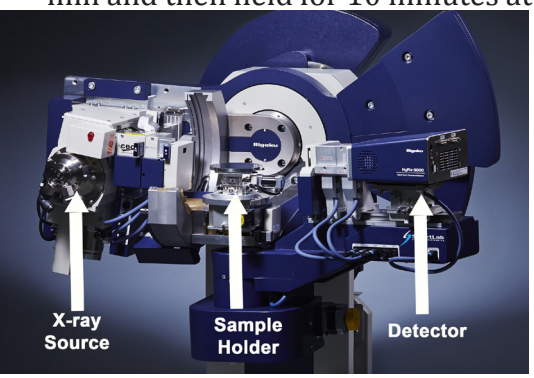


Figure 1. In situ Rigaku SmartLab XRD configuration.

Results and Discussion

Gibbsite

In situ XRD scans that were carried out on gibbsite indicate that this pure phase is stable up to 200°C. At 300°C gibbsite partially transforms to boehmite, with the transformation being completed by 400°C. This is consistent with other studies at every 100°C.

$$Al(OH)_3 \text{ [gibbsite]} \rightarrow \gamma AlO(OH) \text{ [boehmite]} + H_2O \uparrow \qquad \text{(Eq1)}$$

Between 600 and 700°C, boehmite peaks start to disappear, as it transforms to amorphous alumina according to the reaction:

$$2\gamma AlO(OH) \text{ [boehmite]} \rightarrow Al_2O_3 \text{ [amorphous]} + H_2O \uparrow \qquad \text{(Eq2)}$$

Boehmite

Boehmite, under the same conditions, is stable up to 500°C. At 600°C., the intensity of the main crystalline peaks ((020), (120) and (031)) begin to diminish and all trace of the boehmite phase has disappeared by 700°C, with the transformation to amorphous alumina complete via Eq2.

Kaolinite

Kaolinite is stable below 500°C. At 600°C changes have begun to take place with the peaks between 36 and 45° 2θ beginning to disappear. By 650°C, all kaolinite peaks have disappeared according to the reaction outlined in Eq3. Meanwhile anatase peaks continue to be present and show no signs of any change up to 650°C.

$$Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O \text{ [kaolinite]} \rightarrow Al_2O_3 \cdot 2SiO_2 \text{ [metakaolin]} + 2H_2O \uparrow \qquad \text{(Eq3)}$$

Bauxite

The XRF analysis of the bauxite samples reveals a large variation in composition (Table 1). Gibbsite is the main aluminium-bearing phase for both samples.

Sample	Al_2O_3	SiO_2	Fe_2O_3	TiO_2	MgO	P_2O_5	Quartz	LOI
Bauxite A	39.3	14.2	24.7	1.9	0.03	0.05	0.3	19.4
Bauxite B	53.2	6.5	13.0	2.6	0.03	0.06	1.5	24.1

Table 1. Chemical analysis of bauxite samples (wt.%).

For bauxite sample A, the detectable phases at 100°C are kaolinite, gibbsite, hematite and anatase, with no boehmite or quartz detectable. At 300°C, the gibbsite begins to disappear, but unlike the pure gibbsite sample, it does not transform to boehmite. The kaolinite has also transformed to metakaolin by 600°C, a lower temperature than pure kaolinite.

Bauxite sample B consisted predominantly of gibbsite and boehmite, with no kaolinite detected. Unlike bauxite sample A, some gibbsite was still present at 300°C, although the transformation was well underway. Boehmite has also disappeared by 600°C, which was a lower transition temperature compared to the pure boehmite sample.

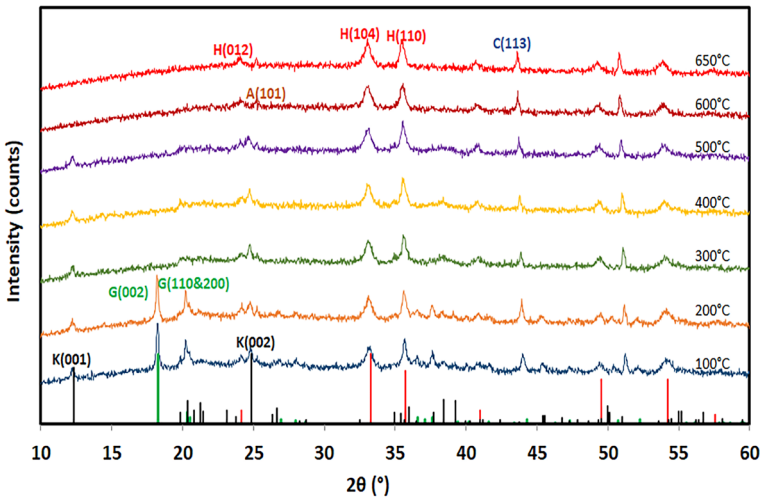


Figure 2. In-situ XRD patterns of heat-treated bauxite A as a function of temperature (black column kaolinite; red column hematite; green column gibbsite; brown anatase; blue Corundum).

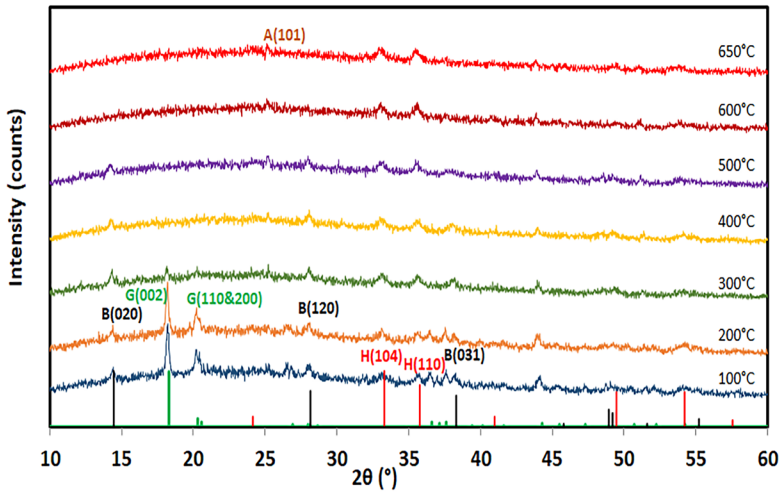


Figure 3. In-situ XRD patterns of heat-treated bauxite B as a function of temperature (black column boehmite; red column hematite; green column gibbsite; brown anatase; blue corundum).

The transition temperatures for the pure materials and bauxite sample are summarised in Table 2. These results indicate that bauxite materials rich in boehmite could benefit from a thermal activation/ dehydroxylation step prior to entering the Bayer process as the resultant amorphous phase would be suitable for a lower temperature Bayer digestion.

Table 2. Transition temperatures for hydroxide phases (°C).

Phases	Pure Phases	Bauxite A	Bauxite B
Gibbsite	200-300	200-300	300-400
Boehmite	600-700	-	500-600
Kaolinite	600-650	500-600	-

Conclusion

In situ XRD carried out in a Rigaku SmartLab was able to demonstrate that different bauxite samples behave differently, while the hydroxide phases gibbsite, boehmite and kaolinite) also transform at different temperatures compared to their pure analogues. The gibbsite present in the bauxite samples transformed into amorphous material above 300°C, while the kaolinite required exposure to temperature above 600°C for complete dehydroxylation. This study also demonstrates the suitability of in situ XRD for the development of an understanding of the thermal activation of bauxite.

[1]https://aluminium.org.au/australian-industry/industry-description/australian-bauxite/
[2] http://bauxite.world-aluminium.org/refining/process/
[3]https://www.uq.edu.au/news/article/2016/08/new-green-method-could-unlock-queensland-bauxite-deposits

X-ray Materials Analysis Internet Courses – Wavelength Dispersive XRF and Powder XRD (Plus Mentoring Program on Rietveld XRD Phase Analysis)

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 analytical practicalities. Features of the courses -

- *Start at any time*
- *Self-paced instruction to accommodate the needs of busy people*
- *Study materials comprise 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 participants, as well as Australians, and are being used by companies as vehicles for in-house XRF and XRD training, and also for Rietveld phase composition analysis.

Internet XRF Course: Series 11, 2019

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.

Internet XRD Course: Series 6, 2019

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.)

Internet Rietveld XRD Analysis - Personalised Mentoring Program

The internet Rietveld XRD Analysis Personalised Mentoring Program is designed to support people who need help in becoming proficient in Rietveld-analysing their materials for phase composition. The program is customised to meet the needs of the participant, and will include learning how to efficiently Rietveld-analyse their own XRD patterns and will also address requirements for fast-analysis of large suites of XRD patterns. The program is structured according to the background knowledge of the mentee, and also the Rietveld software used in the person's laboratory.

Further Information and Enrolment Procedure:

Course director: Brian O'Connor
Email: brian_oconnor@iprimus.com.au
Tel: 08 9291 7067 / 0407 775 034

AXAA Website and Contacts

Please visit our website, www.axaa.org, for further information, or follow us on Twitter @axaa_org.

NATIONAL COUNCIL PRESIDENT:

Nathan Webster
CSIRO Mineral Resources, Box 10, Clayton South, VIC 3169
Telephone: (03) 9545 8635
e-mail: nathan.webster@csiro.au

NATIONAL COUNCIL VICE PRESIDENT:

Vanessa Peterson
Australian Centre for Neutron Scattering (ANSTO), Locked Bag 2001, Kirrawee DC NSW 2232
Telephone: (02) 9717 9401
e-mail: vanessa.peterson@ansto.gov.au

NATIONAL COUNCIL SECRETARY:

Mark Styles
CSIRO Manufacturing, Private Bag 10, Clayton South, VIC 3169
Telephone: (03) 9545 8179
e-mail: mark.styles@csiro.au

NATIONAL COUNCIL TREASURER:

Sally Birch
CSIRO Mineral Resources, Locked Bag 2, Glen Osmond SA 5064
Telephone: (08) 8303 8487
e-mail: sally.birch@csiro.au

NATIONAL COUNCIL COMMUNICATIONS EDITOR:

Jessica Hamilton
e-mail: jlhamilton713@gmail.com

NATIONAL COUNCIL MEMBERS:

Natasha Wright (CSIRO, VIC)
Gordon Thorogood (ANSTO, NSW)
William Rickard (Curtin University, WA)
Talitha Santini (University of Western Australia, WA)

AXAA Membership

All registered participants of the AXAA-2017 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 Mark Styles.

AXAA Resource Centre

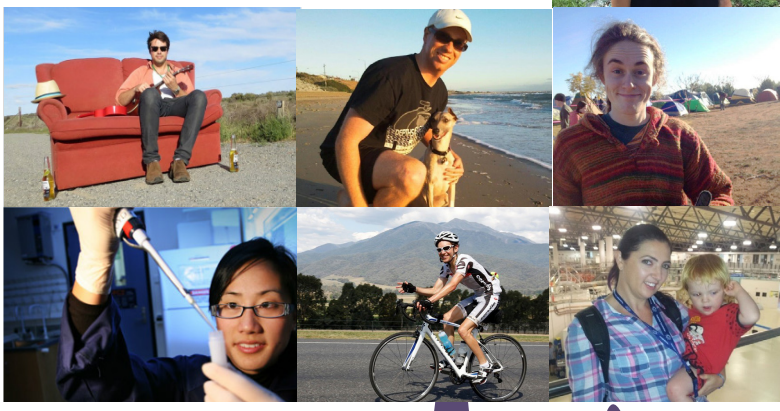
There are a range of resources available on the AXAA website, including video recordings of the two Public Lectures at AXAA-2017, tips for Rietveld Analysis, Clay Analysis, XRF tips, and more. We welcome further contributions to our Resource Centre.

Next AXAA Newsletter

The next issue of the AXAA Newsletter will be distributed in April 2019. Please feel free to send contributions for the newsletter to Jessica Hamilton at *ausxray@gmail.com*. Any comments or feedback about the Newsletter are welcome.

A Day in the Life of an X-ray / Neutron Scientist

We are seeking posts for our 'Day in the Life' series. If you'd like to contribute, or know someone who might be interested, please contact National Council Communications Editor Jessica Hamilton at ausxray@gmail.com.
W:www.axaa.org/a-day-in-the-life.html



Dec-18

Bruker Launches the S2 POLAR™ High-Performance, Multi-Element Benchtop EDXRF Analyzer for the Petrochemical Industry

Bruker announces the launch of the S2 POLAR™, a new multi-element benchtop analyzer based on polarized Energy Dispersive X-Ray Fluorescence (EDXRF). The S2 POLAR offers the same excellent analytical precision for quality control in the petrochemical industry, which is typically only achieved by more expensive Wavelength Dispersive X-Ray Fluorescence (WDXRF) instruments.

The S2 POLAR analyzes Ultra-Low Sulfur (ULS) content and achieves detection limits in the sub-ppm range for gasoline, kerosene, and diesel. Its performance exceeds various international norms and regulations, making the S2 POLAR also suitable for future requirements. With its capability to measure multiple elements simultaneously, including chlorine for corrosion prevention and phosphorus against residue build-up, the S2 POLAR is well suited for the analytical demands of refineries, as well as for the downstream supply chain of pipelines, oil terminals and petrol stations. Remarkably, the S2 POLAR combines the performance of several single-element analyzers in a single powerful benchtop instrument.

Another application requiring the high precision of the S2 POLAR is at oil manufacturers and oil blenders, where the measurement of additives in lubricating oils, e.g. magnesium, calcium, zinc, and molybdenum, is important for the efficient use of additives and the minimization of production costs.

The S2 POLAR delivers compliant analysis for all relevant ASTM, DIN, IP, JIS, and ISO norms. Bruker's multilingual TouchControl™ interface and factory calibrated application packages for the ASTM norms D7220, D4294, D6481, and D7751 ensure "plug-and-play" operation. Its SampleCare™ component protection supports high instrument uptime and robustness.

Frank Portala, EDXRF Product Manager of Bruker AXS, commented: "The performance for multi-element analysis of virtually all petrochemical products in a compact benchtop instrument makes the S2 POLAR the perfect choice for refineries, petrochemical producers, and oil manufacturers. Its excellent precision enables the analysis of ULS fuels, and quality control of additives in oils. With the S2 POLAR, Bruker further extends its strong commitment to XRF applications in the petrochemical industry."

For more information about the S2 POLAR, please visit **www.bruker.com/s2polar**

5 GOOD REASONS TO CHOOSE AN XRF BENCHTOP

XRF handhelds are a simple and affordable solution for quick and easy elemental analysis. Yes, they are easy to use, measurements are done fast, and the instruments are easy to carry. However, as a user, confidence in the measurement results and the X-ray safety is your top priority.

Therefore, the following considerations are essential for any prospective XRF handheld buyer to make a truly well-informed decision:

1. When you need a quick measurement
2. Do XRF handhelds offer flexibility for any sample?
3. But I just want an indication...
4. Are XRF handhelds safe?
5. When mobility is a requirement

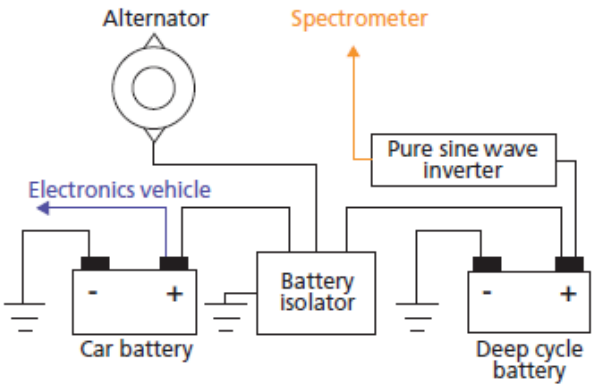
Read our blog before you invest
bit.ly/2GanpgH

Malvern Panalytical
a spectris company

MOBILE LAB AT THE BACK OF YOUR CAR

IDEAS ON HOW TO SET THIS UP

Imagine the possibility of bringing your elemental analysis to the field. Reduce the overall analysis time, have more information for quick decisions. Malvern Panalytical's portable Epsilon 1 has proven to be a rugged and reliable companion in the field, whether you are in mining and minerals, agriculture and more. To operate an Epsilon 1 in your car, simply insert a pure sine wave inverter to convert the DC power of the battery into the required AC power. The recommended option is to power the spectrometer with a dual battery system. Here we illustrate how a second battery, preferably a deep cycle battery, is installed in the car and connected, via a battery isolator, to the vehicle's alternator and car battery.



There are also other options for analysing with the Epsilon 1 in the back of your car. For instance, connecting the spectrometer to the car battery via the inverter and then analysing while the engine is running. Alternatively, you can place a second battery in your vehicle that is disconnected from the vehicle's electrical system. However, this would require you to charge the battery in between travels.

Interested to organize an efficient mobile lab? Read about how the **Epsilon 1** can be used as a fast analysis tool with its high performance silicon drift detector. Not only can you get accurate and quick analysis in only 10 minutes but you could also measure multiple elements too.

How the Epsilon 1 XRF has been used in the field:

- Mineral exploration
- Quarry & mine management
- Soil analysis to optimize fertilizers

www.malvernpanalytical.com/Epsilon1

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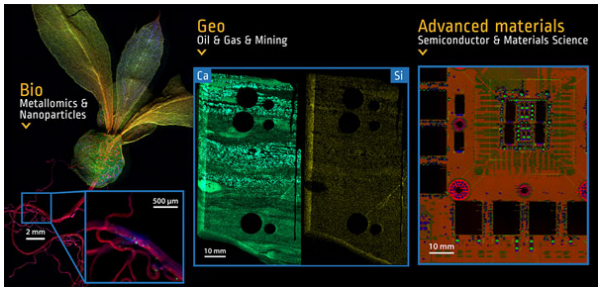
Recent AXT X-Ray Analysis Webinars

As part of AXT's ongoing educational program, we have partnered with our suppliers to bring you educational webinars about new technologies and techniques that will benefit researchers looking to stay at the cutting edge. We intend to continue to present more of these in the coming months.



MicroXRF Webinar with Synchrotron-Like Performance

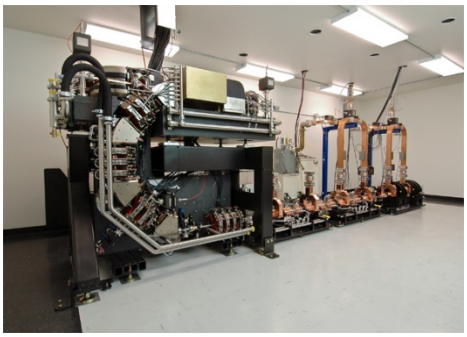
Micro x-ray fluorescence (microXRF) is a powerful non-destructive microscopic chemical imaging technique. It is common on XRF spectrometers but is also available with higher resolution and sensitivity on the synchrotron.

In this webinar, Dr Wenbing Yun from Sigray explains how they have developed technology to bring high speed, high resolution, high sensitivity microXRF with synchrotron-like performance into the laboratory. The Sigray AttoMap, which includes a patented X-ray source and optics, provides researchers with microns-scale resolution and sensitivity reaching down to the sub-femtogram level (up to orders of magnitude greater than alternative techniques).

He also discusses the application of this technology to mining, agriculture/plants, pathological tissue, semiconductor dopants, and materials science as well as how it compliments techniques such as LA-ICPMS and SEM-EDS.

To watch the webinar visit www.axt.com.au/attomap-high-resolution-high-sensitivity-microxrf/#webinar

Compact Light Source – A Local Synchrotron Alternative



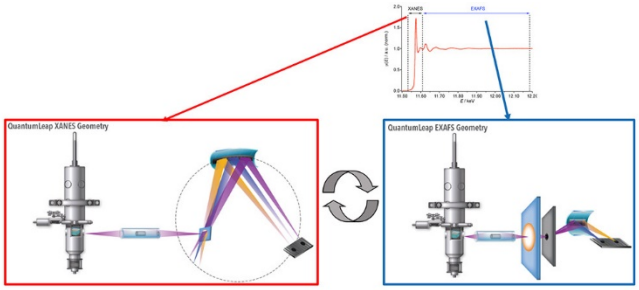
The synchrotron has become an integral part in almost every area or research. However, availability and access can be problematic.

Lyncean have developed a Compact Light Source (CLS), a system capable of synchrotron type experiments. Its compact size allows it to be easily located centrally allowing access to many researchers.

This webinar presented by Dr. Michael Feser, CEO of Lyncean Technologies reviews the technology and provides case studies to demonstrate performance in the areas of XRD, SAXS, imaging and tomography, XRF mapping, XANES, XAS as well as medical imaging and therapy.

To watch the webinar visit www.axt.com.au/lyncean-compact-light-source-a-synchrotron-alternative/

Chemical and Electronic State Determination Using Lab-Based X-Ray Absorption Spectroscopy XAS



X-ray absorption spectrometry (XAS) is a powerful synchrotron-based technique that enables determination of the chemical and electronic state of an element of interest, including oxidation state, local atomic geometry, bond lengths and co-ordination number. With recent technological developments Sigray have developed a lab-based system that allows you to carry out XANES and EXAFS experiments that normally requite a synchrotron.

Dr. Wenbing Yun, CEO of Sigray, explains the technology and how they have developed systems that bring synchrotron technology into your lab. The performance of their QuantumLeap XAS system is demonstrated with examples in mineralogy/geoscience, nanoparticle analysis, catalysts and lithium batteries.

To watch the webinar visit - www.axt.com.au/xas-x-ray-absorption-spectroscopy/#webinar

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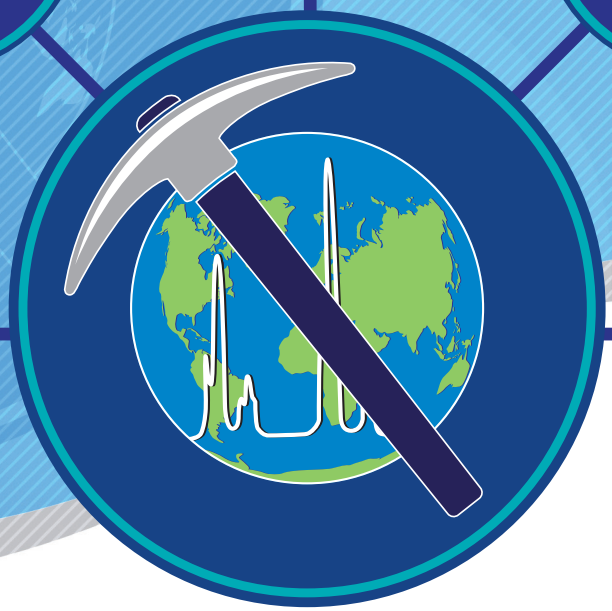

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