55th Canadian Mineral Analysts
Conference and Exhibition

PROGRAM AND ABSTRACTS

April 23-27, 2023.

Montreal, QC

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WELCOME MESSAGE

Analysts, at the heart of mining progress

As Minister of Natural Resources and Forests of Quebec, I salute the fact that the 55th Canadian Conference of Mineral Analysts is being held on Quebec soil, just like its first edition, which took place in 1969 in Abitibi-Témiscamingue.The Quebec mining sector is powered by a complete ecosystem based on science and innovation. The Government of Quebec supports these vectors of progress, in particular through various programs and measures resulting from the Quebec Plan for the Valorization of Critical and Strategic Minerals 2020-2025. The advanced expertise that we are acquiring together, the mining sector is more than ever essential to the economic development of our regions and is at the heart of major societal projects such as energy transition and the decarbonization of the economy. The potential of our different minerals could not be uncovered without the contribution of analysts working in various circles of the mining sector. In this regard, your conference represents a privileged space to encourage the acquisition, transfer and dissemination of knowledge. The future of the mining sector is promising, in particular thanks to professionals like you who devote themselves every day to its progress.
Thank you, and have a good conference!

Maïté Blanchette Vézina

Minister of Natural Resources and Forests
and Minister responsible for the Bas-Saint-Laurent region
and the Gaspésie–Îles-de-la-Madeleine region

WELCOME MESSAGE

We are pleased to host the Canadian Mineral Analysts Conference here in Pointe-Claire.

We hope that participants will be able to take advantage of their free time to visit our beautiful city. Wishing you all a successful conference.

Timothy L. Thomas

Mayor - Municipal Council

City of Pointe-Claire

WELCOME MESSAGE

On behalf of the CMA Committee, we would like to welcome the delegates to the 55th Canadian Mineral Analysts (CMA) Conference in Montreal, Quebec. We are committed to supporting the CMA and are honored in hosting this year's conference.

The City of Montreal offers multicultural activities throughout the year. We hope you will have a chance to visit the Old Port of Montreal, Jean Talon Market, and other sightseeing hot spots while you are here. We invite you to take advantage and enjoy what our city has to offer.

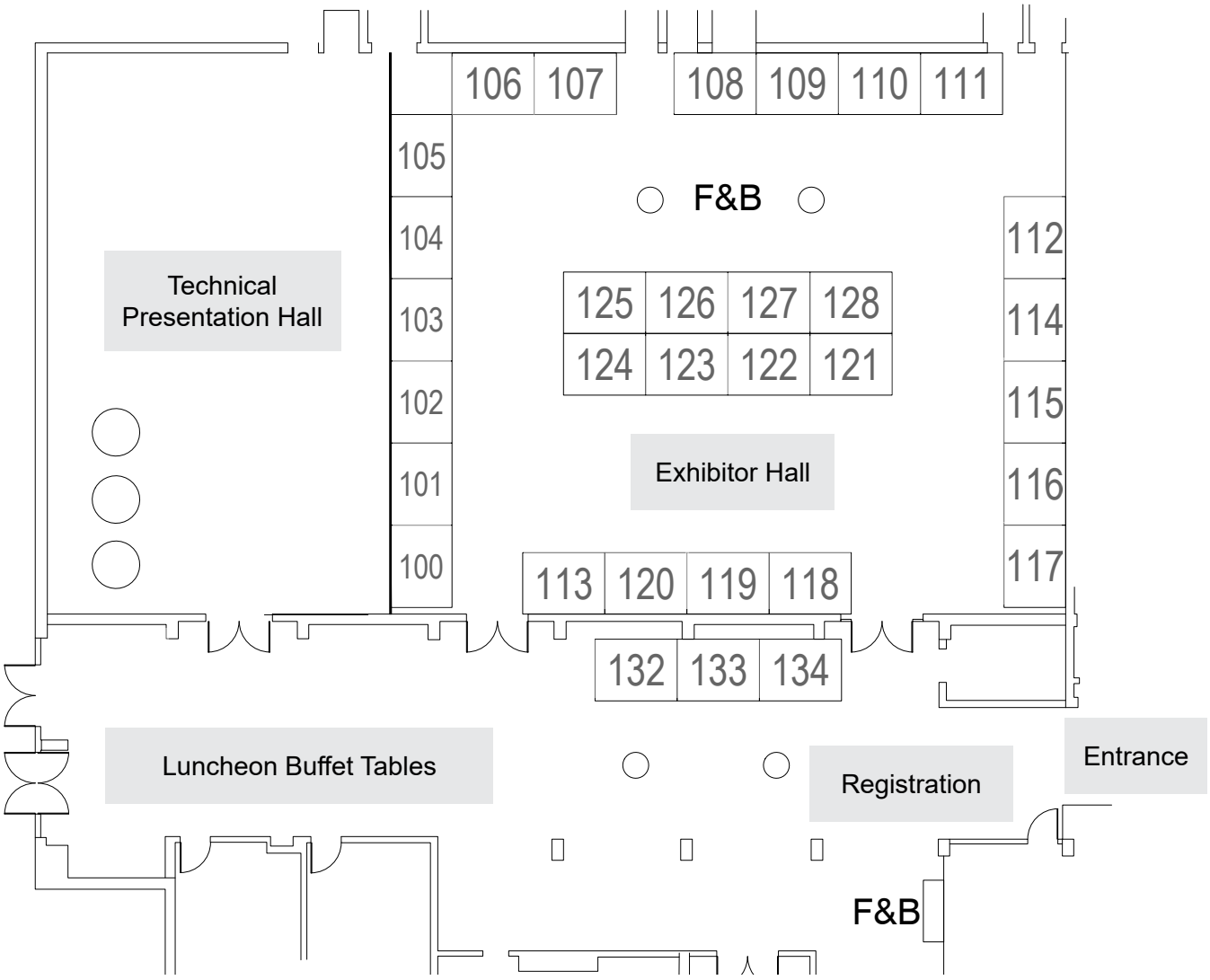
We would like to thank the exhibitors and sponsors of the conference. Without your dedicated support, we would not be able to have this conference. Your help and generosity are always welcomed.

Carl Chan,

Marketing Manager,

SCP SCIENCE

FLOOR PLAN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EXHIBITOR DESCRIPTIONS

Agat Laboratories

https://agatlabs.com/

Booth #113

Is a highly specialized Canadian company providing analytical solutions worldwide. As Canada's national privately-owned laboratory network, AGAT Laboratories is renowned for providing accurate, timely and defensible solutions to complex analytical requests with a constant focus on ensuring "Service Beyond Analysis" to its national and international clients since 1979. With coast-to-coast locations, AGAT Laboratories is comprised of 12 scientific divisions that service a wide spectrum of industries, namely, Environmental Chemistry, Mining Geochemistry, Petroleum Testing, Oil Sands Analysis, Rock Properties, Reservoir Characterization, Lubricant Testing, Air Quality Monitoring, Forensic Chemistry, Ultra-Trace and Toxicology, Food Testing, and Agricultural Analysis.

Agilent Technologies

https://www.agilent.com/

Booth #102

Leads the industry with robust, reliable instruments that provide the ability to analyze, confirm and quantify substances of interest. Our workflow solutions enable you to maintain stringent practices from sample preparation, through analysis, to final report. When combined with our informatics architecture, large quantities of data can be managed while preserving the integrity and security of the results. Agilent offers a complete line of GC, LC, MS and Spectroscopy instruments and technologies, as well as the related consumables, support and services. For more information visit our website.

AnalytiChem

https://analytichem.com/

Booth #124

We enable laboratories to achieve optimal analytical results for mission critical quality control and compliance applications. AnalytiChem supports customers in the material science, environmental, animal health and chemical industries through our well recognized portfolios of reference materials, culture media, laboratory consumables and sample preparation products. We are global, operating from ISO 17034, ISO 17025 accredited centers of excellence in North America, Europe and Australia.

Analytik Jena

Booth #104

AssayNet Canada Inc.

https://assaynetlims.com/

Booth #123

Is an IT company specializing in LIMS (Laboratory Information Management Systems) for minesite and environmental labs. AssayNet offers total data management for mine operations, making data available in real time from around the world to corporate offices. AssayNet has built its success on deep industry knowledge, with all implementation, installation and site training done by its internal support group working 24/7 to assist in any time zone. Flagship system AssayNet LIMS is robust, scalable and user friendly; uses a server-centric architecture; and offers high-end features such as web access, barcoded sample tracking, and integrated QA/QC to assay labs. Immediate benefits to labs include a centralized data system with automated data exporting to clients, reduced turnaround time and labor costs, and compliance with ISO 17025 and National Instrument 43-101 of TXS. Products and services are available in English, Spanish and French, and programs can be used in different languages concurrently.

ATS Scientific Inc.

https://www.ats-scientific.com/

Booth #103

Is a leading provider of high-quality Analytical Instrumentation, Sample Preparation and Materials Processing equipment, sales, and service across Canada. ATS' market-leading sales team includes factory trained technical specialists for many of our product lines which is complimented by one of the industry's largest factory-trained service departments. Always growing to serve our customers better, ATS Scientific Inc. recently acquired Folio Instruments Inc., addressing the growing demand in the petroleum, energy, environmental and heavy industrial industries. Since 1989, ATS has been recognized as one of the most reliable and technically focused suppliers to the Canadian scientific community.

Avantor

https://ca.vwr.com/mining

Booth #106, 107

Through its Anachemia brand and broad portfolio of trusted third-party brands – has long been the leading global provider of products and services for mining and commercial analytical laboratories. We manufacture and sell fire assay and refinery flux, crucibles, and cupels, as well as many other related products including analytical equipment, consumables, chemicals, safety products and laboratory furniture. In addition to our product portfolio, we also offer design services for both modular and permanent laboratory facilities.

Bruker AXS LLC

Booth #111

Canalytical

Booth #119

CDN Resource Laboratories Ltd.

https://cdnlabs.com/

Booth #127

Has been operational in Canada for over 25 years. The company services the mining sector with CRMs (Certified Reference Materials) which help to provide confidence in accurate results when testing for gold, silver, copper, and other important elements in ore. More specifically, these CRMs are used by laboratories to check that their instruments are operating correctly, and are also used by mining companies to ensure their laboratories are operating correctly. CDN is considered a small business in Langley, B.C., but boasts over 200 customers globally. Local customers include businesses in B.C.'s Golden Triangle, and Ontario's Timmins and Kirkland Lake region. International customers receive CDN products in the United States, Mexico, South America, Germany, Finland, Africa, Turkey, Spain, and many more. They are known in the industry as providers of a high-quality products and are great supporters of QAQC (Quality Assurance Quality Control) programs. CDN provides two main services – off-the-shelf standards which are made in advance and tailored to frequently purchased grades of elements, and custom-made standards which are prepared to order and are made from the ore of real mines to ensure a matching ore type to their customer's own ore. Having matrix-matched reference standards increases the accuracy of the laboratory results, and provides confidence that your lab is performing honestly and optimally.

CEM Corporation

http://cem.com/

Booth #133

Is a science-based technology company that has provided sample prep solutions for analytical analysis for almost 40 years. CEM manufactures systems that perform sample preparation for both gas and liquid chromatography as well as optical emission spectroscopy. CEM is proud to introduce the new BLADE microwave digestion system for ICP/MS and OES sample preparation. The BLADE is an automated sequential digestion system that will perform a complete digest in mere minutes. From routine to extreme samples, CEM's line of digestion equipment, including our popular MARS system and the BLADE, will digest it all. Stop by our booth to learn about simplifying your sample prep.

Delta Scientific Laboratory Products Ltd.

Booth #128

Elemental Scientific, Inc.

Booth #132

Elemission Inc.

https://www.elemission.ca/

Booth #117

World-class technology delivers complete solutions for researchers in all branches of science. No matter what is the type and size of the sample, and what questions are being asked, there is always a dedicated solution available to solve all required tasks. ELEMISSION manufactures LIBS instruments that can characterize light elements bearing minerals directly with signals coming from element #1 to 118.

Hoskin Scientifique

https://hoskin.ca/

Booth #115

Depuis plus de 75 ans, le service environnemental de Hoskin Scientifique fournit un soutien consultatif d'experts pour trouver le produit qui répond le mieux aux besoins de votre application. Que vous ayez besoin d'instruments de surveillance ou d'essais, de location ou de services d'entretien ou de réparation, nous sommes là où vous avez besoin de nous partout au Canada. Essais de matériaux et de produits pour les secteurs du sol, de l'asphalte, du pétrole, du béton, du ciment, de l'alimentation et des cosmétiques.

ISOSPARK Analytical Solutions

https://www.isospark.com/

Booth #125

Operates throughout North, Central and South America with a head office located in Montréal, Canada. Our company exclusively represents the SPECTRO and EDAX brands of AMETEK's material analysis division, the Los Gatos Research and FT-IR groups of ABB and ELEMISSION, a leader in Laser Induced Breakdown Spectroscopy [LIBS]. We are also the exclusive representative of QATM, a renowned manufacturer of equipment and consumables for materialography and a channel partner for ELTRA, a leading manufacturer of elemental analyzers, both divisions of Verder Scientific. We have recently joined with FINK & PARTNER, providing [FP]-LIMS analysis management software solutions for all industries, as well as with Advanced Material Solutions (AMS) to distribute the most advanced acoustic resonance NDT inspection systems.

Katanax

https://katanax.com/

Booth #122

Develops automated furnaces for sample preparation by fusion. Katanax Electric Fluxers prepare fused beads for XRF analysis and solutions for AA, ICP, and wet chemistry analysis. They can withstand the worst environment in fusion. Typical samples include cements, ores, slag, sediments, soils, rocks, ceramics, pigments, glasses and even metals. Our fluxers are the ultimate fusion machines and we are proud to support analytical laboratories in their quest for safety, efficiency, and accuracy. Get yourselves "a Katanax" for your lab and prepare to be amazed!

Laval Lab Inc.

http://www.lavallab.com/

Booth #112

Is the leading Canadian supplier of laboratory equipment. Its easy-to-use Web site bears witness to the company's complete line, which it delivers to the world. Product lines cover sample preparation (crushers, grinders, pulverizers), particle size analysis (sieve shakers, particle size analysers, sieves), zeta potential, sample division, powder blenders, XRF-sample preparation, fluxers, platinum labware, borate fluxes, and elemental analysis (LIBS) spectrometers. Each product line is extensive and comprises high value for money items. Highly experienced staff take pride in generating creative solutions to help clients increase efficiency and accuracy in laboratory analyses. If you run a laboratory, you need to visit Laval Lab online right now.

LECO

https://www.leco.com/

Booth #101

Malvern Panalytical

https://www.malvernpanalytical.com/

Booth #116

Our mining and geology customers value Malvern Panalytical's complete offerings of instrumentation, expertise and smart technologies for all steps of your mining process - from exploration to final product analysis. Lower grade ore deposits, sustainable energy and volatile market conditions pushes the mining industry towards predictive, sustainable and agile analytical solutions to improve safety, increase efficiency and develop new services and business models. Let us help you with the complete analytical chain – sample preparation, certified reference materials, highest quality instrumentation, and the expertise to help you every step of the way with your mineralogical challenges.

Metrohm Canada, Inc.

https://www.metrohm.com/

Booth #100

Is one of the world's most trusted manufacturers of high-precision instruments for laboratory and process analysis. Our instruments and methods allow customers to work in a more accurate, reliable, environmentally compatible, and cost-effective way – helping them to be more successful than their competitors. Metrohm offers a comprehensive portfolio of analytical technologies ranging from titration and ion chromatography to near-infrared and Raman spectroscopy, as well as several other techniques. Metrohm Canada is located in Mississauga and has local sales and service representations across the country. Our facility includes a laboratory and warehouse which greatly enhances our ability to support our customers from a technical perspective (analysis of customer samples) and from a supply chain management perspective (parts,consumables,instruments).

PerkinElmer

https://www.perkinelmer.com/

Booth #134

Enables scientists, researchers, and clinicians to address their most critical challenges across science and healthcare. With a mission focused on innovating for a healthier world, we deliver solutions to serve the diagnostics, life sciences, food and applied markets. We're passionate about helping customers sustain the well-being and longevity of people.

Prolite Systems Inc

http://www.prolitepiping.com/

Booth #108

Questron Technologies Corp.

https://questron.ca/

Booth #109

Located in Mississauga, Canada, Questron provides labs with high-end sample-prep solutions. Our products focus on automation of sample digestions, liquid-transfers and associated processes. Our product range includes Vulcan Workstation for block digestions, QWave Microwave Digestion System, and QBlock heated digestion blocks. As throughput, better safety, and cleaner processing become more important than ever sample testing requirements in labs, Questron's efforts to automate have become more recognized in industry. Ask us about our complete product list, totally manufactured at our facility in Canada. We would be thrilled to become your solution provider.

Radom Corporation

https://radomcorp.com/

Booth #114

Is a global leader in advanced plasma technologies, providing sustainable and innovative plasma solutions for industries including analytical instrumentation, clean tech, and hydrogen generation. The Core technology is CERAWAVETM. Our products and instruments lead to safer processes, faster performance, and the reduction of pollution with the promise of continuing to detoxify our earth. MICAP-OES 1000 small footprint and lightweight design provides trace element results where most impactful for business decisions.

Romquest Technologies

http://www.romquest.com/

Booth #118

Is the exclusive Canadian distributor for reputable manufacturers of high quality analyzers and consumables from Europe and USA. Our product lines include: Eltra Elemental Analyzers, RETSCH – Solutions in Milling & Sieving, Alpha Resources consumables, supplies, certified standards for elemental analyzers and ICP-MS Cones, GBC Scientific Equipment Pty Ltd, Eurovector CHNS/O & N-Protein Analyzers, Belec Optical Emission Spectrometers, Radwag Balances & Scales.

STG Mining

https://stgmining.com/

Booth #120

The Canadian Association for Laboratory Accreditation (CALA)

https://www.cala.ca/

Booth #121

The Canadian Association for Laboratory Accreditation (CALA) is an internationally-recognized leader in providing high quality accreditation of laboratories. CALA is signatory to the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA). CALA's commitment is to ensure that accredited laboratories have the necessary technical and management capability to produce accurate and reliable results by providing accreditation and training services. CALA promotes the use of internationally recognized standards and use of laboratory accreditation as a tool to enhance the credibility of laboratory results, to support fair trade and to protect public health and safety.

Thermo Fisher Scientific Inc.

https://www.thermofisher.com/

Booth #126

Is the world leader in serving science. Our Mission is to enable our customers to make the world healthier, cleaner and safer. Whether our customers are accelerating life sciences research, solving complex analytical challenges, increasing productivity in their laboratories, improving patient health through diagnostics or the development and manufacture of life-changing therapies, we are here to support them. Our global team delivers an unrivaled combination of innovative technologies, purchasing convenience and services through our industry-leading brands, including Thermo Scientific, Applied Biosystems, Invitrogen, Fisher Scientific, Unity Lab Services.

University of Ottawa

https://www.uottawa.ca/

Booth #105

XRF Scientific Americas Inc.

https://www.xrfscientific.com/

Booth #110

Is an Australian listed company (ASX: XRF) based in Perth, Western Australia. XRF manufactures equipment and chemicals, which are distributed to production mines, construction material companies and commercial analytical laboratories, in Australia and overseas, and used in the preparation of samples for analysis. XRF has manufacturing, sales and support facilities located in Perth, Melbourne, Europe and Canada, plus a global network of distributors. The Company has representation in the United States, South America, Africa, the Middle East and Asia. XRF's technology is used to measure the composition and purity of materials and is mainly applied in industrial quality control and in process control for manufacturing processes in industries such as metals and mining, construction materials, chemicals and petrochemicals. XRF's products help customers to improve product quality and performance, increase productivity and yield and reduce downtime and waste. Its businesses have established positions in their specialised markets.

WORKSHOPS

Workshop 1: Ethics and the Success of Your Laboratory

Presenter: France Legault, CALA Instructor
Date / Time: Monday, April 24, 2023. / 9:00 am - 12:00 pm.
Course Length: ½ day

Course Description

Good ethics are good business. Yet sometimes we all struggle to do the right thing in the workplace. Maybe we feel stressed or overwhelmed, and the easier option becomes more attractive. We could also be afraid to speak up - or just unsure what the ethical decision would be.

Ethics in the laboratory covers acting with professional integrity, understanding and abiding with impartiality and conflict of interest guidelines, and maintaining confidentiality.

This engaging training course will cover the ethics knowledge that is required to ensure laboratory activities are conducted impartially and ensuring objectivity is maintained. It includes in-depth discussions and case studies that will challenge your understanding of professional integrity and ethics.

Who should attend?

This course is for all laboratory staff, including people who:

- Conduct testing or calibration
- Support laboratory activities
- Manage the laboratory management system
- Train laboratory staff
- Manage the laboratory

Objectives

After completing this course participants will be able to:

- Understand ethical principles
- Understand the connection between professional integrity and data integrity
- Implement systems that include requirements for impartiality and confidentiality in the laboratory

Workshop 2: Calibration for Analytical Measurements

Presenter: Dr. Nimal DeSilva Faculty Scientist, University of Ottawa
Date / Time: Tuesday, April 25, 2023. / 9:00 am - 12:00 pm.
Course Length: ½ day

Course Description:

- Overview of Basic Statistics
- Types and Propagation of Errors
- Signal Noise, Uncertainty and Dynamic Range
- Linear and Non-linear Regression for Calibration
- Weighted versus Un-Weighted Regression
- Optimum selection of Calibration Range and Standard Intervals
- Gravimetric versus Volumetric standards, and their Preparation
- Real World: Non-Linearity, Matrix effects, Blanks, Signal Drift
- Remedies: Standard Addition, Internal Standards, Drift Correction, Non-linear Calibration, Use of multiple responses
- Use and Misuse of Dynamic Range
- Evaluation and Visualization of Calibrations and Data from Large Data sets using EXCEL

Although the material discussed is universally applicable, examples will be taken mainly from ICP-ES, ICP-MS and Chromatography.

TECHNICAL SESSIONS

Technical Presentation Schedule for Monday, April 24, 2023.

Timeslot	Presenter	Co-author	Title	Category
1:00 pm - 1:20 pm	**Vincent Hamel;** *Katanax Inc.*	Marc Boivin	Understanding the fusion parameters to obtain the best XRF results	Sample Preparation
1:20 pm - 1:40 pm	**Elizabeth Sirianni;** *New Gold Inc*		Laboratory Preparation and Analysis of Metallic Samples	Sample Preparation
1:40 pm - 2:00 pm	**Smita Mohanty;** *University of Ottawa*	Chandrika Liyanapathirana, Nimal De Silva	A sensitive and rapid method for the determination iodine in soil by microwave digestion followed by Inductively Coupled Plasma Mass Spectrometry	Sample Preparation
2:00 pm - 2:20 pm	**François R. Doucet;** *ELEMISSION Inc.*	Lütfü Çelebi Özcan, Kheireddine Rifai	ECORE: the art of bringing quantitative automated mineralogy and chemical assays directly on drill cores	Automation
2:20 pm - 2:40 pm	**Arnoux van der Westhuizen;** *FLSmidth Ltd*		Advances in automated wet chemistry sample preparation and Analysis for Gold assay laboratories	Automation
2:40 pm - 3:00 pm	**Kevin McKinley;** *CALA*	Ema Gitej	Mitigating Risks with ISO/IEC 17025:2017 Accreditation for mineral testing labs	ISO / Quality Control
3:00 pm - 3:30 pm	**Coffee Break (Sponsored by Agilent)**			
3:30 pm - 3:50 pm	**Chantal Jolette;** *OREAS North America*		Why it is important to use high quality CRMs	ISO / Quality Control
3:50 pm - 4:10 pm	**Edgar Paski;** *Analytical Innovations*		Control Charts for Multianalyte Tests	ISO / Quality Control

Timeslot	Presenter	Co-author	Title	Category
4:10 pm - 4:30 pm	**Dr. Audrey Moores;** *McGill University*		Women in Green Chemistry	Personal Development
4:30 pm - 4:50 pm	**Gordon Walker;** *Independent*		Career and Leadership	Personal Development

Technical Presentation Schedule for Tuesday, April 25, 2023.

Timeslot	Presenter	Co-author	Title	Category
1:00 pm - 1:20 pm	**Craig West;** *ColdBlock Technologies*	Lorie Anne Doig, Affiliation: ColdBlock Director Lab Services	ColdBlock Strong Acid Digestion replaces traditional 4-acid digestion	New Methods / Innovation
1:20 pm - 1:40 pm	**Christine Rivera;** *Radom Corporation*	Eric Moen	Title: Innovative Microwave Inductively Coupled Atmospheric Plasma – Optical Emission Spectroscopy (MICAP™-OES 1000) Flexible Sample Matrix and Full Spectrum Acquisition	New Methods / Innovation
1:40 pm - 2:00 pm	**Ruth Merrifield;** *PerkinElmer Inc.*	Aaron Hineman	Accurately Quantifying Rare Earth Elements by the NexION 5000 multi-quadruple ICP-MS	New Methods / Innovation
2:00 pm - 2:20 pm	**Alex Kuhnert;** *Ernesto Technical and Advisory Services*		How does Innovation Break Through in the Canadian Mineral Analysis Market Some Recent Case Studies with Key Learnings	New Methods / Innovation
2:20 pm - 2:40 pm	**Julia Sedlmaira;** *Bruker*	Sid Pharasi, Arkady Bumana	Benchtop ED-XRF for Improved Quantification of Total Rare Earth Content	New Methods / Innovation
2:40 pm - 3:00 pm	**Sandeep Kumar;** *PerkinElmer Inc.*	Aaron Hineman	High Precision Elemental Analysis in Cathode Materials of Li-Ion Battery: Major Elements Determination in Lithium Nickel-Manganese-Cobalt Oxide using Avio 500 series ICP-OES	New Methods / Innovation
3:00 pm - 3:30 pm	**Coffee Break (Sponsored by Laval Lab inc.)**			
3:30 pm - 3:50 pm	**Christine Rivera;** *Radom Corporation*		Design and Performance Review of Innovative Microwave Inductively Coupled Atmospheric Plasma – Optical Emission Spectroscopy (MICAP™-OES 1000) Utilized in Determination of Elements in Matrix Reference Materials and In-Service Lubricating Oils Diluted with PremiSolv	New Methods / Innovation

Timeslot	Presenter	Co-author	Title	Category
3:50 pm - 4:10 pm	**Bartosz Jasiak;** *Analytik Jena US LLC*		Determination of precious and platin-group metals in copper ores and intermediate copper products	New Methods / Innovation
4:10 pm - 4:30 pm	**Chantal Audet;** *Malvern Panalytical*		Optimizing sample preparation for elemental monitoring in mining and ore processing with innovative developments in fusion instrument	New Methods / Innovation
4:30 pm - 5:00 pm	**Kurt Headrick;** *Glencore*		Neutron Activation Analysis	New Methods / Innovation

Technical Presentation Schedule for Wednesday, April 26, 2023.

Timeslot	Presenter	Co-author	Title	Category
8:30 am - 8:50 am	**Bastian George;** *Agilent Technologies*	Clint Walker, Michael O'Byrne, and Jean-Louis Cabral	10 Years of ICP-MS/MS	Critical and Battery Metals
8:50 am - 9:10 am	**Marie-Eve Provencher;** *Malvern Panalytical*		Why a sustainable future depends on better lithium mining and accurate mineralogical analysis	Critical and Battery Metals
9:10 am - 9:30 am	**Greg Gilleland;** *Agilent Technologies*		Analysis of Trace Constituents in Anode and Cathode Materials used in Lithium Ion Batteries	Critical and Battery Metals
9:30 am - 9:50 am	**Longbo Yang;** *Agilent Technologies*	Marc-Andre Gagnon, Neli Drvodelic	From Brines to Minerals – Agilent's Atomic Solutions for Lithium Mining Industry	Critical and Battery Metals
9:50 am - 10:20 am	**Coffee Break (Sponsored by Actlabs)**			
10:20 am - 10:40 am	**Jérémie Asselin;** *Malvern Panalytical*		Solutions to resolve key challenges with critical minerals and production of battery energy materials to improve production yield and devices performance	Critical and Battery Metals
10:40 am - 11:00 am	**Luc Dionne;** *ThermoFisher Scientific Inc.*		Application of Analytical Techniques to Raw and Recycled Battery Material Analysis	Critical and Battery Metals
11:00 am - 11:20 am	**Jessica Giles;** *CEM Corporation*		Recent advances in microwave digestion for Li Battery materials	Critical and Battery Metals

Timeslot	Presenter	Co-author	Title	Category
11:20 am - 11:40 am	**Geoff William;** *ATS Scientific*		Sample Preparation… Easily Overlooked	Critical and Battery Metals
11:40 am - 12:00 pm	**Kevin French;** *Vertex Environmental*		How the Design, Construction and Performance of Passive Treatment Barriers for ML/ARD Keeps Getting Better	Critical and Battery Metals

LIST OF ABSTRACTS

Optimizing sample preparation for elemental monitoring in mining and ore processing with innovative developments in fusion instrument.

Presenter: Chantal Audet; Malvern Panalytical

The concept of the analytical chain embraces all the steps involved in a sample from its raw state to the production of analytical data. Accurate and precise elemental analysis is possible when implementing a robust and reliable analytical chain, which in turn relies on optimal sample preparation and calibration. Ensuring that all elements of interest fulfill mineral specifications and quality standards is a key factor in developing simpler and less-time consuming sample preparation strategies for XRF analysis.

Our latest research on fusion has shown that a judicious combination of improved mixing methods with a cutting-edge furnace design speed up the sample preparation.

Coupled with the use of WROXI (Wide Range OXIdes) synthetic CRMs—a complete XRF solution optimized for a wide range and accurate calibrations— our new fusion system was found to provide high throughput levels without compromising the quality of analytical results.

This optimized sample preparation is totally integrated in our analytical process solutions which includes sample tracking capabilities, quality monitoring, simplified fusion methods, use of high-quality chemicals, automated weighing, and certified calibration standards.

Understanding the fusion parameters to obtain the best XRF results

Presenter: Vincent Hamel; KATANAX INC.
Co-author: Marc Boivin

Borate fusion is known to be one of the best sample preparations for analysis with XRF. However, it can be a complex preparation to work with and different parameters have an impact on the analytical results. This presentation will focus on understanding these parameters, before and during the fusion, to help the users achieve a stable method that gives good results.

Sample Preparation… Easily Overlooked!

Presenter: Geoff Williams; ATS SCIENTIFIC INC

This talk presents a comprehensive approach to sample preparation for a variety of samples, prior to elemental analysis. The methods involve the use of microwave digestion and auto-dilution techniques to achieve reliable and accurate results. Prior to analysis, samples are reduced using Retsch Jaw crushers, ensuring efficient and consistent sample preparation. Samples can then be subsampled and digested via our Milestone microwave systems. Once digested, automated dilution provides accurate and precise results for a range of sample matrices, including environmental and geological samples. By utilizing tools such as Teledyne Cetac's Simprep, you can reduce human error and increase the efficiency of the analysis sequence.

This process provides a reliable and efficient solutions for sample preparation to streamline your analysis process for metals analysis, providing accurate and reliable results.

Laboratory Preparation and Analysis of Metallic Samples

Presenter: Elizabeth Sirianni; NEW GOLD INC.

Obtaining representative, accurate results from heterogeneous samples poses a challenge for assayers. The "nugget" effect of gold or other metallic

particles, as well as the potential for cross-contamination in sample prep equipment or instrumentation, can cause undesirable data variation if not approached with care. This presentation will focus on the methods used for two sample streams containing metallic elements encountered at the New Afton Mine. Application of sampling theory and the techniques taken to improve accuracy and mitigate error in sample preparation and analysis are discussed.

A sensitive and rapid method for the determination iodine in soil by microwave digestion followed by Inductively Coupled Plasma Mass Spectrometry

Presenter: Smita Mohanty; UNIVERSITY OF OTTAWA
Co-Author: Chandrika Liyanapathirana
Co-Author: Nimal De Silva

Iodine is a micronutrient essential for human health. Dietary supplementation, by means of iodised salt, is commonly used to address global prevalence of iodine deficiency (ID) disorders. However, efforts to reduce salt consumption to alleviate other chronic health diseases such as high blood pressure and other heart complications could impair the effectiveness of such preventive measures. On the other hand, biofortification is an alternative strategy to address ID, as iodine stored in food is readily bioavailable. Therefore, it is important to understand the iodine-soil-crop dynamics, which demands the need for efficient and sensitive analytical methods for the determination of iodine in soil.

Available methods for the determination of iodine in soil are primarily based on reaction catalysis, spectrophotometry, neutron activation analysis, pyrohydrolysis-ICPMS, etc. which are time consuming, labour intensive, prone to interferences, and of poor sensitivity. Based on microwave digestion with Tetra Methyl Ammonium Hydroxide (TMAH), we have developed a rapid extraction method, followed by sensitive measurement with ICPMS following direct dilution of the digestate. Method was validated using certified soil reference material (NIST SRM2709) with a limit of detection 0.016 ppm (16 ppb) in the dry solid.

ECORE: the art of bringing quantitative automated mineralogy and chemical assays directly on drill cores

Presenter: François R. Doucet; ELEMISSION INC
Co-author: Lütfü Çelebi Özcan
Co-author: Kheireddine Rifai

Laser-induced breakdown spectroscopy (LIBS) is an analytical method that utilizes lasers to produce light emission from samples and analyze their chemical composition using atomic emission spectroscopy. LIBS has been increasingly used in recent years as a powerful tool for bringing microanalysis to macroscale for automated mineralogy. This is due to its several advantages, such as non-destructive sample analysis and ultra-fast data acquisition (1300 measurements per seconds, dwell time of 770 µs). Furthermore, LIBS is compatible with automated mineralogical analysis, making it a suitable method for large-scale and high-throughput mineral analysis in a variety of industries, including mining, metallurgy, and geology directly on the sample without sample preparation.

The LIBS technology allows for the measurement of the chemical composition of minerals in real-time (seconds), providing detailed information about the mineral's elemental composition and phase identification. This information is critical for mineralogical characterization and analysis, as it provides valuable insights into the mineral's properties, behavior, and potential applications. In the mining industry, the ECORE LIBS technology is currently the only approach able to discriminate light-elements bearing minerals for critical minerals such as lithium.

This paper reports an ultra-fast and inexpensive automated method of instrumental analysis that will accelerate decision-making in exploration, and its exploitation directly on crushed ore or drill cuttings. Mineral characterization for several commodities including lithium, copper, silver, gold, PGE, REE and more will be presented.

In conclusion, LIBS is a powerful tool that is revolutionizing the field of mineral analysis by bringing microanalysis to macroscale for automated mineralogy. Its ultra-fast, non-destructive, sensitive to light elements, and high-throughput capabilities make it an ideal method for a variety of applications in the mining, metallurgical, geological, and environmental industries.

Advances in wet chemistry automation technology in the minerals industry

Presenter: Arnoux van der Westhuizen; FLSMIDTH LTD

Mitigating Risks with ISO/IEC 17025:2017 Accreditation for mineral testing labs

Presenter: Kevin McKinley; CALA
Co-author: Ema Gitej

ISO/IEC 17025:2017 is the international standard for testing and calibration laboratories, and it provides guidelines for the management of laboratory activities. Accreditation to this standard indicates that a laboratory is competent and operates under a well-defined management system, ensuring the reliability and accuracy of its results. Mineral testing labs can benefit from accreditation to this standard in several ways, including mitigating risks associated with their testing activities.

Here are some ways in which accreditation to ISO/IEC 17025:2017 can help mineral testing labs mitigate risks:

Ensuring accuracy and reliability of test results: ISO/IEC 17025:2017 requires laboratories to have a quality management system that ensures the accuracy and reliability of test results. This includes ensuring that the test methods used are valid, that equipment is calibrated and maintained, that staff are trained and competent, and that records are maintained.

Reducing the risk of errors and mistakes: Accreditation to ISO/IEC 17025:2017 requires laboratories to have procedures in place to identify and manage risks associated with their testing activities. This includes identifying potential sources of errors or mistakes and taking steps to reduce or eliminate them.

Improving customer confidence: Accreditation to ISO/IEC 17025:2017 is a globally recognized symbol of competence and reliability. Customers can be confident that the test results provided by an accredited laboratory are accurate and reliable, which can help to build trust and confidence in the laboratory's services.

Complying with regulatory requirements: Accreditation to ISO/IEC 17025:2017 can help mineral testing labs demonstrate compliance with

regulatory requirements. This can be particularly important in industries such as mining, where accurate testing of mineral samples is essential for complying with safety and environmental regulations.

Facilitating international trade: Accreditation to ISO/IEC 17025:2017 can facilitate international trade by providing a recognized standard for laboratory competence. This can help to remove barriers to trade and reduce the need for additional testing or certification.

In summary, accreditation to ISO/IEC 17025:2017 can help mineral testing labs mitigate risks associated with their testing activities by ensuring the accuracy and reliability of test results, reducing the risk of errors and mistakes, improving

Control Charts for Multianalyte Tests

Presenter: Edgar Paski; ANALYTICAL INNOVATIONS

Control charting is an essential tool for quality management in assay laboratories. Control charting techniques in current use are geared for single analyte tests, when applied to multianalyte tests such as ICP-OES, XRF the Type I inference error increases as the number of analytes increases, resulting in very high numbers of QC failures. Current practice is to chart only a few selected “important” analytes for control charting, resulting in minimal, if any, QC for most analytes tested.

The Euclidian Distance approach for charting multianalyte tests has been shown to have the same Type I inference error regardless of the number of analytes tested. In this presentation the Type II inference error properties of the Euclidian Distance approach is shown. The experimental situation examined is 50 analytes for a control sample on 500 test runs, a total of 25,000 test results. The data matrix was populated with Gaussian distributed random numbers. Bias was added from 0.1 z units to 5.0 z units to selected analytes ranging from all 50 analytes biased to only one analyte biased.

This approach simulates commonly encountered situations such as dilution error, calibration error, contamination, selective analyte extraction errors during sample digestion / dissolution.

Why it is important to use high quality CRMs

Presenter: Chantal Jolette; OREAS NORTH AMERICA

Career & Leadership

Presenter: Gordon Walker

Younger people can often have difficulty in visualizing career progression and how best to advance themselves in their organization. Some see the company structure as rigid and unchanging, but this view is often formed after an unreasonably short time frame. The reality is that organizations are changing, evolving and normally growing creating opportunities for those willing to rise up and do so earlier in their careers.

People should realize that there are methods to promote themselves by filling vacuums in organizational structures. Leaders are always looking for such people and often don't find them quickly enough. Demographics being what they are, there are shortages of people at all levels, opportunity knocks, it's imperative that people answer the door.

In promoting themselves individuals can add value to their organizations, themselves and gain a richer working environment.

Training and ongoing learning are important, not just specific training, but general training about the sector so that the individual has a better understanding of the context in which their company finds itself on the spectrum of the industry. Doing so makes for a more well rounded employee, one who can communicate more effectively to others in the industry - it also opens doors to business development and more senior management roles.

Once promoted people need to learn the skills of leadership quickly in environments where that's not often taught and/or people lack mentors. There are a few tricks of the trade that can greatly help new leaders to become better leaders faster and ideally with less stress than could otherwise be the case.

The results of self promotion, ongoing training and being an effective leader will lead to a more enriching and rewarding career, and people who are more valuable to the organizations they work for.

ColdBlock Strong Acid Digestion replaces traditional 4-acid digestion

Presenter: Craig West; COLDBLOCK TECHNOLOGIES
Co-Author: Lorie Anne Doig
Co-author - Affiliation: ColdBlock Director Lab Services

In January 2023 ColdBlock Technologies published its new Strong Acid Digestion method. This method was developed to provide laboratories with a faster, safer alternative to traditional 4-acid digestion methods, while still providing the same accuracy and repeatability across sample types and matrices.

We will be presenting this new method and sharing results from our in-house testing of a 10 different CRM's. With ColdBlock's new Strong Acid Digestion method, digestion cycle time is reduced from >1.5hrs to just 30 minutes. Of note, this is accomplished without the use of dangerous perchloric acid.

This new method utilizes ColdBlock's new Pro Series CBM digester – a 16-sample digester that can be scaled up into a 32/48/64-sample platform. It also utilizes ColdBlock's new test tube liners that permit the use of hydrofluoric acid.

Results demonstrate high recoveries relative to stated CRM expected values, and well within acceptable ranges for each CRM type. The results show potential for use with base metal, lithium, and uranium samples and wide range of matrices.

This new method is currently being rolled out for use at several commercial laboratories.

Accurately Quantifying Rare Earth Elements by the NexION 5000 multi-quadruple ICP-MS

Presenter: Ruth Merrifield; PERKINELMER INC.
Co-author: Aaron Hineman

Identifying deposits of rare earth elements (REE) that are economically viable to extract has become increasingly important. REEs have some desirable magnetic, luminescent and electrochemical properties that are desirable in high-tech industries from TV and computer screens to aircraft engines and high-power magnets. These properties are dependent on purity of the element. However, the same properties that make them desirable to industry can also make them difficult quantify analytically due to their ability to form oxides and double charges, causing interferences on other REE and other impurities such as arsenic and selenium respectively. The NexION 5000 multi-quadruple ICP-MS is perfectly suited to the analysis of such difficult elements due the unique powered interface and universal cell technology, making it ideal for reaction mode analysis necessary for REE analysis. Here we describe advanced ICP-MS techniques for accurately quantifying REE elements and removing the interferences caused by utilizing multi-quad ICP-MS and advanced reaction cell technology, and describe how these are utilized in applications.

Innovative Microwave Inductively Coupled Atmospheric Plasma – Optical Emission Spectroscopy (MICAP™-OES 1000) Flexible Sample Matrix and Full Spectrum Acquisition

Presenter: Christine Rivera; RADOM CORPORATION
Co-Author: Eric Moen

Due to the power, exhaust, weight and gas supply constraints, traditional high performance atomic spectroscopy instruments are designed for laboratory use.

MICAP-OES 1000 operates on industrial grade (99.98%) nitrogen and 1000 W power. The technology to create the stable plasma is called Cerawave™ which replaces the traditional water-cooled coil RF generators. The design of a light-weight modular component microwave plasma with an echelle-based,

research grade spectrometer provides real-time full spectrum elemental fingerprint wherever needed.

MICAP-OES 1000 is the frontline defense to capture critical elemental information, providing results for quick decisions in environmental monitoring, mining exploration and manufacturing processes.

This presentation will highlight MICAP performance for mining which will include accuracy, precision and robustness.

Benchtop ED-XRF for Improved Quantification of Total Rare Earth Content

Presenter: Julia Sedlmaira; BRUKER AXS
Co-Author: Sid Pharasia
Co-Author: Arkady Bumana

The mining of Rare Earth Elements (REE) is an important industry and the high value of these REEs makes it even feasible to mine for trace values. Due to their genesis, REEs are usually find all together in specific geological formations like carbonatite, clays, sediments and even Coals.

Determining if a location is worth for mining extraction is important due to financial but also ecological considerations. ED-XRF can be a quick and accurate method to measure indicator elements like Yttrium to determine the total REE concentration (TREE) in a sample. Unlike low power ED-XRF system, a benchtop system can easily determine ppm levels of Y, and at the same time does not require and extensive set up like a floor standing WD-XRF model.

In this short talk we discuss the correlation of TREE with and indicator element and provide more detail on sample preparation and expected accuracy.

How does Innovation Break Through in the Canadian Mineral Analysis Market? Some Recent Case Studies with Key Learnings

Presenter: Alex Kuhnert; ERNESCO TECHNICAL + ADVISORY SERVICES INC.

How does new technology and innovation reach Canada and the savvy mineral analyst?

The mining cycle (with its massive cash flow droughts) and (ever crushing industry) consolidation are 2 critical barriers to entry.

Four technical marketing case studies are discussed with key learning points presented.

Design and Performance Review of Innovative Microwave Inductively Coupled Atmospheric Plasma – Optical Emission Spectroscopy (MICAP™-OES 1000) Utilized in Determination of Elements in Matrix Reference Materials and In-Service Lubricating Oils Diluted with PremiSolv.

Presenter: Christine Rivera; RADOM CORPORATION

Proper maintenance scheduling for critical engine and field machines should be considered to minimize cost, extend lifetime, and maximize performance. A regular maintenance schedule can be hard to implement based on the amount of service hours required in remote locations.

Radom MICAP-OES 1000 is a microwave inductively coupled atmospheric plasma which operates on industrial grade (99.9%) nitrogen and 1000 W power. The technology to create the stable plasma is called Cerawave™ which replaces the traditional electric water-cooled coil coupled to an RF generator. The result is no argon and no chiller required. The benefits are a light-weight, compact instrument with the lowest carbon footprint and lowest cost per sample. This design can perform critical analyses for elements which indicate engine performance.

High Precision Elemental Analysis in Cathode Materials of Li-Ion Battery: Major Elements Determination in Lithium Nickel-Manganese-Cobalt Oxide using Avio 500 series ICP-OES

Presenter: Sandeep Kumar; PERKINELMER INC.
Co-author: Aaron Hineman

Lithium ion batteries are state-of–art power sources and widely used in variety of applications such as portable electronic devices, electric vehicles, and bikes. Precise and accurate determination of major elemental content is very important for performance and quality control of these Li-Ion batteries. This presentation will discuss the analytical requirements and challenges of cathode materials analysis, common methods, continuous real-time simultaneous internal standardization (CRTSIS approach), and analysis results.

Determination of precious and platin-group metals in copper ores and intermediate copper products

Presenter: Bartosz Jasiak; ANALYTIK JENA US LLC

Nowadays, the demand for precious and platin-group metals (PGMs) has increased with the significant growth of economy. Chalcopyrite (CuFeS2) is the world’s most important copper ore. During the extraction of copper, the ore is concentrated using flotation and smelting processes. Resulting waste matter named slag is separated and often contains high amounts precious metals and PGMs. Thus, copper ore, slags and copper concentrates are analyzed for being a potential source of these valuable elements. In this study, results were achieved by taking advantage of the superior resolution (2 pm @ 200 nm) and the high sensitivity of the PlasmaQuant 9100 Elite. Additionally, application advantages originating from the implementation of powerful software tools (ABC, CSI) for background correction and removing spectral interferences are presented.

10 Years of ICP-MS/MS

Presenter: Bastian Georg; AGILENT TECHNOLOGIES

In 2012, Agilent forever changed ICPMS with the introduction of the first ever commercial ICP-MS/MS platform, the Agilent 8800. The unique mass-analyser consisted of two full-sized quadrupoles, one in front and one behind the octupole reaction/collision cell. The performance of the MS/MS mass analyzer was driven by the patented 5-stage vacuum system, which houses each quadrupole in a dedicated high vacuum region to provide low abundance sensitivity (<1x10-10), low backgrounds (<0.2cps), mass resolution of <1u (both quadrupoles) and thus allowed for a full exploitation of reaction modes in MS-MS mode. This unique design afforded a unique instrument platform that combined the ease-of-use and scan speeds of quadrupole based ICPMS with interference handling capabilities outperforming high resolution sector-field ICPMS systems, providing unmatched ICPMS performance. The ICP-MS/MS technology was quickly adopted into laboratories across the globe, resulting in a strongly growing number of research publications and new ICPMS applications. Taking the lessons learned from the 1st ever ICP-MS/MS, Agilent introduced a new, more powerful, generation of ICP-MS/MS systems, the Agilent 8900, in 2016. Join us for a 10th anniversary celebration of ground-breaking ICP-MS/MS technology and a brief history of Agilent's ICP-MS/MS technology.

Why a sustainable future depends on better lithium mining and accurate mineralogical analysis

Presenter: Marie-Eve Provencher; MALVERN PANALYTICAL

While lithium batteries have the potential to power a range of green technologies, true sustainability is only possible if batteries themselves are sustainably produced – and this all starts right at the beginning of the battery-making process. Mining and processing lithium efficiently depend on fast mineral characterization, to ensure both better monitoring and maximum recovery rates for lithium minerals during separation. Lithium is produced from two types of deposits: lithium-rich brines (dissolved lithium chloride), called salars, or hard-rock granite pegmatite deposits (lithium minerals, spodumene, petalite and lepidolite). As these processes can also benefit from monitoring the particle size (at-line or on-line) as well as elemental analysis for the process liquors a special focus will be given to accurate mineralogical analysis. The use of x-ray diffraction (XRD) to monitor mineral composition of lithium ore, concentrates and products before and after heat treatment (α,β-spodumene) as well for the analysis of the different evaporation phases during the treatment of brines will be discussed. The data evaluation shows that due to variable mineralogy blending of different lithium ore grades could improve the beneficiation process.

Analysis of Trace Constituents in Anode and Cathode Materials used in Lithium Ion Batteries

Presenter: Greg Gilleland; AGILENT TECHNOLOGIES

With the growing appetite for energy storage solutions, Li-ion batteries have been the focus of a great deal of research and development over the last few years. We will discuss the analysis of multiple anode and cathode materials for both major constituents and trace impurities using the Agilent 5900 ICPOES.

Application of analytical techniques to raw and recycled battery materials analysis

Presenter: Luc Dionne; THEMRO FISHER SCIENTIFIC

As part of the global initiative on sustainability and green energy, battery electric vehicles (BEVs) are rapidly gaining in popularity and their share of the vehicle market is expected to increase at least 10-fold over the next decade. For comparison purposes, the value of the global lithium-ion battery market is expected to reach 93.1 billion USD by 2025. Development of lithium-ion batteries and research into their materials is at the forefront of the energy sector as it moves away from fossil fuels. It is also not surprising consequently that recycling is one of the major topics for lithium-ion batteries. The objectives of this presentation are to demonstrate the application of ICP-OES and ICP-MS techniques for the analysis of impurities and bulk elements in lithium-ion batteries. This presentation will cover raw material application examples as well as the analysis of recycled materials.

From Brines to Minerals – Agilent's Atomic Solutions for Lithium Mining Industry

Presenter: Longbo Yang; AGILENT TECHNOLOGIES
Co-author: Marc-Andre Gagnon
Co-author: Neli Drvodelic

As a key raw material in the production of high density and rechargeable batteries, Lithium has been heavily sought after in recent years. The two major sources for lithium are 1) lithium brines, which includes salt-lake brine, seawater, geothermal brine etc., and 2) lithium bearing minerals, most commonly spodumene, petalite and lepidolite from pegmatite deposits. Both sources have respective advantages when it comes to mining, with Lithium brines accounting for over 70% of the total lithium reserve, while hard rock pegmatite mines having much higher grade of LiO_2 at around 1~4%. Meanwhile, exploration and extraction for both types of resources face technical challenges that require information on the chemical compositions of the brines/ores, demanding effective analytical solutions for these sample types. However, lithium brines and mineral fusion digests have heavy and complex matrices with high total dissolved solids (TDS) which promote deposition and clogging in the sample introduction systems while introducing spectral and non-spectral interferences. These samples require robust atomic spectroscopy instrumentation and appropriate methods for routine

analysis on an operational basis. Agilent Technologies have developed several methods for fast and accurate analyses of lithium and other major and minor elements in lithium brines and spodumene digests, using the Agilent 5800 VDV ICP-OES and Agilent 240 FS AAS. These methods focus on sample preparation, speed, detection limit, carryover management as well as ease of use, providing a complete suite of solutions for the lithium mining industry.

Recent advances in microwave digestion for Li Battery materials

Presenter: Jessica Giles; CEM CORPORATION

Electrification is the rage in both EV car production as well as energy storage and other mobile applications. It is a worldwide phenomenon with more that 40 million electric vehicles having been sold since 2012 and the numbers are doubling every two years. China leads the world in EV car sales but the North American market will be the fastest growing market in the next few years as more US car manufacturers offer these vehicles and government incentives help the consumer with the cost of ownership. The lithium battery is the heart of all of these electric vehicles. However, many other elements such as iron, cobalt, nickel and manganese to name a few are also in great demand. The challenge is not only to be able to mine these elements to meet production capacities but to refine them to provide the highest purity materials as possible. Impurities are the nemesis to the industry reducing efficiencies, battery life and even safety. The ability to quantify materials into the low and sub ppb range will be critical as this industry looks towards the next generation of batteries. CEM recently launched the BLADE microwave digestion system. The BLADE is a high performance automated system designed to meet the challenges of the high temperature and pressure conditions required to prepare the variety of anode, cathode, separator and electrolyte materials used in battery construction. We will show digestion conditions and results for a wide variety of samples identified above.

Analytical solutions to key challenges in production and quality control of battery materials to improve device performance

Presenter: Jérémie Asselin; MALVERN PANALYTICAL

Optimizing the production of battery components while monitoring their quality characteristics in each step of the fabrication process is critical to the perennity of this sector of economic activity. From the characterization of raw materials to cell assembly, a range of analytical solutions aiming at improving cell production efficiency and at minimizing waste can be used. In particular, the application of X-Ray Fluorescence (XRF) and Laser Diffraction (LD) technologies has proven to be suitable to determine key factors affecting the performance of final products. We will demonstrate that a judicious combination of XRF and LD technologies is a winning strategy to monitor the morphology and the chemical composition of battery materials, which are known to be closely related to battery performance.

Benchtop energy-dispersive (ED-XRF) and floor-standing wavelength-dispersive (WD-XRF) instruments have been used for the elemental analysis of powders and liquid samples with good results in terms of precision and accuracy. In this regard, the control of purity of anode/cathode precursors and the monitoring of quality of final products and recycled battery wastes can be achieved easily, with high throughput and reliability. In addition, LD allows for rapid and precise measurements of the particle size distributions for both raw precursors and produced anodic/cathodic powder materials. Throughout the electrode production steps, particle sizes are crucial to attain optimal performance of batteries and to ensure the highest electrode quality. As such, controlling the quality of processes by characterizing both the composition and the size of the materials that compose the electrode in batteries.

How the Design, Construction and Performance of Passive Treatment Barriers for ML/ARD Keeps Getting Better

Presenter: Kevin French; VERTEX ENVIRONMENTAL

Metal leachate and acid rock drainage (ML/ARD) are common issues at mine sites and at other industrial sites, such as metal plating operations. When such sites are situated in the vicinity of surface water bodies, or the groundwater plumes extend to property boundaries, this can pose environmental risks to aquatic life and/or can result in significant regulatory or legal liability. The long-term presence of ML/ARD at such sites requires an equally long-term solution.

Recent developments have allowed the design and long-term performance of passive treatment barriers for groundwater plumes containing heavy metals to be assessed.

This talk will present:

- ML/ARD related contaminants of concern that can be treated via these passive treatment barriers;
- Recent advances in barrier design, installation and validation techniques that make the performance of these barriers more certain and better than ever; and
- Case studies on an: Arsenic plume site; and Antimony, cadmium and zinc plume site

The case studies will include a presentation of site characteristics, remedial approach and post-remediation groundwater monitoring data demonstrating that remedial targets were achieved and maintained.

SCHEDULE

Day	Date	Start	End	Function	Room
Sunday	April 23rd	1:00 PM	6:00 PM	Registration Desk	Champagne Foyer
		5:00 PM	7:00 PM	Welcome Reception Cocktails	Hotel Bar
Monday	April 24th	7:00 AM	8:30 AM	Continental Breakfast	Champagne Foyer / Champagne C
		8:00 AM	5:00 PM	Registration Desk	Champagne Foyer
		8:30 AM	12:00 PM	Exhibitor Booth Set-up	Champagne A+B / Champagne Foyer
		9:00 AM	12:00 PM	CALA Workshop	Champagne C
		10:00 AM	10:30 AM	Coffee Break	Champagne Foyer
		12:00 PM	1:00 PM	Lunch	Champagne Foyer
		12:00 PM	5:00 PM	Exhibition Opens	Champagne A+B / Champagne Foyer
		1:00 PM	5:00 PM	Technical Sessions 1	Champagne C
		3:00 PM	3:30 PM	Coffee Break	Champagne Foyer
		5:00 PM	6:30 PM	Wine and Cheese Event	Champagne Foyer
Tuesday	April 25th	7:00 AM	8:30 AM	Continental Breakfast	Champagne Foyer / Champagne C
		7:30 AM	8:30 AM	5 KM CMA Run	Meet at Hotel Lobby
		8:00 AM	5:00 PM	Registration Table	Champagne Foyer
		8:30 AM	5:00 PM	Exhibition Opens	Champagne A+B / Champagne Foyer

		8:30 AM	12:00 PM	Workshop 2	Champagne C
		10:00 AM	10:30 AM	Coffee Break	Champagne Foyer
		12:00 PM	1:00 PM	Lunch	Champagne Foyer
		1:00 PM	5:00 PM	Technical Sessions 2	Champagne C
		3:00 PM	3:30 PM	Coffee Break	Champagne Foyer
		5:00 PM	6:30 PM	Cocktails	Champagne Foyer
		7:00 PM	10:00 PM	Dinner Gala	Champagne C
Wednesday	April 26th	7:00 AM	8:30 AM	Continental Breakfast	Champagne Foyer / Champagne C
		8:00 AM	12:00 PM	Registration Table	Champagne Foyer
		8:30 AM	12:00 PM	Exhibition Opens	Champagne A+B / Champagne Foyer
		8:30 AM	12:00 PM	Technical Sessions 3	Champagne C
		1:00 PM	2:00 PM	CMA Annual General Meeting	Champagne C
		1:00 PM	4:00 PM	Exhibition Tear-Down	Champagne B+C / Champagne Foyer
Thursday	April 27th	7:00 AM	8:30 AM	Breakfast	Hotel Restaurant (For Registered Tour Attendees)
		9:00 AM	12:30 PM	SCP SCIENCE Tour and Lunch	Meet at the Hotel Lobby. Bus Leaves DoubleTree Hotel: 8:30 AM
		1:00 PM	4:00 PM	Glencore Factory Tour	Meet at the Hotel Lobby. Bus Leaves DoubleTree Hotel: 12:45 PM

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