

EXTRACTION

2018

August 26–29, 2018 | Westin Ottawa | Ottawa, Ontario, Canada

FINAL PROGRAM

www.ExtractionMeeting.org



Organized by the Metallurgy and Materials Society (MetSoc) of the Canadian Institute of Mining, Metallurgy and Petroleum (CIM); the Society for Mining, Metallurgy & Exploration (SME); and The Minerals, Metals & Materials Society (TMS).

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Extraction 2018 Proceedings

Enjoy your complimentary copy of the Extraction 2018 proceedings!



Welcome to Extraction 2018!

While Extraction 2018 may seem like another new conference, it was actually borne out of a membership initiative within three societies to reduce the number of extractive meetings in 2018. Extraction 2018 is the industry's first collaborative global metallurgy conference focused exclusively on extractive metallurgy, where issues around geography, resources, environment, and human capital are all in play and making for an ever-changing landscape.

The conference has come to fruition out of the hard work of the staff of the three sponsoring societies. The Metallurgy & Materials Society (MetSoc) of CIM (Canadian Institute of Mining, Metallurgy & Petroleum) organized the logistics for this conference, while at the same time holding its first-ever annual meeting outside of Canada at Materials Science & Technology 2018 (MS&T18) in Columbus, Ohio. The Society for Mining, Metallurgy & Exploration Inc. (SME) mobilized its team to manage the trade show and sponsorship, while The Minerals, Metals & Materials Society (TMS) was instrumental in supplying the backbone of the conference for abstract management, author interaction, and marketing. Regular contact between the societies has been beneficial for everyone and will have lasting positive impacts long after Extraction 2018 is over.

Several volunteers from each society were also critical to the organization of the symposia, generously donating considerable personal time to help develop, review, and organize the conference. This includes short courses, tours, and posters, as well as the technical symposia. Extraction 2018 is the home for several important recurring symposia that examine new developments in foundational extractive metallurgy topics and techniques. It also offers new programming designed to share the latest research and insights on emerging technologies and issues that are shaping the global extractive metallurgy industry. The symposia include: the 7th International Symposium on Advances in Sulfide Smelting; the Peter Hayes Symposium on Pyrometallurgical Processing; Hydrometallurgy 2018; the Gordon Ritcey Symposium: Advances in Hydrometallurgical Solution Purification Separations; Processing of Critical Metals; and Sulfide Flotation.

The response to this endeavor has been very encouraging—a reflection of the fact that there are numerous high quality symposia being brought to the conference. It was difficult to balance the number of abstract submissions with the desire to have a manageable conference; we hope the right balance has been achieved.

It will be a lot to take in, but we hope that everyone will get as much as they can from the conference. When the dust has settled, we will take stock of how things went, and if the stars realign in the future, we might try to do this again. But for now, welcome to Extraction 2018—you are among friends!

Sincerely,

The Extraction 2018 Conference Co-Chairs:



Pictured from left to right:

Boyd Davis,
Kingston Process Metallurgy Inc.
Michael Moats,
Missouri University of Science and Technology
Shijie Wang,
Rio Tinto Kennecott Utah Copper Corporation

All times are listed in Eastern Daylight Time (EDT) UTC/GMT-4 hours

Saturday, August 25		Location	Participation
7:30 a.m. to 5:00 p.m.	Professional Development Registration Opens	Les Saisons	Course registrants
8:30 a.m. to 5:00 p.m.	Professional Development Course Exploring Advanced Thermodynamic Process Simulation Tools: From SimuSage to Coupled CFD + Thermochemistry Based Models with COMSOL+M4Dlib+ChemApp	Les Saisons	Course registrants
Sunday, August 26		Location	Participation
7:30 a.m. to 7:00 p.m.	Registration	Nunavut	All
8:30 a.m. to 3:30 p.m.	Exhibitor Setup	Confederation II to III	Exhibitors
8:00 a.m. to Noon	Professional Development Courses Reducing GHG Footprint of Pyrometallurgical Processes	Alberta	Course registrants
8:30 a.m. to 3:50 p.m.	Exploring Advanced Thermodynamic Process Simulation Tools: From SimuSage to Coupled CFD + Thermochemistry Based Models with COMSOL+M4Dlib+ChemApp	Les Saisons	Course registrants
8:30 a.m. to 3:50 p.m.	Metallurgical Accounting: Principles and Main Applications	Ontario	Course registrants
8:30 a.m. to 3:50 p.m.	Solvent Extraction in Hydrometallurgy: Principles, Flowsheet Design, and Selected Applications	Governor General II	Course registrants
1:00 p.m. to 4:00 p.m.	Technical Session: Extractive Metallurgy Markets & Economics, <i>Sponsored by Kingston Process Metallurgy Inc.</i>	Governor General I	All
4:00 p.m. to 5:30 p.m.	Opening Plenary, <i>Sponsored by Kingston Process Metallurgy Inc.</i>	Confederation I	All
5:30 p.m. to 7:00 p.m.	Opening Reception in the Exhibit Hall	Confederation II to III	All
5:30 p.m. to 7:00 p.m.	Society Booths Open	Confederation II to III	All
Monday, August 27		Location	Participation
7:00 a.m. to 8:15 a.m.	Morning Coffee and Muffin Service	Grand Foyer	All
7:00 a.m. to 5:50 p.m.	Registration	Nunavut	All
8:00 a.m. to 12:10 p.m.	Technical Sessions	See Technical Program	All
10:00 a.m. to 1:00 p.m.	Exhibit Hall and Society Booths Open	Confederation II to III	All
10:00 a.m. to 10:45 a.m.	Coffee Break	Confederation II to III	All
10:00 a.m. to 10:45 a.m.	Poster Viewing	Grand Foyer	All
12:10 p.m. to 2:00 p.m.	Lunch on Own		All
2:00 p.m. to 5:50 p.m.	Technical Sessions	See Technical Program	All
3:00 p.m. to 7:00 p.m.	Exhibit Hall and Society Booths Open	Confederation II to III	
3:40 p.m. to 4:10 p.m.	Coffee Break	Confederation II to III	All
3:40 p.m. to 4:10 p.m.	Poster Viewing	Grand Foyer	All

5:30 p.m. to 7:00 p.m.	Networking Reception in Exhibit Hall, <i>Sponsored by FLSmidth</i>	Confederation II to III	All
7:00 p.m. to 10:00 p.m.	Pyro Pub Night, <i>Sponsored by the University of Queensland, Canadian Engineering Associates, and Advisian WorleyParsons</i>	Heart & Crown	Ticketed event
7:00 p.m.	Free evening		All

Tuesday, August 28

		Location	Participation
7:00 a.m. to 8:15 a.m.	Morning Coffee and Muffin Service	Grand Foyer	All
7:00 a.m. to 5:50 p.m.	Registration	Nunavut	All
8:00 a.m. to 12:10 p.m.	Technical Sessions	See Technical Program	All
10:00 a.m. to 4:10 p.m.	Exhibit Hall and Society Booths Open	Confederation II to III	All
10:00 a.m. to 10:45 a.m.	Coffee Break	Confederation II to III	All
10:00 a.m. to 10:45 a.m.	Poster Viewing	Grand Foyer	All
12:10 p.m. to 2:00 p.m.	Lunch on Own		All
2:00 p.m. to 5:50 p.m.	Technical Sessions	See Technical Program	All
3:40 p.m. to 4:10 p.m.	Coffee Break	Grand Foyer/ Confederation II to III	All
3:40 p.m. to 4:10 p.m.	Poster Viewing	Grand Foyer	All
4:10 p.m. to 7:00 p.m.	Exhibitor Move-Out	Confederation II to III	Exhibitors
6:00 p.m. to 6:30 p.m.	Conference Banquet Shuttle Bus	Hotel Lobby	Banquet attendees
6:30 p.m. to 9:30 p.m.	Conference Banquet	Canadian Museum of History	Ticketed event

Wednesday, August 29

		Location	Participation
7:00 a.m. to 8:15 a.m.	Morning Coffee and Muffin Service	Grand Foyer	All
7:00 a.m. to 5:50 p.m.	Registration	Nunavut	All
8:00 a.m. to 12:10 p.m.	Technical Sessions	See Technical Program	All
10:00 a.m. to 10:45 a.m.	Coffee Break and Poster Viewing	Grand Foyer	All
12:10 p.m. to 2:00 p.m.	Lunch on Own		All
12:15 p.m. to 2:00 p.m.	Gordon Ritcey Luncheon, <i>Sponsored by M3</i>	Confederation II	Ticketed event
12:15 p.m. to 2:00 p.m.	Video Tour: Glencore Sudbury INO Smelter & XPS Expert Process Solutions	Confederation III	Ticketed event
2:00 p.m. to 5:50 p.m.	Technical Sessions	See Technical Program	All
3:40 p.m. to 4:10 p.m.	Coffee Break and Poster Viewing	Grand Foyer	All
5:50 p.m.	Conference Conclusion		All

Thursday, August 30

		Location	Participation
	Industry Tours	Offsite	Tour registrants
8:00 a.m. to 8:30 p.m.	CanmetENERGY & KPM Laboratory Tours and Thousand Islands Cruise	Offsite	Tour registrants
8:00 a.m. to 4:30 p.m.	Glencore - CCR Refinery Tour	Offsite	Tour registrants



The Minerals, Metals & Materials Society

COMPLIMENTARY MEMBERSHIP FOR EXTRACTION 2018 PARTICIPANTS!

JOIN THE TMS COMMUNITY FREE FOR ONE YEAR!

As an attendee of Extraction 2018, you are eligible for a complimentary, one-year electronic membership in The Minerals, Metals & Materials Society (TMS).*

HOW DO YOU JOIN?

Visit the TMS membership booth at Extraction 2018 to learn how to activate your complimentary membership or visit the following website for instructions:

www.tms.org/CompMembership

WHAT CAN YOU DO WITH YOUR NEW MEMBERSHIP?

- **Read:** Access more than 20 journals published by TMS and Springer for free and explore online publication libraries available only to members
- **Network:** Join one of our seven technical committees related to extraction and processing or connect with colleagues through the TMS Membership Directory
- **Save:** Receive discounted registration on meetings that gather your colleagues from around the world, like the TMS 2019 Annual Meeting & Exhibition
- And Much More!

Start your free membership today and discover the value of being part of the TMS community!

* Please note: This offer is only valid for new members. Individuals who are current or former TMS members do not qualify.

In Our Members' Words



Registration

Delegates of Extraction 2018 enjoy the following benefits:

(Exception: not applicable for short course only registrants)

- Access to the technical presentations
- Access to the trade show and poster sessions
- Free copy of the electronic proceedings of the meeting
- Hors d'oeuvres and one free drink ticket during the Sunday Opening Reception in the Exhibit Hall
- Refreshments at coffee breaks on Monday, Tuesday, and Wednesday
- Morning coffee and pastries on Monday, Tuesday, and Wednesday
- One free drink ticket at the Monday Networking Reception in the Exhibit Hall, sponsored by FLSmidth

Registration Hours

Badge pick-up for the Exploring Advanced Thermodynamic short course will be available at the hospitality desk on **Saturday, August 25**, in the Les Saisons room (3rd floor) of the Westin Ottawa from 7:30 a.m. to noon.

For the rest of the conference, the registration desk will be open in the Nunavut room (4th floor) of the Westin Ottawa at the following times:

Sunday, August 26	7:30 a.m. to 7:00 p.m.
Monday, August 27	7:00 a.m. to 5:50 p.m.
Tuesday, August 28	7:00 a.m. to 5:50 p.m.
Wednesday, August 29	7:00 a.m. to 5:50 p.m.

Visit MetSoc of CIM, SME, and TMS

Each of Extraction 2018's three organizing societies, MetSoc, SME, and TMS, will have membership booths located at the Exhibit Hall in Confederation II to III ballrooms. Learn more about each organization—stop by and visit while you're at Extraction 2018! Society booths will be open during the following hours:

Sunday, August 26	5:30 p.m. to 7:00 p.m.
Monday, August 27	10:00 a.m. to 7:00 p.m. 3:00 p.m. to 7:00 p.m.
Tuesday, August 28	10:00 a.m. to 4:10 p.m.

Technical Sessions

All oral presentations will be held at the Westin Ottawa. See the Technical Program on pages 23–91 for room locations. All poster presentations will be held in the Grand Foyer of the Westin.

Poster Author Directory

To encourage networking outside of the designated poster viewing times, please refer to the online poster author director on the Technical Program page of the Extraction 2018 website (www.ExtractionMeeting.org). Here you will find contact information for the poster authors and can set up one-on-one discussions.

Exhibit Hall Hours

The Extraction 2018 Exhibit Hall will be located in the Confederation II to III ballrooms at the following times:

Sunday, August 26	5:30 p.m. to 7:00 p.m.
Monday, August 27	10:00 a.m. to 1:00 p.m. <i>and</i> 3:00 p.m. to 7:00 p.m.
Tuesday, August 28	10:00 a.m. to 4:10 p.m.

Wi-Fi Access

Wi-Fi access is available for conference attendees at the Westin Ottawa, including inside meeting rooms. Select "Westin Meeting Room" as your Wi-Fi network and use the password **extract2018** to connect.

Nursing Mother's Room

A private room has been set aside for our delegates who need a private space for nursing. For access to the Nursing Mother's Room, please visit event staff at the registration desk (located in the Nunavut room). The room is equipped with a comfortable chair, table, and mini-fridge.

Business Center

The Business Center at the Westin Ottawa hotel will provide delegates the opportunity to stay connected, with a secure, reliable computer system and copy machine. The Business Center features high-speed internet, computers, printer, fax machine, and copier. Charges may apply.

Cu IN VANCOUVER IN 2019

CALL FOR
ABSTRACTS

COM 2019 HOSTING COPPER 2019 AUGUST 18-21, VANCOUVER, CANADA

MetSoc, the 58th annual Conference of Metallurgists (COM 2019) and CIM are honoured to host Copper 2019, marking a milestone in the International Copper Conference Series with the 10th Edition. The success and outcome of the Copper Conference is the work of the eight leading International Professional Societies (GDMB, IIMCh, MetSoc of CIM, MMIJ, NFSOC, SAIMM, SME, TMS) who tirelessly persevere in bringing forth symposia of the highest quality to the delegates.

Conference Chairs:

COM 2019 Chair:

Dr. Edouard Asselin, University of British Columbia

Cu2019 Chair:

Dr. Joël Kapusta, BBA Inc.

Co-organized by:



Topics will include:

- Cu: Plenary sessions
- Cu: Downstream Fabrication and Applications
- Cu: Economics, Markets, and Historical Perspectives
- Cu: Electrowinning and Electrorefining
- Cu: Health and Safety in Operations
- Cu: Hydrometallurgy
- Cu: Mineral Processing
- Cu: Process Control, Optimization, and Instrumentation
- Cu: Pyrometallurgy (The Phillip Mackey Symposium)
- Cu: Sustainability and Waste Management
- COM 2019 UBC-McGill-UofA Symposium

Share your knowledge
SUBMIT AN ABSTRACT
com.metsoc.org

Key dates

Call for Abstract Open	Aug 29, 2018
Call for Abstracts Deadline	Nov 30, 2018
Author Registration Deadline	May 15, 2019

Opening Reception in the Exhibit Hall

Date: Sunday, August 26

Time: 5:30 p.m. to 7:00 p.m.

Location: Confederation II to III, Westin Ottawa

All delegates are invited to attend, network, and enjoy a complimentary drink and hors d'oeuvres.

Networking Reception in the Exhibit Hall

Date: Monday, August 27

Time: 5:30 p.m. to 7:00 p.m.

Location: Confederation II to III, Westin Ottawa

Join your fellow delegates after a full day of learning to network, exchange, and have fun in the Exhibit Hall. Don't miss this opportunity to meet our exhibitors!

Thank you to the sponsor of this event, FLSmidth.



Pyro Pub Night in Honor of Peter Hayes *Sold Out*

Date: Monday, August 27

Time: 7:00 p.m. to 10:00 p.m.

Location: Heart & Crown Pub, 67 Clarence St., Ottawa, ON K1N 5P5

The Heart & Crown Pub is within walking distance of the Westin Ottawa. Ask at the concierge desk for directions or use Google.

Join your colleagues at our local pub night in honor of Peter Hayes. The evening will include a buffet and two drink tickets per person. Located in Ottawa's historic ByWard Market, the Heart & Crown consists of five pubs under one roof with six patios. Ottawa's Irish Village welcomes you!

Thank you to the co-sponsors of this event, The University of Queensland, the Canadian Engineering Associates, and Advisian WorleyParsons



Advisian
WorleyParsons Group

Conference Banquet & Reception

Date: Tuesday, August 28

Reception Time: 6:30 p.m. to 7:15 p.m.

Dinner & Awards Time: 7:15 p.m. to 9:30 p.m.

Location: Canadian Museum of History, 100 Laurier Street, Gatineau, Québec K1A 0M8

Please remember to wear your badge for security identification and bring your ticket.

Join us at the Canadian Museum of History for the Extraction 2018 Conference Banquet & Reception. The venue is located directly across the Ottawa River from Parliament Hill in Ottawa. The evening will feature presentation of awards from MetSoc, SME, TMS, and AIME to members of the extractive metallurgy community. For more information on each of the evening's award recipients, visit the Awards section of www.ExtractionMeeting.org. A three course meal with wine and transportation* is included with purchased tickets.

Please note that registration was required for this event through the conference registration form. Onsite ticket sales are based on availability. For more information, check with conference staff at the registration desk in the Nunavut room. Have a ticket but can no longer attend? Why not donate your ticket to a student? Visit us at the desk to donate.

***Banquet Bus Shuttle Information**

A shuttle bus will depart from the Westin Ottawa hotel lobby from 6:00 p.m. to 6:30 p.m. The returning shuttle bus will depart from the museum at 9:45 p.m.

Gordon Ritcey Luncheon

Date: Wednesday, August 29

Time: 12:15 p.m. to 2:00 p.m.

Location: Confederation II, Westin Ottawa

This annual luncheon is the Hydrometallurgy Section's premier social event of the year. This year, we will be celebrating hydrometallurgy through a tribute to the life work of Gordon Ritcey in whose honor we have named our annual Hydrometallurgy Section symposium. The featured speaker at this luncheon will be George Demopoulos of McGill University, who will speak to the many contributions made by Ritcey over his career, as well as share some of the lighter moments from the past. The

event will also honor the Hydrometallurgy award recipients for 2018.

Please note that registration was required for this event through the conference registration form. Onsite ticket sales are based on availability. Please check with conference staff at the registration desk in the Nunavut room for more information.

Thank you to the sponsor of this event, M3.



INDUSTRY TOURS

If you registered for one of the three industry tours in advance, please take note of the following important information.

Onsite ticket sales are based on availability. If you did not register for a tour and are still interested in participating in one of the following offerings, please check with conference staff at the registration desk, in the Nunavut room for more information.

Video Tour: Glencore Sudbury INO Smelter & XPS Expert Process Solutions

Date: Wednesday, August 29

Time: 12:15 p.m. to 2:00 p.m.

Location: Confederation III, Westin Ottawa

View this unique video presentation of Glencore's Sudbury Integrated Nickel Operations (INO) Smelter and XPS Expert Process Solutions facilities. In-person representatives with process samples will guide you through the tour and answer your questions over lunch. The video tour has been timed so that you will be able to view each process up close and in action! Lunch will be provided and is included in the cost of the video tour.

CanmetENERGY & KPM Laboratory Tours and Thousand Islands Cruise Sold Out

Date: Thursday, August 30

Time: 8:00 a.m. to 8:30 p.m.

This full-day tour includes a visit to CanmetENERGY-Ottawa, followed by lunch in the historic city of Kingston, a visit to Kingston Process Metallurgy, and a sightseeing cruise of the Thousand Islands. A charter bus will pick attendees up at the Westin Ottawa at 8:00 a.m. and will return around 8:30 p.m. Transportation and lunch are included in the tour price. Dinner is not included, but attendees will have the opportunity to purchase food and beverages.

Glencore – CCR Refinery Tour Sold Out

Date: Thursday, August 30

Time: 8:00 a.m. to 4:30 p.m.

This full-day tour will include the copper refinery and impurities areas of the CCR Refinery, based in Montreal East. A charter bus will pick attendees up at the Westin Ottawa at 8:00 a.m. and will return around 4:30 p.m. Lunch is included with this tour registration fee.

Badges

All attendees must wear registration badges at all times during the conference to ensure admission to events included in the paid fee, such as technical sessions, exhibitions, and receptions. Thank you to our lanyard sponsor, GeoTemps/GeoPros.

Refunds

The deadline for all refunds was August 1, 2018. No refunds will be issued at the congress. Fees and tickets are nonrefundable.

Cell Phone Use

In consideration of attendees and presenters, we kindly request that you minimize disturbances by setting all cell phones and other devices to "silent" while in meeting rooms.

Photography and Recording

Attendees may be photographed by the conference staff while at Extraction 2018. Further, those photos may be used for promotional purposes.

Any unauthorized recording of sessions (audio, video, still photography, etc.) is strictly prohibited during the conference sessions.

Time Zones

Please note that all times for this conference and related events will take place in the local time zone, Eastern Daylight Time (EDT) UTC/GMT -4 hours.

Language

The conference and all presentations, program materials, and signage will be in English.

Dress Code

Traditional business attire is appropriate for all conference activities, including technical sessions, the conference banquet, and other social events.

Attendees with Disabilities

Any delegates requiring special assistance or equipment should contact conference staff at the registration desk located in the Nunavut room at the Westin Ottawa.

EMERGENCY PROCEDURES

Although the probability of an emergency situation occurring at Extraction 2018 is low, being prepared to react effectively in case of an incident is the most critical step in ensuring the health and safety of yourself and those around you. Please take a few moments to review the maps of the Westin Ottawa printed in this program (on page 99). When you enter the building, familiarize yourself with the exits and the stairs leading to those exits. When you arrive at your session or event location, look for the emergency exits that are closest to you.

The Westin Ottawa has a minimum of three emergency response team (ERT) members on the

property at all times. All ERT members are trained in first aid and CPR. Extensive emergency supplies, including oxygen, are maintained onsite.

In the event of an emergency, guests can dial the emergency speed dial on their room phones or dial 7-7-7-7 from any hotel phone. The ERT will be immediately dispatched.

Should an alarm sound, please wait for instructions from the hotel front office via the P/A system. If an evacuation is required, hotel staff will be assigned at various locations to assist you to the exits and security.

ABOUT THE VENUE

Westin Ottawa

Located in the heart of downtown Ottawa, the Westin is connected to the Rideau Centre, one of Canada's leading shopping destinations. The visitor-friendly layout of downtown Ottawa makes it easy for attendees to explore the city. The Westin Ottawa features several in-house dining options featuring locally inspired Ottawa cuisine, including Daly's Restaurant, Daly's Express, and the Shore Club. A variety of restaurants are also located within walking distance of the hotel. See the Westin website for more details on dining and local attractions: www.thewestinottawa.com

GOLD SPONSORS:



SILVER SPONSORS:



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2018

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EXHIBITOR DIRECTORY

www.ExtractionMeeting.org



Join the Society for Mining, Metallurgy & Exploration (SME) to stay current on the latest technical advancements and expand your professional network.

STAY CURRENT

- Search the largest global consortium of mining and minerals articles and research at OneMine.org
- Receive timely insights with complimentary subscriptions to *Mining Engineering* and *Tunneling & Underground Construction* magazines

ADVANCE YOUR CAREER

- Share your expertise by presenting at a conference or developing a paper
- Make connections that could lead to your next job opportunity

SAVE MORE

- Use your member discount to receive up to 25% off technical resources and educational offerings in the SME Store
- Reduced registration rates at our industry-leading conferences

Join online at www.SMENET.org



Upcoming Leading Conferences in **Mining, Minerals** and **Metallurgy**



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33RD ANNUAL FLORIDA SME
REGIONAL MINING CONFERENCE | OCTOBER
3 - 4, 2018

SME Annual Conference & Expo

SMART MINING

Resources for a Connected World
FEBRUARY 24 - 27, 2019 • DENVER, COLORADO



Learn more at: www.SMENET.org

Current as of August 15, 2018.

Visit the Exhibition page of www.ExtractionMeeting.org for the most current list.

6th Wave Innovations Corp	Booth 100	Limpact International Limited	Booth 412
Activation Laboratories Ltd. (Actlabs)	Booth 305	M4Dynamics	Booth 103
Air Liquide	Booth 413	Metso Minerals	Booth 313
Andronaco Industries	Booth 102	MetSoc	Booth 407
APETECK Inc.	Booth 307	OLI Systems, Inc.	Booth 308
Ashland	Booth 204	Pex-Industrial	Booth 113
AuTec Innovative Extractive Solutions Ltd.	Booth 404	Praxair	Booth 105
Canadian Engineering Associates Ltd.	Booth 209	PROMETIA	Booth 205
CANAMIX Mixing & Pumping Solutions	Booth 302	Pultrusion technique	Booth 210, 212
China Nerin Engineering Co., Ltd.	Booth 402	Purolite Corporation	Booth 202
Derrick Corporation	Booth 403	Quinn Process Equipment Co.	Booth 405
Dundee Sustainable Technologies Inc.	Booth 310	RHI Magnesita	Booth 207
Flottweg Separation Technology, Inc.	Booth 208	SGS Canada Inc.	Booth 203
GEA Systems North America LLC	Booth 304	Sipi Metals Corp.	Booth 104
Genesys International Ltd	Booth 213	SME	Booth 409
Hatch	Booth 110, 112	SysCAD	Booth 306
Heath & Sherwood	Booth 211	TMS	Booth 411
ION	Booth 311	Turtle Tough	Booth 206
Kingston Process Metallurgy Inc.	Booth 303	Univar	Booth 312
Kopper Chemical Corp., LTD	Booth 401	XPS Expert Process Solutions	Booth 309

F & B						F & B	
112	113	212	213	312	313	412	413
110	111	210	211	310	311	410	411
108	109	208	209	308	309	408	409
106	107	206	207	306	307	406	407
104	105	204	205	304	305	404	405
102	103	202	203	302	303	402	403
100							401

6th Wave Innovations Corp.

Booth 100

IXOS® nanotech beads are molecularly imprinted and specifically designed to recover dicyanoaurate from alkaline cyanide processing of gold-bearing ore. IXOS® beads do not foul with other metals like carbon and ion exchange resins. IXOS® can significantly enhance gold recovery and mitigate solution losses as proven in lab and field tests. The elution process is simple and inexpensive when compared to activated carbon with no reactivation step. The resin is supplied ready-to-use, with a range of particle sizes available to accommodate heap leach and resin-in-leach/pulp circuits.

Activation Laboratories Ltd. (Actlabs)

Booth 305

Activation Laboratories Ltd. (Actlabs) are leaders in Quality, Innovation and Service. We have been recognized as one of the highest quality labs serving the mineral exploration industry for over 30 years. Adapting the latest technologies to help solve our customer's challenges, we provide complete Assay and Geochemical Services, Radiochemistry, Mineralogy, Metallurgy, On-site Laboratories, Environmental analysis and more.

Air Liquide

Booth 413

The world leader in gases, technologies and services for Industry and Health, Air Liquide is present in 80 countries with approximately 67,000 employees and serves more than 3 million customers and patients. Oxygen, nitrogen and hydrogen are essential small molecules for life, matter and energy. They embody Air Liquide's scientific territory and have been at the core of the company's activities since its creation in 1902. Extractive Metallurgy being no exception, Air Liquide is showcasing valuable gas-based solutions geared towards higher recovery yields, productivity and cost efficiencies.

Andronaco Industries

Booth 102

A global leader and manufacturer of corrosion resistant piping components for the safe and reliable transfer of the hazardous chemicals used in the hydro-metallurgical processing of ores. Products include pipe spools, fittings, valves, basket strainers, expansion joints, flexible hoses, gaskets and other piping accessories. Piping components manufactured from vinyl ester and epoxy composites, fluoropolymer lined and corrosion resistant exotic metals. ISO 9001-2015 certified company with CRN documentation. Piping design and layout services available.

APETECK Inc.

Booth 307

Being a professional supplier of anode and cathode for electrowinning industry, APETECK has their sophisticated fabrication facility in China so as to provide customers all over the world quality anode and cathode at competitive price for over 10 years. You are cordially welcomed to our booth for the latest products and equipment information.

Ashland

Booth 204

Ashland Derakane™ resins are used in hydrometallurgical equipment used to extract and refine copper, nickel, cobalt, and rare earth metals exposed to extremely corrosive chemical environments. Derakane™ resins have been providing critical reliability in corrosion-resistant FRP applications from chemical processing, water treatment and pollution control, to power generation for over 50 years. Ashland is a premier global specialty chemicals company serving customers in a wide range of industrial and consumer markets, including automotive, building & construction, infrastructure, marine, corrosion and adhesives.

AuTec Innovative Extractive Solutions Ltd.

Booth 404

AuTec is a metallurgical testing, process development and piloting facility. We focus on helping our clients in the mining industry overcome their unique extractive metallurgy challenges to unlock the greatest possible value from their mineral assets. We have a broad range of analytical and testing capabilities to support the development and evaluation of process flow sheets, with exceptional expertise in the recovery of gold from refractory and preg-robbing ores.

Canadian Engineering Associates Ltd.

Booth 209

Canadian Engineering Associates Ltd. is a group of dedicated experienced engineers focused on quality delivery of services to the metallurgical industry in a safe and environmentally compliant manner. With the final operation always in mind, our group delivers only the necessities to achieve an effective outcome in a lean concise manner. Servicing clients on every inhabited continent, we are specialists in smelting, electrorefining, furnace and equipment design, bulk materials handling, gas handling, all aspects of assessment, design, engineering and operation of smelters and refineries.

CANAMIX Mixing & Pumping Solutions**Booth 302**

CANAMIX designs and manufactures processing equipment for all industries. Superior Quality. Up to date technology. Competitive Pricing. Process Guarantee. That's the CANAMIX Promise!

China Nerin Engineering Co., Ltd.**Booth 402**

China Nerin Engineering Co., Ltd., a large comprehensive engineering company based in Nanchang, China, is reformed from the predecessor Nanchang Engineering and Research Institute of Nonferrous Metals. Nerin, founded in 1957, has a staff of over 1400 employees. Nerin has taken and completed over 4000 projects home and abroad so far, has good knowledge and understanding of the market, equipment manufacturers and suppliers, and rich experience and expertise in project engineering, especially in copper smelting, metallurgical gas treatment and acid making.

Derrick Corporation**Booth 403**

Derrick® has manufactured an array of innovative wet and dry, fine screening technology for the Mining & Industrial marketplace for over 66 years. Derrick offers its clients leading-edge solutions to maximize separation efficiency. Using this patented equipment and innovative screen surface technology, offers unmatched performance – increased product recovery and reduced power consumption. Derrick's equipment symbolizes rugged reliability, and remains committed to providing the latest technological enhancements that evolve alongside industry best practices and market developments.

Dundee Sustainable Technologies Inc.**Booth 310**

Dundee Sustainable Technologies Inc. (DST) offers proprietary metallurgical processes for the treatment of material from the mining industry. DST's processes are applied for the extraction of precious and base metals and for the removal and stabilisation of contaminants, such as arsenic, antimony and mercury from ores, concentrates and tailings. DST provides environmentally friendly, viable and efficient processes, capable of handling complex and refractory ores which cannot be processed with conventional approaches due to metallurgical issues or environmental considerations.

Flottweg Separation Technology Inc.**Booth 208**

Flottweg Separation Technology Inc. is a worldwide ISO 9001 supplier of liquid solid separation equipment for mining applications. Flottweg 2 and 3 phase decanter centrifuges and separator centrifuges are used in a variety of liquid-solid process applications including drilling mud recovery, solvent extraction crud separation, solids dewatering, gravel washing, oil water solids separation, solids sorting, and wastewater treatment. Skid mounted and containerized systems are also available.

GEA Systems North America LLC**Booth 304**

GEA is one of the largest suppliers of process technology for the food industry and a wide range of other industries. The international technology group focuses on process technology and components for sophisticated production processes in various end-user markets.

Genesys International Ltd.**Booth 213**

Genesys International Limited is an industry leader in the development and manufacture of specialty membrane chemicals for RO/NF and UF systems. Genesys™ antiscalants have been developed to allow maximum system recovery rates and the Genesol™ cleaners are proven to reduce CIP frequency and operating costs. Our reputation is built around a team of specialist membrane industry experts and a network of over sixty distributors, delivering our products and services world-wide to miners such as Barrick, Buenaventura, OCP, Potash Corp, Newmont, Mantos Copper and Lundin Mining.

Hatch**Booth 110, 112**

Our organization is passionately committed to the pursuit of a better world through positive change. We embrace your visions as our own and partner with you to develop better ideas that are smarter, more efficient, and innovative. Our global network of 9,000 professionals work on the world's toughest challenges. Our corporate roots extend back more than a hundred years, and our experience spans over 150 countries around the world in the metals, energy, infrastructure, digital, and investments market sectors.

Heath & Sherwood

Booth 211

Tuyere Line Management equipment used around Copper & Nickel Converters. Automatic Sampling Systems. On-Stream Analyzers and Particle Size Monitors. Founded in 1927 with equipment operating in 65 countries. Gaspé Tuyere Punchers, Tuyere Pyrometers, Tuyere's, Tuyere Silencers, Refractory Drilling Machines. Sampling of all Mineral Commodities and in Mineral Processing Operations.

ION

Booth 311

Automation positively transforms the lives of people and business. ION is reinventing the way business is done through innovations in automation technology. Our software improves decision-making, increases efficiency, simplifies complex processes, and empowers people. ION commodities solutions automate the management of your supply and value chains. Wherever you are, and whatever industry you're in, ION puts you in control of your trading and procurement, enterprise risk, logistics, and scheduling. We also help you manage your storage and inventory, processing, settlement, and accounting.

Kingston Process Metallurgy Inc.

Booth 303

Kingston Process Metallurgy (KPM) is a contract process development firm for metallurgical and chemical companies. KPM practices "integrated" process development, where the laboratory work is directed by the economics and technical risk of the process. Work is staged so that the necessary derisking of the project is done at the right time. Clients are typically large producers, but KPM also works with junior companies and startups. The lab work is supported by analytical and a machine shop as well as employees experienced in techno-economics.

Kopper Chemical Corp., Ltd.

Booth 401

KopperChem is a national high-tech enterprise and located in Chongqing (Changshou) Chemical Industry Park, which integrates R&D, manufacturing, marketing and systems engineering services into one enterprise. KopperChem is one of the world's largest manufacturers of solvent extraction reagents, and provides the most complete series of extractants and engineering services, including Mextral series solvent extraction reagents and diluents, which are widely used in the hydrometallurgy of copper, zinc, cobalt, nickel, precious metals, rare earth metals, etc., as well as wastewater treatment, secondary resources recovery, etc.

Limpact International Limited

Booth 412

Limpact has been an active manufacturer/exporter of custom products for the non-ferrous electrolytic metals refining industry for over 40 years. We are a privately owned company operating from the city of Cobourg, Canada. Our unique process of impact bonding dissimilar metals allows us to manufacture energy-saving products with increased service life for metals refining. You will find Limpact products in most of the leading zinc refineries around the world, as they have been for the past 45 years.

M4Dynamics

Booth 103

M4Dynamics™ is a Toronto based consulting and software development company specializing in Multiphysics and Solution Thermodynamics Simulations Analysis and development of custom built applications or physics models. We also offer training in COMSOL® and GTT-Technologies products FactSage™, ChemApp™, SimuSage™, ChemSheet™, CSFAP, KilnSimu software, FactSage™ (FACT, SGTE, FS, FT, etc.) and GTT oxide databases.

Metso Minerals

Booth 313

Metso is a world-leading industrial company offering equipment and services for the sustainable processing and flow of natural resources in the mining, aggregates, recycling and process industries. With our unique knowledge and innovative solutions, we help our customers improve their operational efficiency, reduce risks and increase profitability. Metso employs over 12,000 people in more than 50 countries.

MetSoc of CIM

Booth 407

The Metallurgy & Materials Society (MetSoc) of CIM (Canadian Institute of Mining, Metallurgy & Petroleum) serves society and the needs of professionals in the global metallurgy & materials community. We are of service for those involved in the research, development, and application of science and technology for environmentally responsible extraction, fabrication, utilization, and recycling of metals and materials. MetSoc is headquartered in Montreal, Quebec, Canada. For more information, visit www.metsoc.org.

OLI Systems Inc.**Booth 308**

Global technology leader in electrolytes, providing simulation software for mining and metals refining. OLI software is used to optimize water use in ore concentrating, COG cleaning, coke / slag quenching, steel descaling, boil feed, ingot cooling and dust control. Better process designs can help control costs in PAH emissions control, cooling water cycle-up, corrosion and scaling, water use optimization, sludge processing and ammonia and light oil recovery. Anticipate, diagnose and fix costly operations and minimize time, cost and risk in lab, pilot and field tests.

Praxair**Booth 105**

Praxair has served extractive metallurgy since the inception of tonnage gases to enhance productivity, yield, product quality, and environmental performance. Praxair's gases are used throughout the periodic table from aluminum, cement, copper, gold, silver, steel to zinc processing, rare earths extraction, from mine to smelter to refinery. Praxair's deep quest for reliable supply, value added gas applications and our unparalleled commitment to safety and sustainability support our drive to make our planet more productive. Praxair—your ultimate partner for Extraction and Processing.

PROMETIA**Booth 205**

PROMETIA is an international association promoting innovation in mineral processing and extractive metallurgy for mining and recycling of raw materials. PROMETIA aims to strengthen European technical skills and industrial know-how in raw materials processing and support industrial and economic development promoting an easier access for industrial partners to the most relevant and competent European R&D teams as well as to services & facilities for up-scaling metallurgical and mineral processes; and promoting the most innovative cutting-edge scientific results from European research teams towards industrial partners.

Pultrusion technique**Booth 210, 212**

Pultrusion parts, polymer concrete parts, epoxy parts, thermoset resins, RRIM, Compression moulding, handly-up, others process for mining, petroleum, and distribution of electricity.

Purolite Corporation**Booth 202**

Purolite is a leading developer, manufacturer and supplier of ion exchange, adsorbent and specialty

resins. Headquartered in Pennsylvania, USA, we have ISO 9001 certified manufacturing facilities in the USA, China, and Romania and operate five global R&D centers. Established in industries such as hydrometallurgy, mining, metals plating, ultra-pure water among others. With the largest, most knowledgeable technical sales force and over 40 sales offices in more than 30 countries, Purolite can help solve your metallurgical process challenges.

Quinn Process Equipment Co.**Booth 405**

Quinn Process Equipment Co. (QPEC) specializes in the design and manufacture of a wide range of mineral process equipment for pilot and small commercial size plants. QPEC has provided equipment for a broad range of plants throughout the world. QPEC's specialty is conventional design solvent extraction mixer-settlers for flows from 100 ml up to 7 cubic meters per minute. QPEC has a full range of small to medium size flotation cells from 0.3 cubic feet up to 180 cubic feet per cell. Special materials are available for most corrosive/abrasive applications.

RHI Magnesita**Booth 207**

RHI Magnesita is the result of the combination of RHI and Magnesita to form the global leading supplier of high-grade refractory products, systems and services which are indispensable for industrial high-temperature processes exceeding 1,200°C in a wide range of industries, including steel, cement, non-ferrous metals, and glass, among others. With a vertically integrated value chain, from raw materials to refractory products and full performance-based solutions, RHI Magnesita serves more than 10,000 customers in nearly all countries around the world and has more than 14,000 employees.

SGS Canada Inc.**Booth 203**

SGS is the global leader in inspection, verification, certification and testing services. Our flowsheet development, pilot plant testing and chemical analysis have earned the respect of the global minerals industry and we are the world's leading provider of bankable metallurgical services. We offer an extensive range of services that covers exploration, plant design and engineering, production, industrial applications and decommissioning and closure. As your strategic partner, we provide testing, technology, and trade services to help deliver more growth, improve your speed to market and reduce risk.

Sipi Metals Corp.

Booth 104

Sipi Metals is a leading refiner of precious metal-bearing materials and is a manufacturer of copper alloys and addition agents that meet or exceed the highest industry standards. Our precious metals division serves the mining, electronics manufacturing, and e-scrap industries. Our copper alloys division is a trusted partner with the most discriminating non-ferrous foundries and alloys manufacturers. We deliver peace of mind. We're certified to ISO 9001 and ISO 14001 standards, have an exemplary environmental record, and have been independently owned since 1905.

SME

Booth 409

The Society for Mining, Metallurgy & Exploration Inc. (SME) is a professional society (nonprofit 501(c)3 corporation) whose more than 13,000 members represent all professionals serving the mining, minerals, and underground construction industry in more than 85 countries. SME members include engineers, geologists, metallurgists, educators, students, and researchers. SME advances the worldwide mining, minerals, and underground construction community through information exchange and professional development. SME's staff of 51 are located in Englewood, Colorado, USA. For more information, visit www.smenet.org.

SysCAD

Booth 306

SysCAD is a powerful and versatile plant simulator, and can be used to simulate the simplest processing circuit through to a complex full plant operation. When used to its full potential, it can serve in every aspect of the plant life cycle from feasibility studies, to design, commission, operations and maintenance to expansion and more.

TMS

Booth 411

The Minerals, Metals & Materials Society (TMS) is a professional society that connects minerals, metals, and materials scientists and engineers who work in industry, academia, and government positions around the world. TMS creates networking, publication, and professional development opportunities by convening international conferences, publishing books and journals, administering awards, conducting short courses and training, and bringing together the professional community to address issues of common concern. TMS currently supports nearly 13,000 professional and student members on six continents. For more information, visit www.tms.org.

Turtle Tough

Booth 206

Turtle Tough designs and develops sensors for liquid analysis for the world's toughest applications. We are a world leader in the development of electrochemical sensors for hydrometallurgy applications. We have dedicated years to perfecting measurement solutions in the refining and extraction of gold, copper, nickel, uranium and zinc. We have also engineered time tested solutions for titanium dioxide production, ammonium nitrate, solvent extraction, and industrial waste water. Turtle Tough sensors provide superior reliability, lower maintenance, less drift, better accuracy and the lowest cost of ownership.

Univar

Booth 312

Supplier of Chemicals and Waste Management Services (Chemcare)

XPS Expert Process Solutions

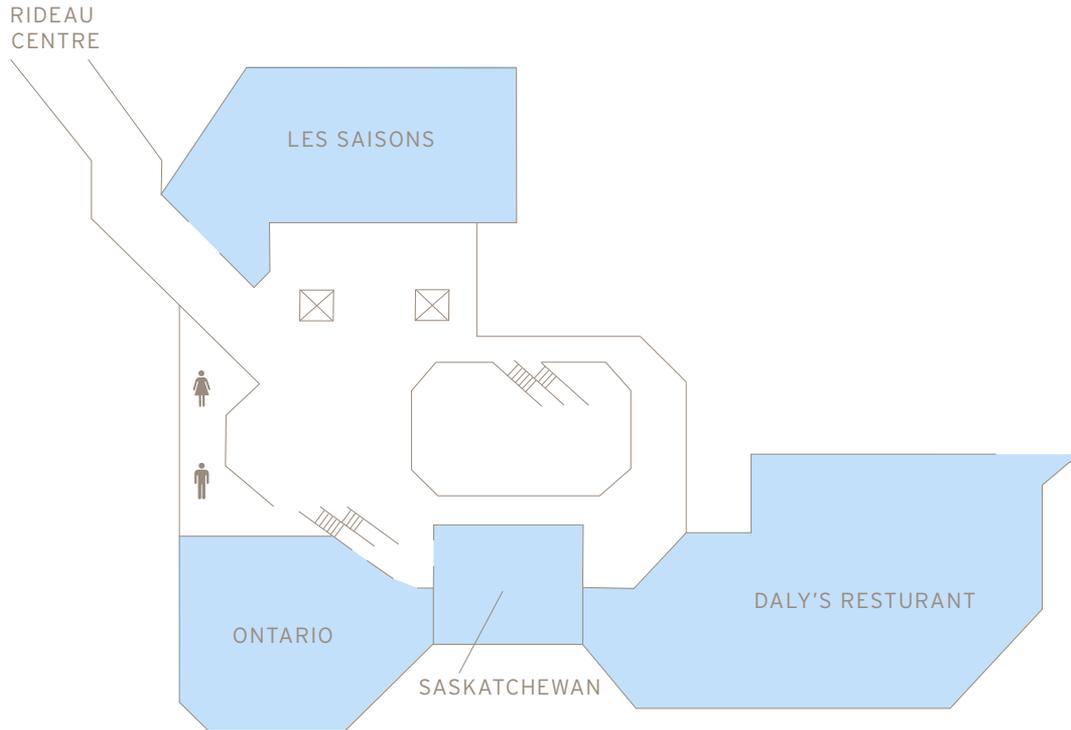
Booth 309

XPS is a metallurgical engineering, technology and test services business offering industry leading expertise in orebody characterisation, flowsheet development, operational support, techno-economic analysis and asset integrity management for most commodities including gold, nickel, copper, cobalt, zinc, PGEs, rare earth, lithium and industrial minerals. XPS offers solutions from five integrated groups, Process Mineralogy, Extractive Metallurgy, Process Control, Materials Technology and Plant Support and Commissioning.

Upcoming Events from MetSoc, SME, and TMS

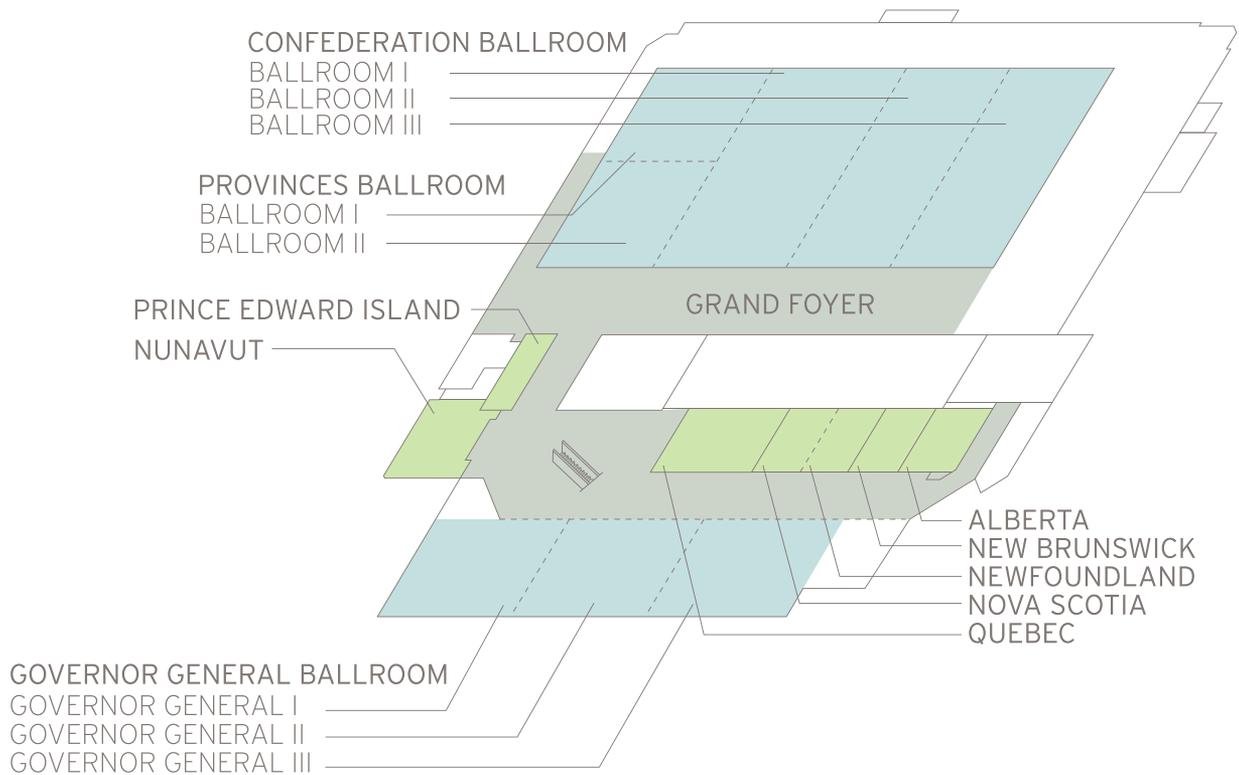
Event	Dates	Location
SME 2018 THRIVE Conference www.smeTHRIVE.com	September 27, 2018	Pittsburgh, Pennsylvania, USA
Materials Science & Technology 2018 Technical Meeting and Exhibition (MS&T18), Including COM 2018 – 57th Annual Conference of Metallurgists www.matscitech.org	October 14–18, 2018	Columbus, Ohio, USA
SME 2018 Arizona Conference	December 2–3, 2018	Tucson, Arizona, USA
SME 2019 Annual Conference & Expo, held in conjunction with the Colorado Mining Association's 121st National Western Mining Conference http://www.smeannualconference.com/	February 24–27, 2019	Denver, Colorado, USA
TMS 2019 Annual Meeting & Exhibition (TMS2019, Including REWAS 2019) www.tms.org/TMS2019	March 10–14, 2019	San Antonio, Texas, USA
SME 2019 Minnesota Conference	April 15–16, 2019	Duluth, Minnesota, USA
CMSC 2019 – Canadian Materials Science Conference www.cmsscConf.org	June 19–22, 2019	Vancouver, British Columbia, Canada
5th World Congress on Integrated Computational Materials Engineering (ICME 2019) www.tms.org/ICME2019	July 21–25, 2019	Indianapolis, Indiana, USA
COM 2019 – 58th Annual Conference of Metallurgists Hosting Copper 2019 com.metsoc.org	August 18–21, 2019	Vancouver, British Columbia, Canada
11th International Conference on Porous Metals and Metallic Foams (MetFoam 2019) www.tms.org/MetFoam2019	August 20–23, 2019	Dearborn, Michigan, USA
Materials Science & Technology 2019 Technical Meeting and Exhibition (MS&T19)	September 29–October 3, 2019	Portland, Oregon, USA
TMS 2020 Annual Meeting & Exhibition (TMS2020) www.tms.org/TMS2020	February 23–27, 2020	San Diego, California, USA
SME 2020 Annual Conference & Expo	February 24–27, 2020	Phoenix, Arizona, USA
Uranium 2020 www.metsoc.org	May 10–13, 2020	Saskatoon, Saskatchewan, Canada
ICTP 2020: The 13th International Conference on the Technology of Plasticity	July 26–31, 2020	Columbus, Ohio, USA
COM 2020 – 59th Conference of Metallurgists www.metsoc.org	August 24–27, 2020	Toronto, Ontario, Canada
14th International Symposium on Superalloys (Superalloys 2020) www.tms.org/Superalloys2020	September 13–17, 2020	Seven Springs, Pennsylvania, USA

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**AMERICAN
ELEMENTS**

THE ADVANCED MATERIALS MANUFACTURER®

1 H 1.00794 Hydrogen																	2 He 4.002602 Helium
3 Li 6.941 Lithium	4 Be 9.012182 Beryllium											5 B 10.811 Boron	6 C 12.0107 Carbon	7 N 14.007 Nitrogen	8 O 15.9994 Oxygen	9 F 18.998432 Fluorine	10 Ne 20.1797 Neon
11 Na 22.98976928 Sodium	12 Mg 24.304 Magnesium											13 Al 26.9815385 Aluminum	14 Si 28.0855 Silicon	15 P 30.973762 Phosphorus	16 S 32.065 Sulfur	17 Cl 35.453 Chlorine	18 Ar 39.948 Argon
19 K 39.0983 Potassium	20 Ca 40.078 Calcium	21 Sc 44.955912 Scandium	22 Ti 47.887 Titanium	23 V 50.9415 Vanadium	24 Cr 51.9961 Chromium	25 Mn 54.938045 Manganese	26 Fe 55.845 Iron	27 Co 58.933195 Cobalt	28 Ni 58.6934 Nickel	29 Cu 63.546 Copper	30 Zn 65.38 Zinc	31 Ga 69.723 Gallium	32 Ge 72.64 Germanium	33 As 74.9216 Arsenic	34 Se 78.96 Selenium	35 Br 79.904 Bromine	36 Kr 83.798 Krypton
37 Rb 85.4678 Rubidium	38 Sr 87.62 Strontium	39 Y 88.90585 Yttrium	40 Zr 91.224 Zirconium	41 Nb 92.90638 Niobium	42 Mo 95.96 Molybdenum	43 Tc (98) Technetium	44 Ru 101.07 Ruthenium	45 Rh 102.9055 Rhodium	46 Pd 106.42 Palladium	47 Ag 107.8682 Silver	48 Cd 112.411 Cadmium	49 In 114.818 Indium	50 Sn 118.71 Tin	51 Sb 121.75 Antimony	52 Te 127.6 Tellurium	53 I 126.90447 Iodine	54 Xe 131.293 Xenon
55 Cs 132.9054 Cesium	56 Ba 137.327 Barium	57 La 138.9047 Lanthanum	72 Hf 178.48 Hafnium	73 Ta 180.948 Tantalum	74 W 183.84 Tungsten	75 Re 186.207 Rhenium	76 Os 190.23 Osmium	77 Ir 192.222 Iridium	78 Pt 195.084 Platinum	79 Au 196.966569 Gold	80 Hg 200.59 Mercury	81 Tl 204.3833 Thallium	82 Pb 207.2 Lead	83 Bi 208.9804 Bismuth	84 Po (209) Polonium	85 At (210) Astatine	86 Rn (222) Radon
87 Fr (223) Francium	88 Ra (226) Radium	89 Ac (227) Actinium	104 Rf (261) Rutherfordium	105 Db (262) Dubnium	106 Sg (263) Seaborgium	107 Bh (264) Bohrium	108 Hs (270) Hassium	109 Mt (276) Meitnerium	110 Ds (281) Darmstadtium	111 Rg (286) Roentgenium	112 Cn (285) Copernicium	113 Nh (284) Nihonium	114 Fl (289) Flerovium	115 Mc (288) Moscovium	116 Lv (293) Livermorium	117 Ts (294) Tennessine	118 Og (294) Oganesson
58 Ce 140.116 Cerium	59 Pr 140.90766 Praseodymium	60 Nd 144.242 Neodymium	61 Pm (145) Promethium	62 Sm 150.36 Samarium	63 Eu 151.964 Europium	64 Gd 157.25 Gadolinium	65 Tb 158.92535 Terbium	66 Dy 162.5 Dysprosium	67 Ho 164.93032 Holmium	68 Er 167.259 Erbium	69 Tm 168.93421 Thulium	70 Yb 173.054 Ytterbium	71 Lu 174.9668 Lutetium				
90 Th 232.0376 Thorium	91 Pa 231.03688 Protactinium	92 U 238.02891 Uranium	93 Np (237) Neptunium	94 Pu (244) Plutonium	95 Am (243) Americium	96 Cm (247) Curium	97 Bk (247) Berkelium	98 Cf (251) Californium	99 Es (252) Einsteinium	100 Fm (257) Fermium	101 Md (258) Mendelevium	102 No (259) Nobelium	103 Lr (262) Lawrencium				

Now Invent.™

The Next Generation of Material Science Catalogs

American Elements serves as the global mining industry's key distribution opportunity for extracted materials. With a catalog of more than 15,000 mined and refined materials as well as added-value products such as chemical compounds, extruded parts, and even nanoparticles, American Elements is your best option for bringing refined materials to high technology customers.

American Elements opens a world of possibilities so you can Now Invent!

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