

THE WORLD COMES HERE

TMS 2020

149th Annual Meeting & Exhibition

February 23-27, 2020

San Diego Convention Center and Marriott Marquis San Diego Marina
San Diego, California, USA • www.tms.org/TMS2020

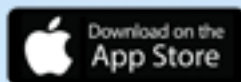
#TMSAnnualMeeting

CONFERENCE GUIDE

General Meeting Information, Maps, Programming
Highlights, and Exhibit Directory Inside

NEED A COPY OF THE TECHNICAL PROGRAM?

Download the TMS2020
Mobile App or pick up a print
copy at the TMS Member
Welcome Center.





CompuTherm, LLC

Software • Database • Consulting

Over the past 20 years Pandat software has evolved from a software for multicomponent phase diagram calculation to a powerful simulation tool for accelerated materials design and development

In 1996 CompuTherm LLC was formed as a University of Wisconsin-Madison spin-off

In 2000 Pandat software was first released for multicomponent phase equilibrium calculation

In 2012 Pandat software was redesigned as a software package including three modules: PanPhaseDiagram, PanPrecipitation, and PanOptimizer

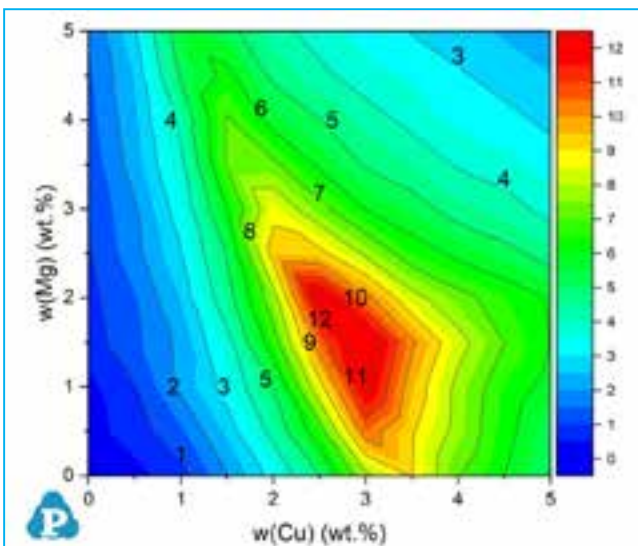
In 2018 PanDiffusion module was released

In 2020 PanSolidification module is released

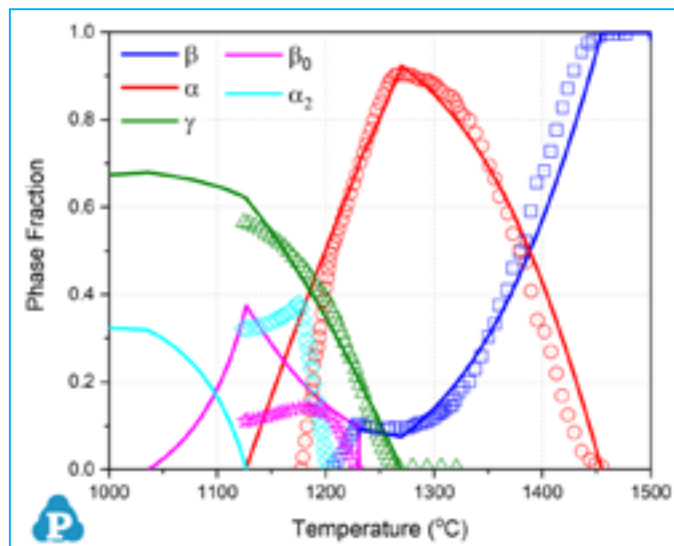


Advantages of Pandat Software

- Simulate the process of materials processing by one software from solidification to homogenization and heat treatment
- Optimize alloy composition and processing condition through understanding the correlations among alloy composition, processing condition, microstructure and mechanical properties
- Accelerate materials development by screening multidimensional composition space to quickly identify the compositions that meet user's selected criteria
- Go beyond phase diagrams to simulate any user-defined properties that depend on phases
- Develop customized applications by accessing thermodynamic properties through PanEngine API



HOT CRACKING SUSCEPTIBILITY MAP



PHASE FRACTION vs. TEMPERATURE

For more information, please visit us at **Booth 518** and our website: www.computherm.com



A MESSAGE FROM THE 2019 TMS PRESIDENT: JAMES C. FOLEY

Welcome to the TMS 2020 Annual Meeting & Exhibition (TMS2020)—where minerals, metals, and materials scientists, engineers, and students from around the world can gather for a week of technical exchange, networking, and camaraderie. I'm glad you've decided to join us and encourage you to make the most of your time with us in San Diego. Here are a few ways you can do that:

MAKE A PLAN

We received a record number of abstracts—more than 5,000—for this year's conference, so it will be helpful to have a schedule mapped out. Here are a few tools you can use:

- 1) **TMS2020 App:** Download the "TMS 2020 Annual Meeting" mobile application, where you can create your own schedule of technical presentations, social functions, and networking events.
- 2) **Conference Guide:** Use this printed conference guide (the one you're reading now) to identify high-profile keynote sessions and social and networking events you'd like to attend. Then add them to your schedule.
- 3) **Technical Program:** If you prefer to view a print version of the complete technical presentations and sessions planned at TMS2020, you can pick one up at the TMS Member Welcome Center, as well as at the Member Welcome booths on the upper level of the convention center and on Level 1 of the Marriott Marquis.

Remember that the **9th International Symposium on Lead and Zinc Processing (PbZn 2020)** will be co-located with TMS2020 this year. As part of your conference registration fee, all TMS2020 attendees are welcome to attend PbZn 2020 technical sessions.

JOIN US FOR THE ALL-CONFERENCE PLENARY

John Mason, Director of Gas Turbine Products Engineering at Solar Turbines, will give a broad-interest talk for all attendees on Monday at noon. Come and hear his presentation and then join your colleagues in the exhibit hall for lunch.

LUNCH WITH EXHIBITORS

Don't forget that all full-conference registrations include lunch in the exhibit hall on Monday, Tuesday, and Wednesday. Check the tickets attached to your name badge to find your lunch tickets and take some time during your lunch break to browse the exhibit booths.

TRY SOMETHING NEW

We have a few new elements planned for this year's meeting that you might like to check out:

First, TMS will be piloting some new approaches to its poster session at the **Diffusion Zone**, where a blend of traditional and digital presentations create new ways to network and share ideas.

Also new will be the **Silent Session** technology that lets attendees listen to presentations in a whole new way, using headset technology. The benefits of this approach include the ability to group related symposia more closely together, making it easier for attendees to move between related sessions and to network in a shared lounge area. We're piloting this approach with our Characterization and Nuclear Materials tracks.

Have any lunch plans on Thursday? Plan to join us for the inaugural **Materials and Manufacturing Innovation Spotlight Luncheon**. Three leaders in their fields will close out the week with a forward-looking session discussing the potential of three emerging technologies. Purchase a lunch ticket at the registration desk by Wednesday at 10:00 a.m. to enjoy a boxed lunch or simply stop by (no RSVP needed) to hear what these influential speakers have to say.

See pages 32 and 33 for details on all of these new events.

**THERE'S A LOT TO SEE AND DO AT
TMS2020—MAKE THE MOST OF IT
AND ENJOY YOUR WEEK!**

Sincerely,

James C. Foley, 2019 TMS President

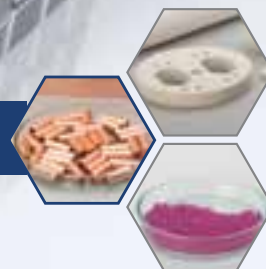
TABLE OF CONTENTS

President's Welcome Message	1	PbZn 2020	26
San Diego City Map	3	Keynote & Featured Sessions	28
TMS2020 Location Maps	4	New for 2020	32
Emergency Procedures	12	TMS Technical Division Honorary Symposia	36
Registration & Tickets	14	Special Lectures	38
Wi-Fi, Food & Business Services	14	Networking & Social Events	44
Proceedings Information	15	Student & Young Professional Events	46
News & Meeting Updates	16	2020 TMS-AIME Awards Ceremony & Banquet ...	48
Member Services & Information	17	2019-2020 TMS Board of Directors	54
Meeting Policies	18	2020 EXHIBIT DIRECTORY	
CALENDAR OF EVENTS		Exhibit Hours	55
Saturday	19	Exhibiting Companies	56
Sunday	19	Exhibition Floorplan	57
Monday	20	Exhibit Directory by Product Category	58
Tuesday	21	Exhibiting Company Descriptions	60
Wednesday	22	2020 Conference Sponsors	66
Thursday	23	Technical Program At A Glance	67
Technical Committee Schedule	24	Notes	85
All-Conference Plenary Session	25	Upcoming TMS Meetings	88

Goodfellow
Your global supplier for materials™

Visit Us at
Booth #421

Where **MATERIALS KNOWLEDGE**
& **INNOVATION** meet



Metals



Alloys



Ceramics



Polymers



Composites



Compounds

www.goodfellowusa.com / info@goodfellowusa.com / 1-800-821-2870

MEETING INFORMATION



HOTELS

- 1 Marriott Marquis San Diego Marina - (HQ)
- 2 Omni San Diego
- 3 Hilton San Diego Gaslamp
- 4 Westin Gaslamp Quarter

WALKING DISTANCE TO CONVENTION CENTER

- 1 min.
- 2 min.
- 4 min.
- 13 min.

HOTELS

- 5 Embassy Suites San Diego Bay
- 6 Best Western Plus Bayside Inn
- 7 Wyndham San Diego Bayside
- 8 Hampton Inn San Diego Downtown

WALKING DISTANCE TO CONVENTION CENTER

- 14 min.
- 21 min.
- 26 min.
- 27 min.



VIEW THE FULL TECHNICAL PROGRAM

For complete details on technical symposia and presentations:

- Search the "TMS 2020 Annual Meeting" app, or access the web version at www.tms.org/TMS2020app
- Download an interactive PDF of the technical program at www.tms.org/TMS2020
- Pick up a copy of the complete printed technical program at the TMS Member Welcome Center



ZONE 1

REGISTRATION

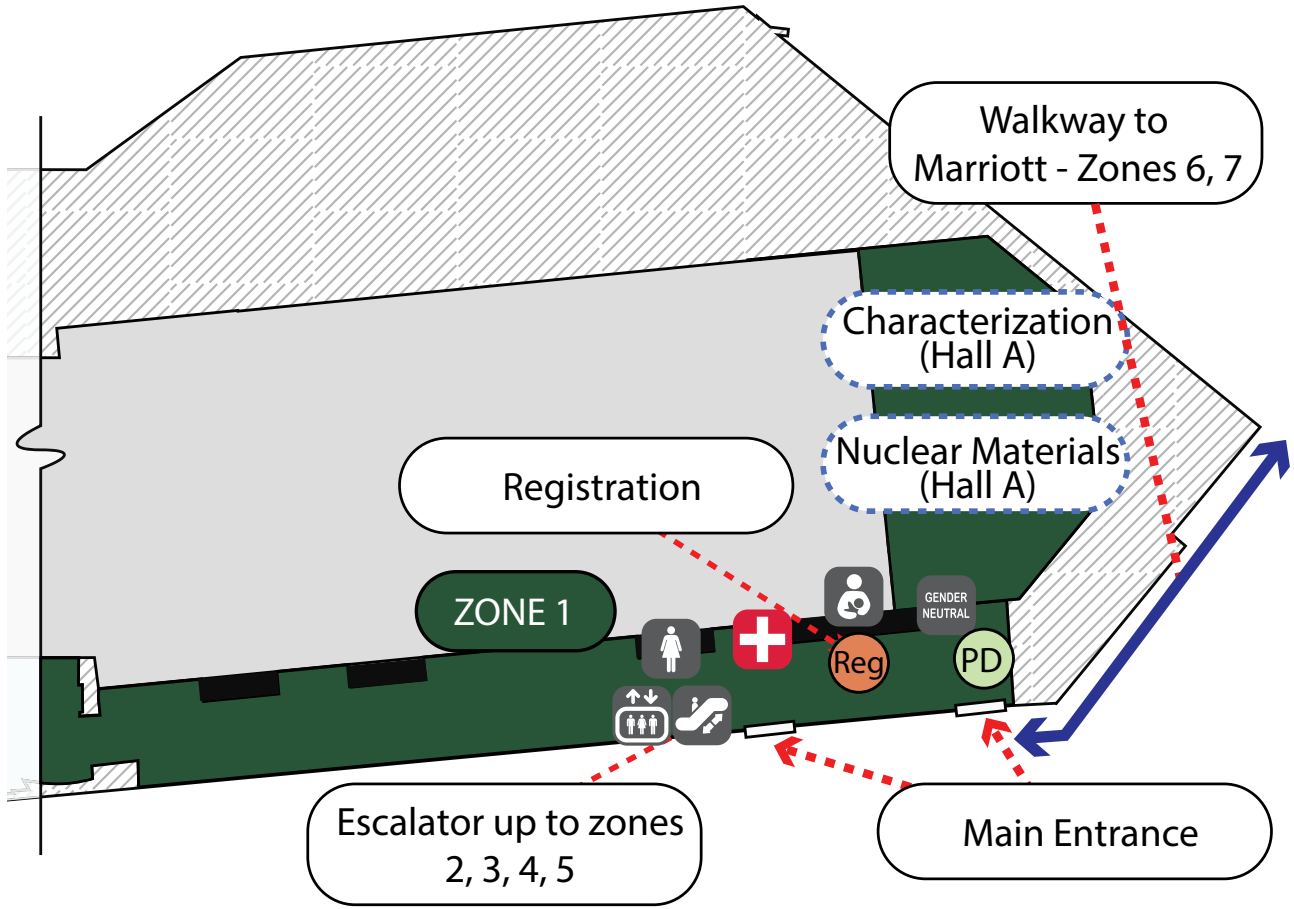
PROGRAMMING SUPPORT DESK (PD)

HOUSING SUPPORT DESK

SILENT SESSION THEATERS
A-1 through A-10

NUCLEAR MATERIALS

CHARACTERIZATION



MEETING INFORMATION

First Aid:



Escalator:



Stairs:



Elevator:



Restrooms:



Mother's Room:



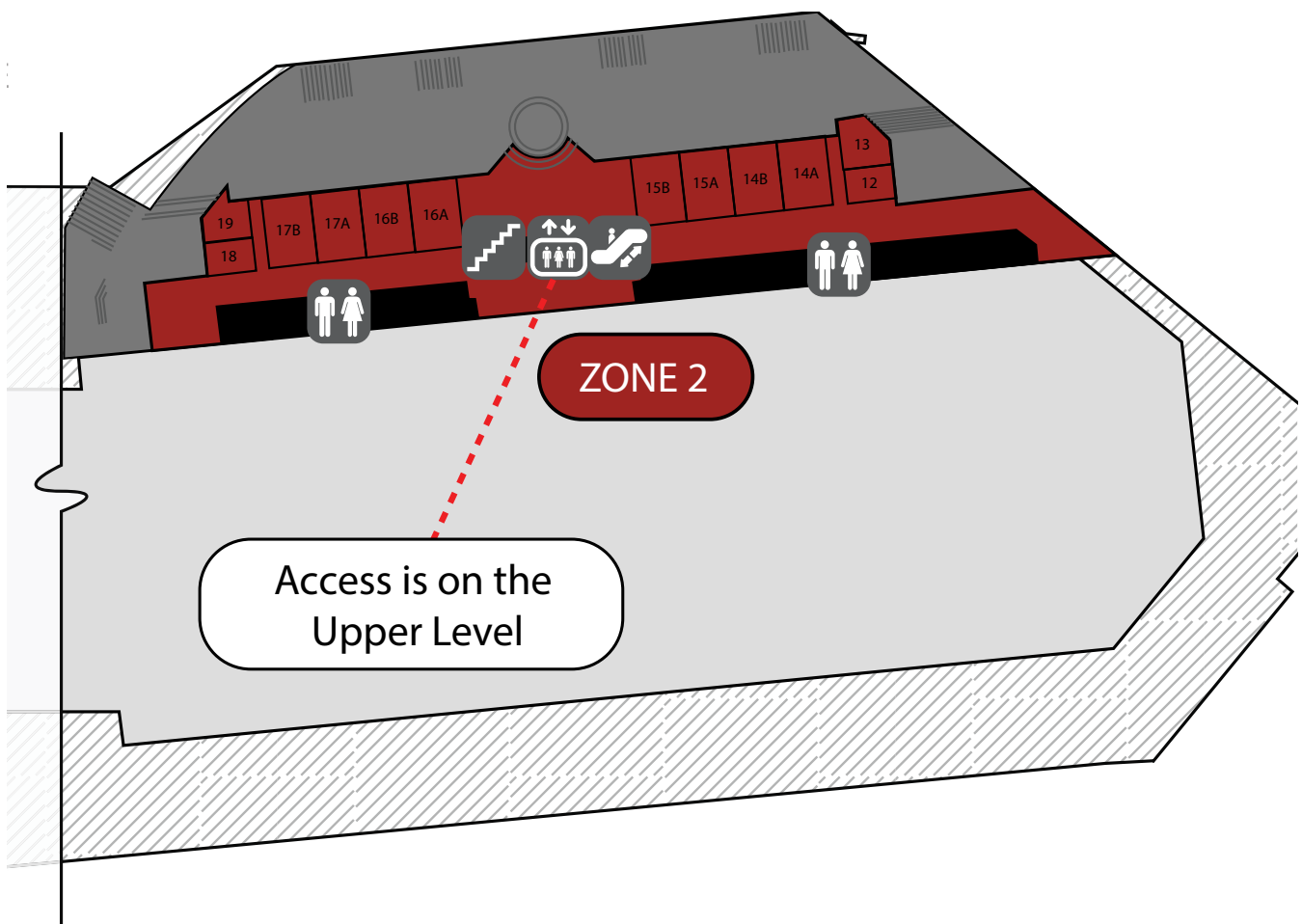
ZONE 2

MATERIALS PROCESSING

PHYSICAL METALLURGY

ENERGY & ENVIRONMENT

CORROSION



Escalator:



Stairs:



Elevator:



Restrooms:



Mother's Room:



ZONE 3

ZONE 4

MEMBER WELCOME CENTER (M)

TMS2020 APP SUPPORT (AP)

SPRINGER BOOTH

LIGHT METALS

MECHANICS AND STRUCTURAL RELIABILITY

SPECIAL TOPICS

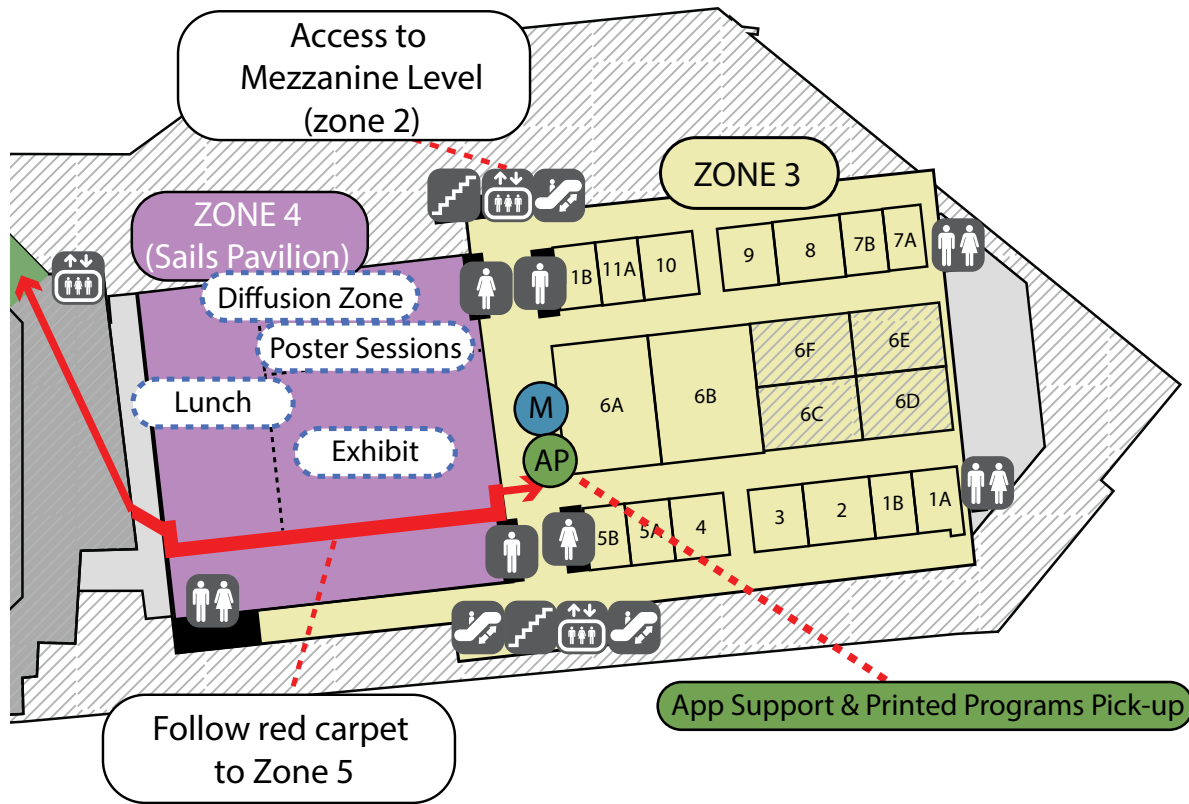
ADDITIVE TECHNOLOGIES

EXHIBITION

POSTER SESSIONS

DIFFUSION ZONE

LUNCHES



MEETING INFORMATION

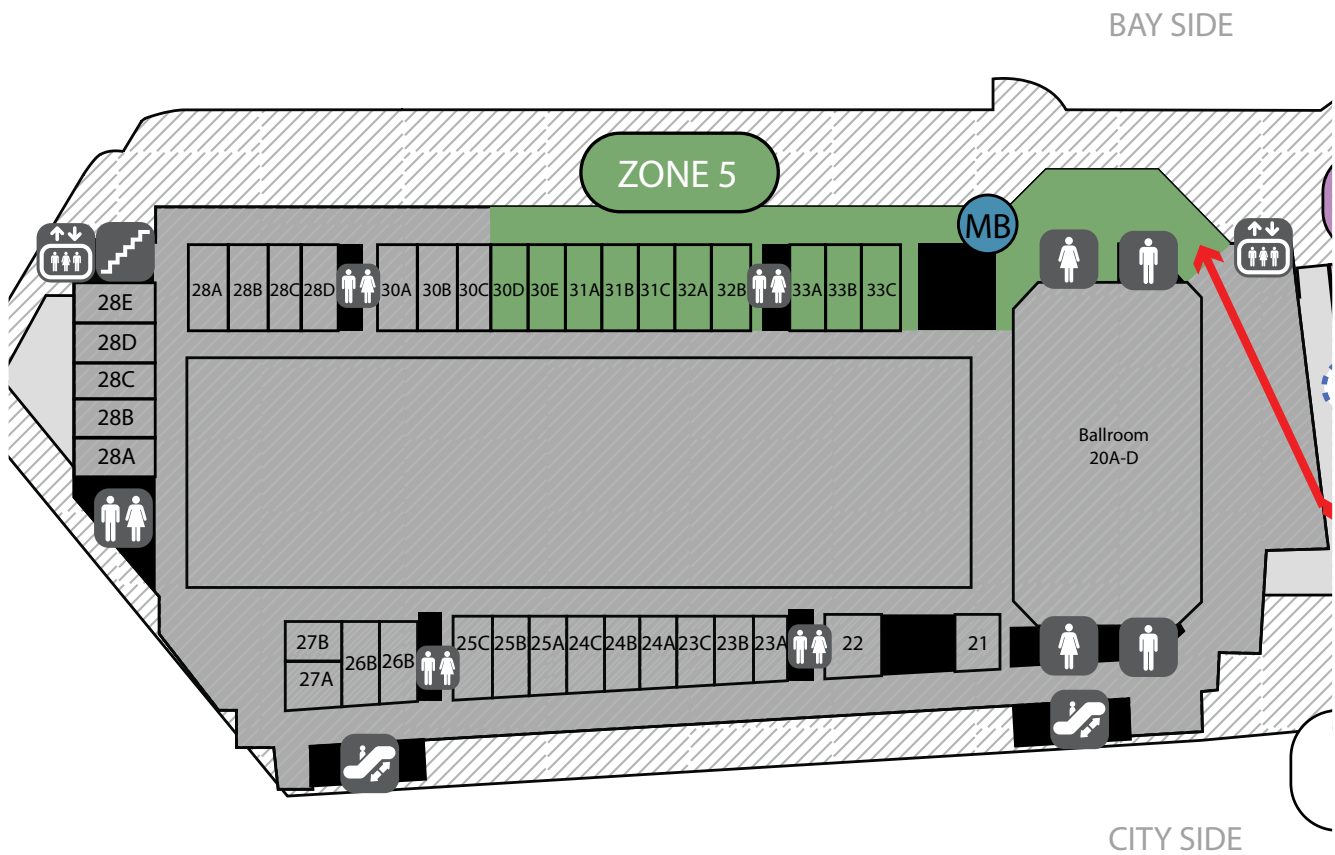


ZONE 5

MEMBER WELCOME BOOTH

MATERIALS DESIGN

PHYSICAL METALLURGY



Escalator:

Stairs:

Elevator:

Restrooms:

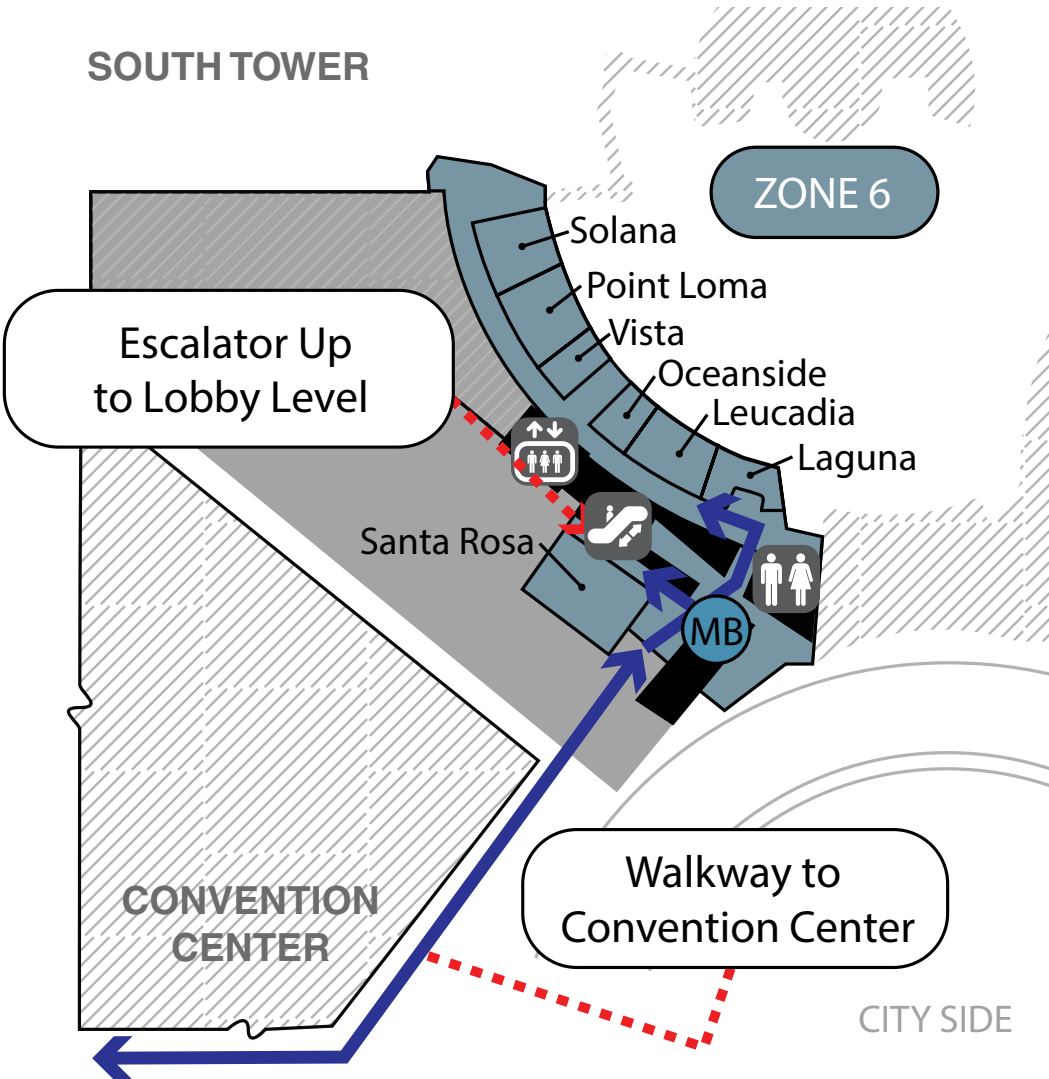
GENDER NEUTRAL

Mother's Room:

MEETING INFORMATION

ZONE 6

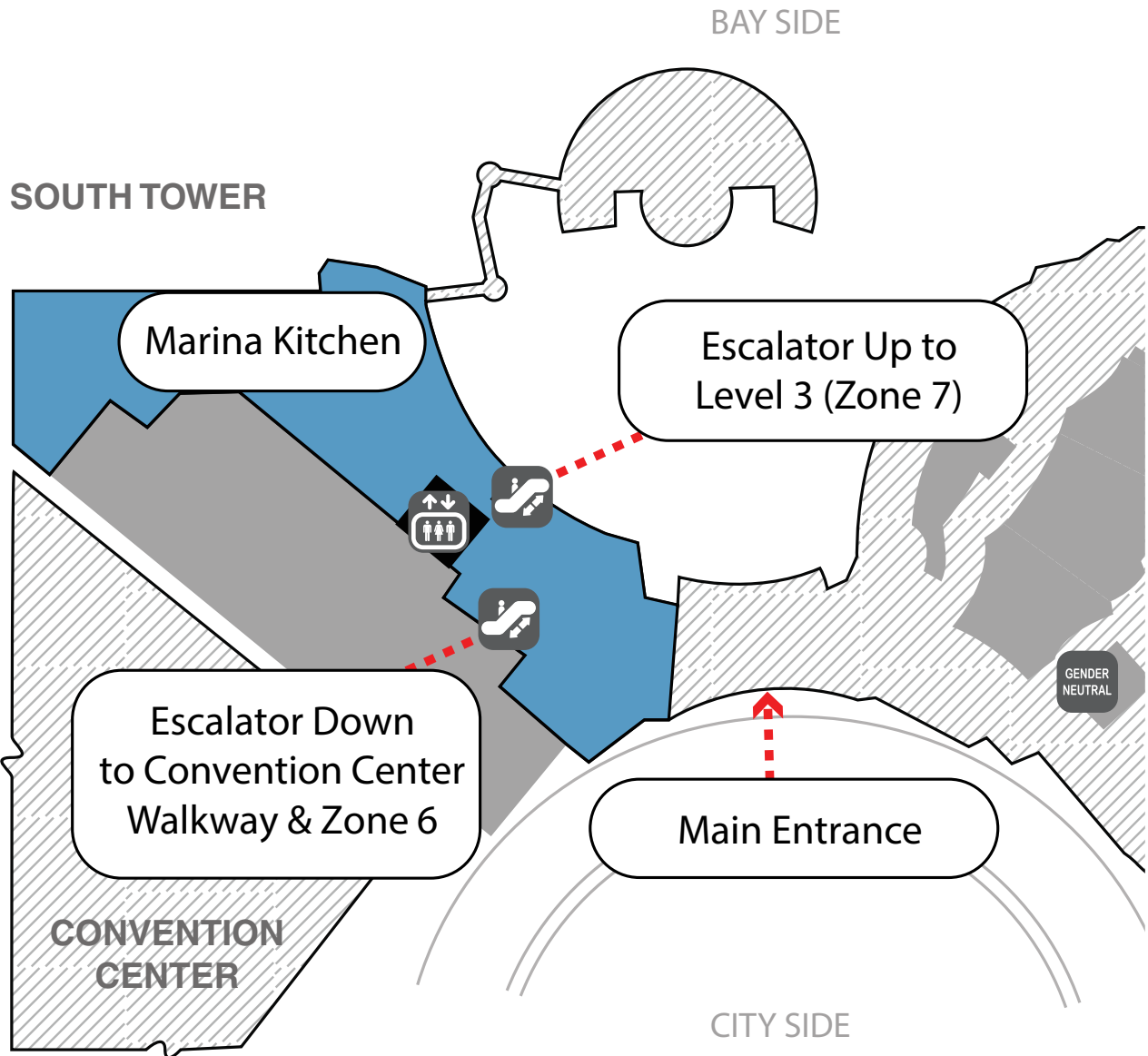
- MEMBER WELCOME BOOTH
- BIOMATERIALS
- NANOSTRUCTURED & HETEROSTRUCTURED MATERIALS



MEETING INFORMATION

- Escalator: 
- Stairs: 
- Elevator:  
- Restrooms:  
- Mother's Room: 

Lobby Level



Escalator:



Stairs:



Elevator:



Restrooms:



Mother's Room:



MEETING INFORMATION

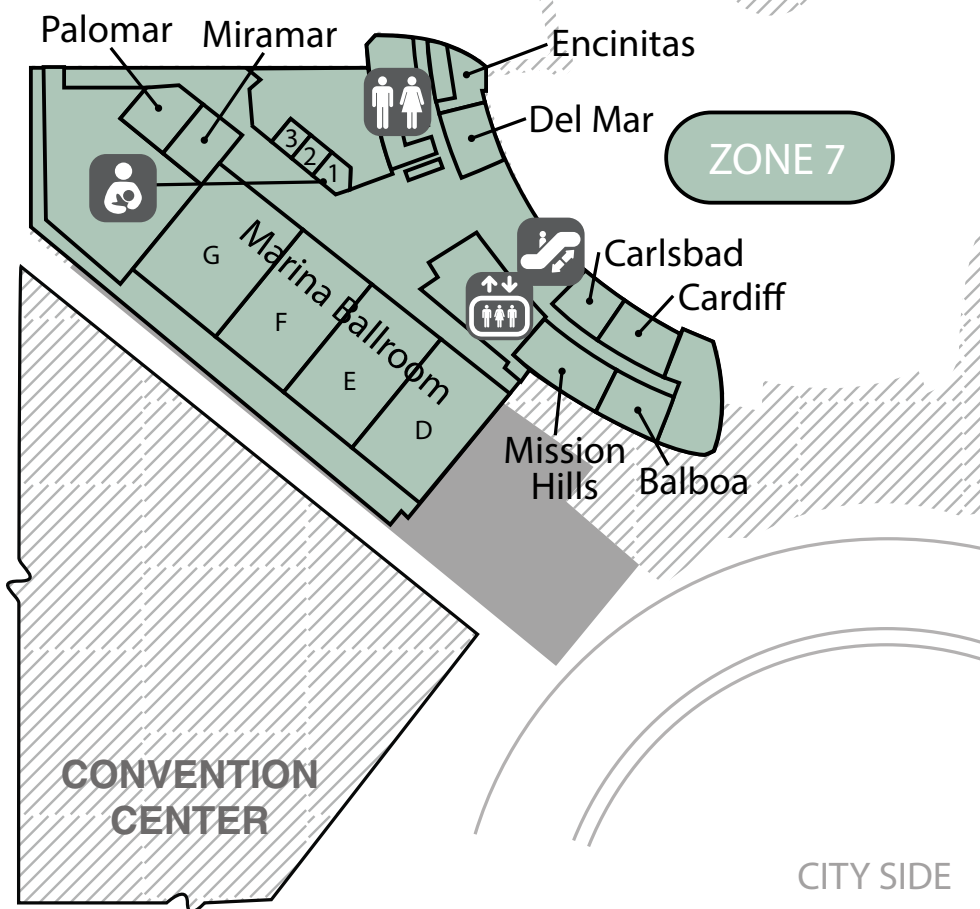
ZONE 7

ELECTRONIC MATERIALS

ADVANCED MATERIALS

NANOSTRUCTURED & HETEROSTRUCTURED MATERIALS

SOUTH TOWER



MEETING INFORMATION

Escalator:



Stairs:



Elevator:



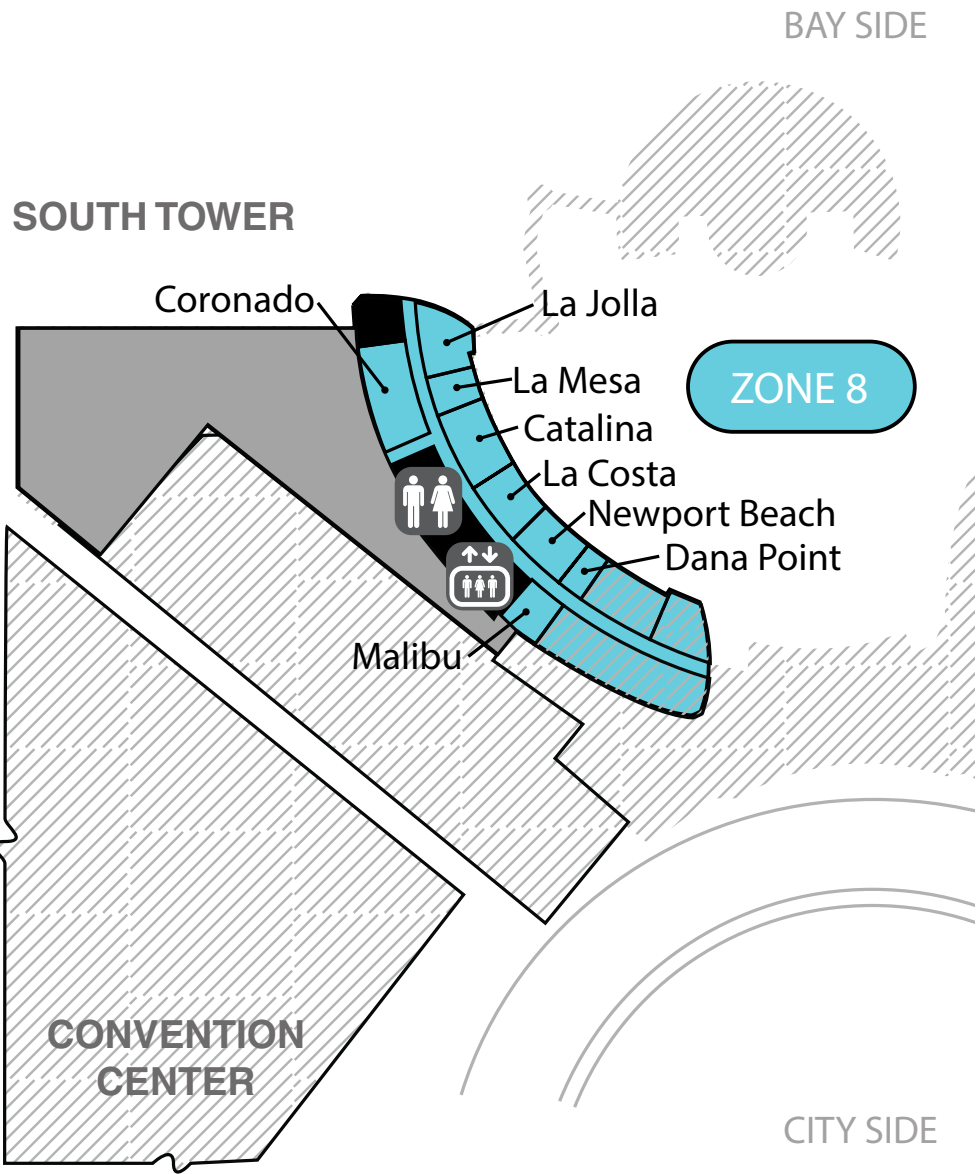
Restrooms:



Mother's Room:



ZONE 8



Escalator:



Stairs:



Elevator:



Restrooms:



Mother's Room:



MEETING INFORMATION

EMERGENCY PROCEDURES

Being prepared to react effectively in case of an emergency situation is the most critical step in ensuring the health and safety of yourself and those around you.

KNOW YOUR SURROUNDINGS

Please take a few moments to review the maps of the TMS2020 facilities available on pages 3-11 of this guide and on the "TMS 2020 Annual Meeting" App. When you enter these buildings, 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 in proximity to you.

AT THE SAN DIEGO CONVENTION CENTER

HOW TO REPORT AN EMERGENCY

If you have an emergency at any time during move in, event or move out please contact the San Diego Convention Center Corporation's (SDCCC) Security Services Department by dialing ext. 5911 from any of the wall-mounted house phones located throughout the facility or by calling **619-525-5911** from a cell phone. SDCCC Security is staffed seven days a week, twenty-four hours per day, 365 days per year (holidays included).

ALARMS

Should an alarm and/or strobe become activated, it will be followed by a P.A. (Public Address) delivered through the SDCCC Security Services Department. This P.A. announcement will inform you that the situation is being investigated. **Example "Please remain calm, stay where you are, and wait for instructions."** A second P.A. will give you updated information. It will either be an **"All Clear"** announcement or **"Evacuation"** instructions. The announcement will be repeated until it is confirmed by the Emergency Response Team that the situation is all clear or the evacuation has commenced. The SDCC Fire Safety System is divided into specific building areas. Therefore it is possible that you may hear a P.A. announcement without hearing an alarm or seeing strobes. Unless you feel there is an immediate threat and that you should evacuate, please follow the instructions given by the P.A. announcement.

EMERGENCY EVACUATIONS

If told to evacuate, exit the building and proceed to a designated assembly point and remain outside until instructed to re-enter. The SDCC staff will provide evacuation assistance to guests with disabilities.

TAKE NOTE

OF LOCATIONS FOR SPECIAL SERVICES

NURSING MOTHER'S ROOMS



Nursing mother's rooms are located on the ground level of the San Diego Convention Center (near Registration and the Programming Support Desk) and on Level 3 of the Marriott Marquis San Diego Marina. Look for this icon on the map.

GENDER-NEUTRAL RESTROOMS



Gender-neutral restrooms are available on the ground level of the San Diego Convention Center (near Registration and the Programming Support Desk) and on the Lobby Level of the Marriott Marquis San Diego Marina. Look for this icon on the map.

EXITS AND ELEVATORS FOR ATTENDEES WITH DISABILITIES



Exits and elevators designated for attendees with disabilities are indicated on the map with this icon.

AT THE MARRIOTT MARQUIS SAN DIEGO MARINA

HOW TO REPORT AN EMERGENCY

From any house phone, dial extension 53 for the hotel emergency team. For hotel security, dial extension 6100 or **619-230-8911**.

ALARMS

If an alarm is activated, follow the announcement from the public address system instructing you what action should be taken.

EMERGENCY EVACUATIONS

In the case of an emergency evacuation, follow the instructions of the hotel staff and proceed to the nearest emergency exit/stairwell. Follow the evacuation route out of the building to a designated assembly area. At the assembly area, please inform a hotel staff member of your room number and whether you require medical attention. Guests with disabilities should dial extension 53 from any house phone if they need assistance. At check-in, inform the front office host if you will need assistance evacuating so that the hotel can keep record of it.



Pro.

No.

The first mechanochemical observation dates back to 1866 by M. Carey Lea. His following reactions were created in a Mortar, the same tool used as early as 1550 BC. Everyone knows this is an ancient tool, but do you know what the most advanced alternative for mechanochemistry is in 2019 AD? Pulverisette premium line, Planetary Ball Mills with ACCELERATION forces up to 95 x g and size reduction down through the NANO-range. Expand your capabilities for materials science, advanced chemistry, & sample prep. Consistent and repeatable processing, real time pressure and temperature monitoring, data logging with PC control. THE RIGHT MILL FOR EVERY MATERIAL, even if you haven't created it yet.



REGISTRATION & TICKETS

REGISTRATION BADGES

The TMS 2020 Annual Meeting & Exhibition (TMS2020) name badge you received at registration must be worn for admission to technical sessions, the exhibition hall, social functions, and other events. Your full-meeting registration badge provides you access to:

- More than 85 symposia in 15 technical tracks
- Technical sessions for the 9th International Symposium on Lead and Zinc Processing 2020 (PbZn 2020)
- All-conference plenary session, featuring John Mason, Solar Turbines Incorporated
- A three-day pass to the TMS2020 Exhibition:
 - Exhibit Hall Opening Reception and Poster Session
 - Exhibit Hall Happy Hour and Poster Session
 - Lunch on Monday, Tuesday, and Wednesday
- 2020 TMS-AIME Awards Ceremony
- Online access to the complete collection of TMS2020 proceedings publications

Attached to your name badge, you will find tickets to attend the lunches and receptions listed above. Any additional luncheon or social function tickets that you have purchased will also be attached to your badge.

WI-FI, FOOD & BUSINESS SERVICES

WI-FI ACCESS

For your convenience, free wireless internet access will be available in all areas of the San Diego Convention Center and in the TMS meeting space in the south tower of the Marriott Marquis San Diego Marina. To access free Wi-Fi:



Choose Network: **TMS2020**
Enter Password: **materials**

LUNCHES

Tickets for lunches in the TMS2020 Exhibit Hall (included as part of the conference registration fee) are attached to each full-conference attendee's name badge. Please take advantage of these lunches as a convenient option during busy days. Lunch will be available in the exhibit hall at the following days and times:

HOURS

Monday, February 24 • 1:00 p.m. to 2:30 p.m.
Tuesday, February 25 • 11:30 a.m. to 1:30 p.m.
Wednesday, February 26 • 11:30 a.m. to 1:30 p.m.

BADGE & TICKET REPLACEMENT

Please keep your badge and tickets with you at all times during the meeting. If you misplace your badge and tickets, replacement badges and tickets can be printed at the TMS2020 registration desk for a fee of \$25.

TICKETED EVENTS

Certain receptions, luncheons, and other activities at TMS2020 require purchase of a ticket in order to attend. If you purchased tickets in advance for one of these events, your ticket will be attached to your name badge. If you would like to add a ticketed event to your registration, please inquire at the registration area.

Most ticket sales will be closed by 10:00 a.m. the day before the event. For example, tickets for the awards banquet on Wednesday evening should be purchased by 10:00 a.m. on Tuesday. An exception is the Fresh Coffee, Fresh Ideas: Diversity and Inclusion Breakfast on Wednesday morning. Ticket sales for this event will close at 5:00 p.m. on Monday.

REGISTRATION DESK

HOURS

Sunday: 7:00 a.m. to 7:00 p.m.
Monday: 7:00 a.m. to 6:00 p.m.
Tuesday: 7:00 a.m. to 5:30 p.m.
Wednesday: 7:00 a.m. to 5:00 p.m.
Thursday: 7:00 a.m. to 2:00 p.m.

COFFEE AND QUICK BITES

The following concession areas will be open in the San Diego Convention Center for coffee and snacks:

- **Starbucks Coffee**
Location: Lobby A, San Diego Convention Center
- **Mrs. Fields Cookies/Auntie Anne Pretzels Concession Cart**
Locations: Lobby A and 6 Foyer

Concession area hours: 7:00 a.m. to 5:00 p.m., Monday through Thursday

For more information on convention center and local area dining and maps, see the TMS2020 App or visit the Travel page of the TMS2020 website at www.tms.org/TMS2020.

BUSINESS SERVICES

A FedEx Office business center, located in Lobby D of the San Diego Convention Center, offers shipping, mailing, printing, and other business services to attendees for a fee.

FREE PROCEEDINGS ACCESS

TMS2020 attendees in most registration classes receive free online access to the complete collection of proceedings publications. For details on how to download the proceedings publications, see the instructions attached to your name badge.

Please note that complimentary proceedings content must be downloaded by April 30, 2020, at which time standard pricing will take effect.

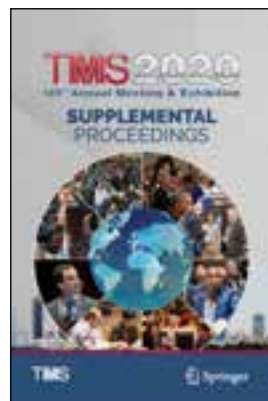
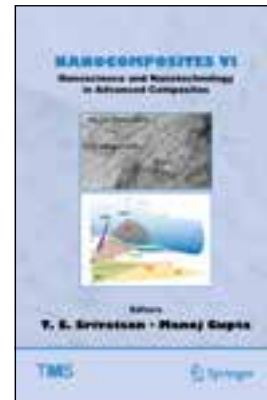
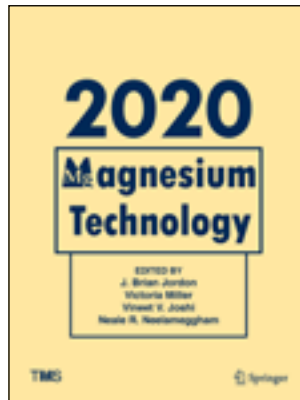
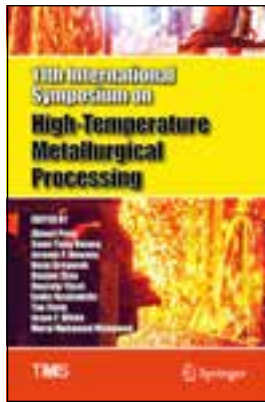
INDIVIDUAL VOLUMES FOR PURCHASE

TMS members receive a 40% discount off hard copies of the TMS2020 proceedings volumes presented on this page. These books will be available for purchase at the Springer booth, located near the Sails Pavilion and the TMS Member Welcome Center on the upper level of the San Diego Convention Center.

Visit the online TMS Bookstore to search the complete inventory of available TMS publications, including past proceedings volumes, at www.tms.org/Bookstore.

TMS2020 PROCEEDINGS VOLUMES

The following volumes will be included in the online proceedings access for most registrants, and hard copies will be available for purchase at TMS2020:



"TMS 2020 ANNUAL MEETING" APP



Build a personalized schedule, view the most up-to-date technical program information, access venue maps, and more with the TMS 2020 Annual Meeting App. To download, search "TMS Annual Meeting" in the App Store or the Google Play™ Store. You can also use a web-based version of the app by visiting www.tms.org/TMS2020app.

The app's features include:

- Latest programming schedule
- Complete abstracts
- Ability to build a personalized schedule
- Speaker information
- Exhibit map
- Exhibitors and sponsors
- Venue information
- Interactive Venue maps
- Access to *TMS2020 News*
- Appointment scheduling and messaging between attendees

This year's app has a new look and new features so be sure to check it out!

PLEASE NOTE: LOG IN REQUIRED FOR MOST FUNCTIONS

You can view the full technical program without logging in to the app. However, to view attendees, build your own schedule, or communicate through the app, you will be required to log in using the same e-mail address you used when registering for TMS2020. Can't remember which e-mail? Check the printed ticket with your registration badge titled "Use the TMS 2020 Annual Meeting App" for a reminder.

TMS2020 NEWS: YOUR DAILY MEETING NEWSLETTER

Want to stay informed of everything that's happening at the TMS 2020 Annual Meeting & Exhibition? *TMS2020 News*, a daily newsletter reporting on conference activities and events, will be published each morning, Sunday through Thursday, during the conference. You can access the newsletter through the TMS2020 app at any time, through the TMS2020 website, or by clicking on the link in the notification e-mail we'll send each morning.

Each issue will provide a reminder of the big events planned for the day, as well as recaps and photos from events happening around the meeting. So before you start your day at TMS2020, sit down with a cup of coffee and read *TMS2020 News* so that you don't miss a thing.

TWEET YOUR OWN UPDATES



Keep each other updated on meeting activities, interesting talks, and tips on the best local restaurants. Use **#TMSAnnualMeeting** to tweet your observations to **@TMSociety**.



Stop by Room 6A in the San Diego Convention Center between 3:00 p.m. and 7:00 p.m. on Sunday to cheer on your favorite school at the 2020 TMS Materials Bowl. The teams competing in this year's event are:

- Illinois Institute of Technology
- San Jose State University
- Georgia Institute of Technology
- University of Florida
- University of Illinois
- Facultad de Ingenieria Mecanica y Electrica
- Colorado School of Mines
- University of Michigan, Ann Arbor
- Indian Institute of Technology Kanpur
- McGill University
- University of Pittsburgh
- South Dakota School of Mines & Technology

The winning team will be announced in Monday's edition of *TMS2020 News*.

VISIT THE TMS MEMBER WELCOME CENTER



HOURS OF OPERATION

Sunday: 7:00 a.m. to 7:00 p.m.
Monday: 7:00 a.m. to 6:00 p.m.
Tuesday: 7:00 a.m. to 5:30 p.m.
Wednesday: 7:00 a.m. to 5:00 p.m.
Thursday: 7:00 a.m. to 5:00 p.m.

Location: San Diego Convention Center, Ballroom 6 Lobby

COUNTDOWN TO THE 150TH ANNIVERSARY



2021 marks the conclusion of a series of commemorative pins issued by TMS to celebrate the 150th anniversary of its parent organization—the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME). Complete your collection with next year’s pin, which highlights the 150th TMS Annual Meeting & Exhibition.

WHAT CAN YOU DO AT THE TMS MEMBER WELCOME CENTER?

FIND TECHNICAL PROGRAM INFORMATION AND GET APP SUPPORT

Learn how to access technical program information through the TMS2020 App or pick up a print copy of the TMS2020 technical program.

PICK UP YOUR 2020 COMMEMORATIVE PIN



All TMS2020 attendees are invited to pick up their commemorative pin honoring the 25th anniversary of TMS going digital in order to give members the best access possible to information and knowledge-sharing opportunities.

PICK UP YOUR FREE COPY OF TMS'S NEWEST STUDY



Creating the Next Generation Materials Genome Initiative Workforce

Organized by TMS on behalf of the U.S. National Science Foundation.

Download for free: www.tms.org/MGIWorkforce

VIEW THE FOUNDATION HONOR ROLL



Take a moment to view the TMS Foundation Honor Roll, which thanks the individuals who helped support important outreach programs by donating to the TMS Foundation in 2019.

ASK QUESTIONS

Please visit the TMS Member Welcome Center with any questions you may have about your membership or simply stop by to introduce yourself to TMS staff!

FIRST-TIME ATTENDEES: PICK UP YOUR WELCOME GIFT

If this is your first time attending a TMS annual meeting, visit the TMS Member Welcome Center to pick up a guide to making the most of your membership and a small gift to thank you for joining us at TMS2020.

REPEAT ATTENDEES: CLAIM YOUR THANK YOU GIFT

If you have attended ten or more **consecutive** TMS annual meetings, stop by the TMS Member Welcome Center for your free gift—our small way of saying thank you for your loyalty to us and our conference. Eligible attendees received an e-mail in advance of the meeting and can use the ticket attached to their name badge to claim their gift.

MEETING BADGES

All attendees must wear registration badges at all times during the meeting to ensure admission to events included in the paid registration fee, such as technical sessions, exhibition, and receptions. "Exhibit Only" badges only provide admittance to the show floor for events in the exhibit hall. "Exhibit Only" attendees may not attend technical sessions.

BADGE & TICKET REPLACEMENT FEE

There is a \$25 fee to reprint lost badges and tickets. Visit the registration area to request a replacement badge.

GUEST SESSION & FUNCTION ACCESS

Each full-conference attendee is permitted up to two guests for one session at which they are presenting. This does not include colleagues or exhibitors. This access is intended for family members who wish to listen to one talk presented by their relative. Please provide the names of the guests who will be attending your presentations when picking up your badge, so that your guests receive a ticket that allows them entry to your session. If your guest is under the age of 18, please refer to the TMS Policy on Minor Children at Events. You may purchase additional tickets to social functions for your guests at the registration desk.

MINOR CHILDREN AT EVENTS

In accordance with the TMS Policy on Minor Children at Events, no one under the age of 18 will be allowed on the exhibit floor, with the exception of Material Advantage or other university student registrants and nursing babies with their mothers. View the full policy at www.tms.org/CodeofConductPolicies.

REFUND POLICY

The deadline for all refunds was January 17, 2020. No refunds will be issued at the meeting. Fees and tickets are nonrefundable. TMS is not responsible for "no-show" presenters. Presenters are scheduled and advertised in good faith, based on the presenter's proposal to be included in the program.

PHOTOGRAPHY POLICY

By registering for this meeting, all attendees acknowledge that they may be photographed by TMS personnel while at events, and that those photos may be used for promotional purposes, in TMS publications and websites, and on social media sites.



TMS DIVERSITY AND INCLUSION STATEMENT

The Minerals, Metals & Materials Society (TMS) is committed to advancing diversity in the minerals, metals, and materials professions, and to promoting an inclusive professional culture that welcomes and engages all who seek to contribute to the field. TMS recognizes that a diverse minerals, metals, and materials workforce is critical to ensuring that all viewpoints, perspectives, and talents are brought to bear in addressing complex science and engineering challenges. To build and nurture this diverse professional community, TMS welcomes and actively engages the participation of underrepresented groups in all of its initiatives and endeavors.

MEETINGS CODE OF CONDUCT

TMS is committed to providing a safe, inclusive and welcoming environment for all attendees. For this reason, TMS does not tolerate harassment in any form and requires all participants to abide by TMS policies, including the Meetings Code of Conduct and Anti-Harassment Policy. For more information, or to report violations of these policies go to www.tms.org/CodeofConductPolicies or see a TMS staff member.

ANTITRUST COMPLIANCE POLICY

TMS complies with the antitrust laws of the United States. Attendees are encouraged to consult with their own corporate counsel for further guidance in complying with U.S. and foreign antitrust laws and regulations.

AMERICANS WITH DISABILITIES ACT



TMS strongly supports the federal Americans with Disabilities Act (ADA) which prohibits discrimination against, and promotes public accessibility for, those with disabilities. In support of, and in compliance with ADA, we ask those requiring specific equipment or services to notify TMS staff at the TMS Member Welcome Center or the Registration desk.

CELL PHONE USE



In consideration of attendees and presenters, TMS requests that you set cell phones and other devices on "silent" while in meeting rooms.

RECORDING OF SLIDES AND PRESENTATIONS

TMS reserves the right to all audio and video reproductions of presentations at TMS-sponsored meetings. Any recording of sessions (audio, video, still photography, etc.) intended for personal use, distribution, publication, or copyright without the express written consent of TMS and the individual authors is strictly prohibited. Attendees violating this policy may be asked to leave the session or the meeting without refund.

CALENDAR OF EVENTS

Event/Function Name	Time	Venue	Room	Access
Saturday, February 22, 2020				
Professional Development & Lectures				
Lead Processing	10:30 AM to 6:00 PM	SDCC	Room 2	T
Council/Committee Meetings				
Professional Registration Item Writers Workshop and Committee Meeting	9:00 AM to 5:00 PM	Marriott	Newport Beach	R
Sunday, February 23, 2020				
All-Conference Events				
TMS Member Welcome Center	7:00 AM to 7:00 PM	SDCC	Ballroom 6 Lobby	O
Registration	7:00 AM to 7:00 PM	SDCC	Hall AB1 Pre-Function	O
Member Welcome Booth - Marriott	7:00 AM to 7:00 PM	Marriott	Santa Rosa Foyer	O
App Support & Technical Programs	7:00 AM to 7:00 PM	SDCC	Ballroom 6 Lobby	O
Programming Support Desk	2:00 PM to 6:00 PM	SDCC	Hall AB1 Pre-Function	O
Professional Development & Lectures				
Zinc Processing	8:00 AM to 5:00 PM	SDCC	Room 1B	T
Advanced Microelectronics Packaging, Interconnection Technology, and Pb-Free Solders	8:00 AM to 5:00 PM	SDCC	Room 4	T
Modelling the Coevolution of Microstructure and Properties using the MOOSE Framework	8:00 AM to 5:00 PM	SDCC	Room 5A	T
Lead Processing	9:30 AM to 12:00 PM	SDCC	Room 2	T
Additive Manufacturing Materials and Processes Workshop	1:00 PM to 5:00 PM	SDCC	Room 5B	T
Council/Committee Meetings				
Incoming Board Member Orientation	7:30 AM to 9:00 AM	Marriott	Encinitas	I
TMS Board of Directors Meeting - Open Session	9:00 AM to 1:00 PM	Marriott	Cardiff/Carlsbad	I
Accreditation Committee Meeting	12:30 PM to 2:30 PM	Marriott	Newport Beach	O
Technical Division Chairs Meeting	1:30 PM to 2:30 PM	Marriott	Dana Point	I
Magnesium Committee Meeting	1:30 PM to 3:00 PM	SDCC	Room 6C	O
Recycling and Environmental Technologies Committee Meeting	1:30 PM to 3:00 PM	SDCC	Room 16A	O
TMS Nominating Committee Meeting	1:30 PM to 3:00 PM	Marriott	Catalina	R
Aluminum Committee Meeting	2:00 PM to 4:00 PM	Marriott	Marina Ballroom D	O
Materials Characterization Committee Meeting	2:30 PM to 4:00 PM	Marriott	La Costa	O
Diversity Committee Meeting	3:00 PM to 4:30 PM	Marriott	Mission Hills	O
Pyrometallurgy Committee Meeting	3:00 PM to 4:30 PM	Marriott	Balboa	O
ABET Preparation Training	3:00 PM to 5:30 PM	Marriott	Newport Beach	O
JOM Advisor Briefing	4:00 PM to 5:00 PM	Marriott	Solana	I
Hydrometallurgy and Electrometallurgy Committee Meeting	4:00 PM to 5:00 PM	SDCC	Room 14A	O
<i>Metallurgical and Materials Transactions</i> Board of Review	4:00 PM to 5:00 PM	Marriott	Santa Rosa	I
TMS Program Committee	4:00 PM to 6:00 PM	Marriott	Cardiff/Carlsbad	I
Process Technology and Modeling Committee Meeting	5:00 PM to 6:00 PM	Marriott	Palomar	O
Thin Films and Interfaces Committee Meeting	5:00 PM to 6:00 PM	Marriott	Oceanside	O
Additive Manufacturing Committee Meeting	5:30 PM to 7:00 PM	SDCC	Room 7B	O
Frontiers of Materials Award Subcommittee	6:00 PM to 7:00 PM	Marriott	Cardiff/Carlsbad	R
Nanomechanical Materials Behavior Committee Meeting	6:00 PM to 7:30 PM	SDCC	Room 7A	O
Mechanical Behavior of Materials Committee Meeting	7:30 PM to 9:00 PM	SDCC	Room 7A	O
Phase Transformations Committee Meeting	7:30 PM to 9:00 PM	Marriott	Marina Ballroom E	O
Alloy Phases Committee Meeting	7:30 PM to 9:00 PM	Marriott	Mission Hills	O
Exhibition				
Exhibitor Move-in	8:00 AM to 5:00 PM	SDCC	Sails Pavilion	O

SDCC

San Diego Convention Center

Marriott

Marriott Marquis San Diego Marina

SDCC/Marriott

Both Locations

O = Open to All Attendees R = Restrictions Apply T = Ticketed Event, Pre-registration required I = Invitation Only

MEETING INFORMATION

CALENDAR OF EVENTS

Event/Function Name	Time	Venue	Room	Access
Social Functions				
TMS Fellows and Invited Guests Reception	4:30 PM to 6:30 PM	Marriott	Roy's San Diego Waterfront Big Island Room, 2nd Floor	I
LGBTQ+ and Allies Networking Mixer	8:00 PM to 10:00 PM	SDCC	Room 3	O
Student & Young Professional Functions				
Materials Bowl	3:00 PM to 7:00 PM	SDCC	Room 6A	O
Student Networking Mixer	7:00 PM to 8:30 PM	SDCC	Room 6B	O
Monday, February 24, 2020				
All-Conference Events				
TMS Member Welcome Center	7:00 AM to 6:00 PM	SDCC	Ballroom 6 Lobby	O
Programming Support Desk	7:00 AM to 6:00 PM	SDCC	Hall AB1 Pre-Function	O
Registration	7:00 AM to 6:00 PM	SDCC	Hall AB1 Pre-Function	O
Member Welcome Booth - Marriott	7:00 AM to 6:00 PM	Marriott	Santa Rosa Foyer	O
Member Welcome Booth - Convention Center	7:00 AM to 6:00 PM	SDCC	Ballroom 33C Bayside Foyer	O
App Support & Technical Programs	7:00 AM to 6:00 PM	SDCC	Ballroom 6 Lobby	O
Technical Programming Sessions	8:00 AM to 11:30 AM	SDCC/ Marriott	Various	O
Morning Break	9:20 AM to 10:00 AM	SDCC/ Marriott	Various	O
All-Conference Plenary Session	12:00 PM to 1:00 PM	SDCC	Room 6A	O
Technical Programming Sessions	2:30 PM to 6:00 PM	SDCC/ Marriott	Various	O
Afternoon Break	3:50 PM to 4:30 PM	SDCC/ Marriott	Various	O
Council/Committee Meetings				
Education Committee Meeting	7:30 AM to 9:00 AM	Marriott	Newport Beach	O
Membership & Student Development Committee Meeting	7:30 AM to 9:30 AM	Marriott	Catalina	R
TMS Pride Meeting	8:30 AM to 9:30 AM	Marriott	Dana Point	O
TMS Executive Committee Meeting	8:30 AM to 11:00 AM	Marriott	Encinitas	I
EPD Council Meeting	1:00 PM to 3:00 PM	Marriott	La Costa	I
Powder Materials Committee Meeting	1:15 PM to 2:30 PM	Marriott	Catalina	O
Integrated Computational Materials Engineering Committee Meeting	1:15 PM to 2:30 PM	SDCC	Room 10	O
Superalloys 2020 Program Committee Meeting	5:00 PM to 7:00 PM	Marriott	Encinitas	I
Advanced Characterization, Testing and Simulation Committee Meeting	6:00 PM to 7:00 PM	SDCC	Room 19	O
Biomaterials Committee Meeting	6:00 PM to 7:00 PM	Marriott	Leucadia	O
Chemistry and Physics of Materials Committee Meeting	6:00 PM to 7:00 PM	SDCC	Room 32A	O
Refractory Metals & Materials Committee Meeting	6:00 PM to 7:00 PM	Marriott	Cardiff	O
Steels Committee Meeting	6:00 PM to 7:00 PM	Marriott	Mission Hills	O
Surface Engineering Committee Meeting	6:00 PM to 7:00 PM	SDCC	Room 9	O
Nuclear Materials Committee Meeting	6:00 PM to 7:30 PM	Marriott	Carlsbad	O
Shaping and Forming Committee Meeting	6:00 PM to 7:30 PM	Marriott	Catalina	O
Materials Innovation Committee Meeting	6:00 PM to 7:30 PM	Marriott	Malibu	R
Composite Materials Committee Meeting	6:30 PM to 7:30 PM	SDCC	Room 10	O
LMD Council Meeting	6:30 PM to 8:30 PM	Marriott	La Costa	I
Computational Materials Science & Engineering Committee Meeting	7:30 PM to 8:30 PM	SDCC	Room 11A	O

MEETING INFORMATION

SDCC San Diego Convention Center
 Marriott Marriott Marquis San Diego Marina
 SDCC/Marriott Both Locations
 O = Open to All Attendees R = Restrictions Apply T = Ticketed Event, Pre-registration required I = Invitation Only

CALENDAR OF EVENTS

Event/Function Name	Time	Venue	Room	Access
Exhibition				
Exhibitor Move-in	8:00 AM to 10:00 AM	SDCC	Sails Pavilion	O
TMS2020 Exhibition	11:00 AM to 7:00 PM	SDCC	Sails Pavilion	O
Poster Session I Installation	12:00 PM to 2:00 PM	SDCC	Sails Pavilion	O
Lunch in the Exhibit Hall	1:00 PM to 2:30 PM	SDCC	Sails Pavilion	T
Poster Session I Gallery Viewing	2:00 PM to 5:30 PM	SDCC	Sails Pavilion	O
Technical Division Student Poster Contest	5:00 PM to 6:30 PM	SDCC	Sails Pavilion	O
Exhibit Opening Reception & Poster Session I Presentations	5:30 PM to 7:00 PM	SDCC	Sails Pavilion	O
Poster Session I Dismantle	7:00 PM to 7:30 PM	SDCC	Sails Pavilion	O
Social Functions				
SMD Luncheon	1:00 PM to 2:30 PM	SDCC	Room 6B	T
Worcester Polytechnic Institute Alumni and Guests Reception	5:30 PM to 7:00 PM	Off-site	Harbor House	I
PuBZoNe: Networking Reception for PbZn 2020	6:00 PM to 7:30 PM	Off-site	Barleymash	T
Tuesday, February 25, 2020				
All-Conference Events				
TMS Member Welcome Center	7:00 AM to 5:30 PM	SDCC	Ballroom 6 Lobby	O
Registration	7:00 AM to 5:30 PM	SDCC	Hall AB1 Pre-Function	O
Member Welcome Booth - Marriott	7:00 AM to 5:30 PM	Marriott	Santa Rosa Foyer	O
Member Welcome Booth - Convention Center	7:00 AM to 5:30 PM	SDCC	Ballroom 33C Bayside Foyer	O
App Support & Technical Programs	7:00 AM to 5:30 PM	SDCC	Ballroom 6 Lobby	O
Programming Support Desk	7:00 AM to 6:00 PM	SDCC	Hall AB1 Pre-Function	O
Technical Programming Sessions	8:30 AM to 12:00 PM	SDCC/ Marriott	Various	O
Morning Break	9:50 AM to 10:30 AM	SDCC/ Marriott	Various	O
Technical Programming Sessions	2:00 PM to 5:30 PM	SDCC/ Marriott	Various	O
Afternoon Break	3:20 PM to 4:00 PM	SDCC/ Marriott	Various	O
Council/Committee Meetings				
DMMM4 Organizing Committee Meeting	7:00 AM to 8:30 AM	Marriott	La Jolla	I
Energy Conversion and Storage Committee Meeting	7:30 AM to 8:30 AM	SDCC	Room 16B	O
Fellows Award Subcommittee Meeting	7:30 AM to 8:30 AM	Marriott	Encinitas	R
Committee Chair Orientation	7:30 AM to 9:30 AM	Marriott	Newport Beach	I
TMS Foundation Board of Trustees Meeting	7:30 AM to 10:00 AM	Marriott	Malibu	I
Young Professionals Committee Meeting	8:00 AM to 9:30 AM	Marriott	Catalina	O
TMS Past Presidents Meeting	11:30 AM to 1:00 PM	Marriott	Catalina	I
SMD Council Meeting	12:00 PM to 2:00 PM	Marriott	La Costa	I
Electronic Packaging and Interconnection Materials Committee Meeting	12:30 PM to 1:30 PM	Marriott	Palomar	O
Public & Governmental Affairs Committee Meeting	1:30 PM to 3:00 PM	Marriott	Catalina	O
Financial Planning Committee Meeting	3:00 PM to 5:00 PM	Marriott	Encinitas	R
Content Development and Dissemination Committee	5:00 PM to 7:00 PM	Marriott	Catalina	I
Professional Development Committee Meeting	5:00 PM to 7:00 PM	Marriott	Malibu	I
Solidification Committee Meeting	5:45 PM to 6:45 PM	Marriott	Balboa	O
Corrosion and Environmental Effects Committee Meeting	6:00 PM to 7:00 PM	SDCC	Room 19	O
Energy Committee Meeting	6:00 PM to 7:00 PM	SDCC	Room 17A	O
Nanomaterials Committee Meeting	6:00 PM to 7:00 PM	Marriott	Point Loma	O
Titanium Committee Meeting	6:00 PM to 7:00 PM	SDCC	Room 30E	O
High Temperature Alloys Committee Meeting	6:00 PM to 7:30 PM	Marriott	Newport Beach	O
MPMD Council Meeting	6:30 PM to 8:30 PM	Marriott	La Costa	I
Magnetic Materials Committee Meeting	7:00 PM to 8:00 PM	Marriott	Del Mar	O

SDCC

San Diego Convention Center

Marriott

Marriott Marquis San Diego Marina

SDCC/Marriott

Both Locations

O = Open to All Attendees R = Restrictions Apply T = Ticketed Event, Pre-registration required I = Invitation Only

MEETING INFORMATION

CALENDAR OF EVENTS

Event/Function Name	Time	Venue	Room	Access
Exhibition				
TMS2020 Exhibition	11:00 AM to 7:00 PM	SDCC	Sails Pavilion	O
Lunch in the Exhibit Hall	11:30 AM to 1:30 PM	SDCC	Sails Pavilion	T
Poster Session II Installation	12:00 PM to 2:00 PM	SDCC	Sails Pavilion	O
Poster Session II Gallery Viewing	2:00 PM to 5:30 PM	SDCC	Sails Pavilion	O
Exhibit Hall Happy Hour & Poster Session II Presentations	5:30 PM to 7:00 PM	SDCC	Sails Pavilion	O
Poster Session II Dismantle	7:00 PM to 7:30 PM	SDCC	Sails Pavilion	O
Professional Development & Lectures				
Preparing A Winning Application Package	4:00 PM to 6:00 PM	SDCC	Room 6A	O
Social Functions				
EPD/MPMD/PbZn Luncheon	12:00 PM to 2:00 PM	SDCC	Room 6B	T
Student & Young Professional Functions				
Young Professional Tutorial Luncheon	12:00 PM to 12:45 PM	SDCC	Room 6A	T
Young Professional Tutorial Lecture	12:45 PM to 2:00 PM	SDCC	Room 6A	O
Student Career Forum	2:00 PM to 4:00 PM	SDCC	Room 19	O
Wednesday, February 26, 2020				
All-Conference Events				
TMS Member Welcome Center	7:00 AM to 5:00 PM	SDCC	Ballroom 6 Lobby	O
Registration	7:00 AM to 5:00 PM	SDCC	Hall AB1 Pre-Function	O
Member Welcome Booth - Marriott	7:00 AM to 5:00 PM	Marriott	Santa Rosa Foyer	O
Member Welcome Booth - Convention Center	7:00 AM to 5:00 PM	SDCC	Ballroom 33C Bayside Foyer	O
App Support & Technical Programs	7:00 AM to 5:00 PM	SDCC	Ballroom 6 Lobby	O
Programming Support Desk	7:00 AM to 6:00 PM	SDCC	Hall AB1 Pre-Function	O
Technical Programming Sessions	8:30 AM to 12:00 PM	SDCC/ Marriott	Various	O
Morning Break	9:50 AM to 10:30 AM	SDCC/ Marriott	Various	O
Technical Programming Sessions	2:00 PM to 5:30 PM	SDCC/ Marriott	Various	O
Afternoon Break	3:20 PM to 4:00 PM	SDCC/ Marriott	Various	O
Council/Committee Meetings				
Light Metals 2021 Subject Chairs	7:00 AM to 8:30 AM	Marriott	Newport Beach	I
International Affairs Committee Meeting	11:30 AM to 1:00 PM	Marriott	Encinitas	I
JOM Strategic Planning Committee Meeting	12:00 PM to 1:30 PM	Marriott	Newport Beach	I
FMD Council Meeting	12:00 PM to 2:00 PM	Marriott	La Costa	I
TMS Industrial Advisory Committee Meeting	1:00 PM to 5:00 PM	Marriott	Catalina	I
Leadership Recruitment Committee Meeting	2:00 PM to 3:30 PM	Marriott	Encinitas	R
Exhibition				
TMS2020 Exhibition	10:00 AM to 2:00 PM	SDCC	Sails Pavilion	O
Lunch in the Exhibit Hall	11:30 AM to 1:30 PM	SDCC	Sails Pavilion	T
Exhibitor Move-out	2:00 PM to 7:00 PM	SDCC	Sails Pavilion	O
Professional Development & Lectures				
TMS2021 Program Information Session	5:00 PM to 6:00 PM	SDCC	Room 16A	O
Social Functions				
Diversity & Inclusion Breakfast	7:00 AM to 8:00 AM	SDCC	Room 6B	T
LMD Luncheon	12:00 PM to 2:00 PM	SDCC	Room 6B	T
JOM Advisor Mixer	4:30 PM to 6:00 PM	Marriott	Newport Beach	I
TMS-AIME Awards Reception	5:30 PM to 6:00 PM	Marriott	Marriott Ballroom Foyer	O
TMS-AIME Awards Ceremony	6:00 PM to 7:30 PM	Marriott	Marriott Ballroom F/G	O
TMS-AIME Awards Dinner	7:30 PM to 8:30 PM	Marriott	Marriott Ballroom D/E	T
Dessert Party	8:30 PM to 10:00 PM	Marriott	Marriott Ballroom Foyer	T

SDCC San Diego Convention Center
 Marriott Marriott Marquis San Diego Marina
 SDCC/Marriott Both Locations
 O = Open to All Attendees R = Restrictions Apply T = Ticketed Event, Pre-registration required I = Invitation Only

MEETING INFORMATION

Event/Function Name	Time	Venue	Room	Access
Thursday, February 27, 2020				
All-Conference Events				
Registration	7:00 AM to 2:00 PM	SDCC	Hall AB1 Pre-Function	O
Member Welcome Booth - Marriott	7:00 AM to 5:00 PM	Marriott	Santa Rosa Foyer	O
Member Welcome Booth - Convention Center	7:00 AM to 5:00 PM	SDCC	Ballroom 33C Bayside Foyer	O
App Support & Technical Programs	7:00 AM to 5:00 PM	SDCC	Ballroom 6 Lobby	O
TMS Member Welcome Center	7:00 AM to 5:00 PM	SDCC	Ballroom 6 Lobby	O
Programming Support Desk	7:00 AM to 6:00 PM	SDCC	Hall AB1 Pre-Function	O
Technical Programming Sessions	8:30 AM to 12:00 PM	SDCC/ Marriott	Various	O
Morning Break	9:50 AM to 10:30 AM	SDCC/ Marriott	Various	O
Technical Programming Sessions	2:00 PM to 5:30 PM	SDCC/ Marriott	Various	O
Afternoon Break	3:20 PM to 4:00 PM	SDCC/ Marriott	Various	O
Council/Committee Meeting				
The Annual Meeting of the Membership and Open Board Meeting	8:00 AM to 8:30 AM	Marriott	Newport Beach	O
TMS Board of Directors and TMS Foundation Board of Trustees Strategic Planning Meeting	8:30 AM to 1:00 PM	Marriott	Point Loma	I
Social Functions				
Materials and Manufacturing Innovation Spotlight Luncheon	12:00 PM to 2:00 PM	SDCC	Room 3	T
Professor Don Sadoway Honorary Symposium Dinner	6:00 PM to 8:30 PM	Marriott	Marina Ballroom D	T

SDCC San Diego Convention Center
 Marriott Marriott Marquis San Diego Marina
 SDCC/Marriott Both Locations
 O = Open to All Attendees R = Restrictions Apply T = Ticketed Event, Pre-registration required I = Invitation Only

ANNOUNCING THE 2020 TMS MEETING OF THE MEMBERSHIP AND OPEN BOARD OF DIRECTORS MEETING

The Minerals, Metals & Materials Society, Inc. (TMS), in accordance with its bylaws (Article II, Section 2.6 and Article III, Section 3.7) will hold its 2020 Annual Meeting of the Membership with an open Board of Directors Meeting, on **Thursday, February 27, 2020, from 8:00 a.m. to 8:30 a.m.** (Pacific Standard Time) in the Newport Beach Room (South Tower, Level 4) at the Marriott Marquis San Diego Marina during the TMS 2020 Annual Meeting & Exhibition. All TMS members are welcome to attend this meeting.

TECHNICAL COMMITTEE SCHEDULE

SUNDAY, FEBRUARY 23, 2020

Committee	Time	Room
Magnesium	1:30 p.m. to 3:00 p.m.	SDCC - Room 6C
Recycling & Environmental Technologies	1:30 p.m. to 3:00 p.m.	SDCC - Room 16A
Aluminum	2:00 p.m. to 4:00 p.m.	Marriott - Marina Ballroom D
Materials Characterization	2:30 p.m. to 4:00 p.m.	Marriott - La Costa
Pyrometallurgy	3:00 p.m. to 4:30 p.m.	Marriott - Balboa
Hydrometallurgy & Electrometallurgy	4:00 p.m. to 5:00 p.m.	SDCC - Room 14A
Process Technology & Modeling	5:00 p.m. to 6:00 p.m.	Marriott - Palomar
Thin Films & Interfaces	5:00 p.m. to 6:00 p.m.	Marriott - Oceanside
Additive Manufacturing	5:30 p.m. to 7:00 p.m.	SDCC - Room 7B
Nanomechanical Materials Behavior	6:00 p.m. to 7:30 p.m.	SDCC - Room 7A
Mechanical Behavior of Materials	7:30 p.m. to 9:00 p.m.	SDCC - Room 7A
Phase Transformations	7:30 p.m. to 9:00 p.m.	Marriott - Marina Ballroom E
Alloy Phases	7:30 p.m. to 9:00 p.m.	Marriott - Mission Hills

MONDAY, FEBRUARY 24, 2020

Committee	Time	Room
ICME	1:15 p.m. to 2:30 p.m.	SDCC - Room 10
Powder Materials	1:15 p.m. to 2:30 p.m.	Marriott - Catalina
Advanced Characterization, Testing & Simulation	6:00 p.m. to 7:00 p.m.	SDCC - Room 19
Biomaterials	6:00 p.m. to 7:00 p.m.	Marriott - Leucadia
Chemistry & Physics of Materials	6:00 p.m. to 7:00 p.m.	SDCC - Room 32A
Refractory Metals & Materials	6:00 p.m. to 7:00 p.m.	Marriott - Cardiff
Steels	6:00 p.m. to 7:00 p.m.	Marriott - Mission Hills
Surface Engineering	6:00 p.m. to 7:00 p.m.	SDCC - Room 9
Nuclear Materials	6:00 p.m. to 7:30 p.m.	Marriott - Carlsbad
Shaping & Forming	6:00 p.m. to 7:30 p.m.	Marriott - Catalina
Composite Materials	6:30 p.m. to 7:30 p.m.	SDCC - Room 10
Computational Materials Science & Engineering	7:30 p.m. to 8:30 p.m.	SDCC - Room 11A

TUESDAY, FEBRUARY 25, 2020

Committee	Time	Room
Energy Conversion & Storage	7:30 p.m. to 8:30 a.m.	SDCC - Room 16B
Electronic Packaging & Interconnection Materials	12:30 p.m. to 1:30 p.m.	Marriott - Palomar
Solidification	5:45 p.m. to 6:45 p.m.	Marriott - Balboa
Corrosion & Environmental Effects	6:00 p.m. to 7:00 p.m.	SDCC - Room 19
Energy	6:00 p.m. to 7:00 p.m.	SDCC - Room 17A
Nanomaterials	6:00 p.m. to 7:00 p.m.	Marriott - Point Loma
Titanium	6:00 p.m. to 7:00 p.m.	SDCC - Room 30E
High Temperature Alloys	6:00 p.m. to 7:30 p.m.	Marriott - Newport Beach
Magnetic Materials	7:00 p.m. to 8:00 p.m.	Marriott - Del Mar

Room Key: SDCC = San Diego Convention Center • Marriott= Marriott Marquis San Diego Marina

“Leveraging Materials Innovation to Drive Industrial Gas Turbine Performance and Secure a Sustainable Future”

Date: Monday, February 24
Time: Noon to 1:00 p.m.
Location: San Diego Convention Center, Room 6A

The TMS2020 All-Conference Plenary session offers an opportunity for all annual meeting attendees to come together for a shared presentation of common interest. Join your colleagues for this special presentation and then enjoy lunch together in the exhibit hall afterward.

FEATURED SPEAKER:



John Mason
 Director, Gas Turbine Products Engineering
 Solar Turbines Incorporated, USA

ABOUT THE PRESENTER

John Mason is the Director of Gas Turbine Products Engineering at Solar Turbines. In this role, Mason's organization is accountable to continuously improve the quality, durability, and capability of Solar's gas turbine product family in increasingly challenging oil and gas and power-generation market applications. Previously, he served in various leadership roles within Turbomachinery Products in Engineering and Customer Services Business Development. Mason earned his bachelor's degree in Mechanical Engineering from the University of California in Irvine and his master's degree from the University of Southern California.

ABOUT THE PRESENTATION

Industrial gas turbine engines are taking on greater importance in today's energy landscape. Their high-power density, operational flexibility and lower greenhouse gas emissions relative to other traditional power generation sources make them a desirable energy solution.

Improvements in gas turbine engine performance have been enhanced by an array of materials and processing advancements. Developments in nickel-base superalloys, advanced melt and refining techniques, single crystal casting technology, innovative thermomechanical processing and high-temperature and corrosion resistant coatings have contributed to the evolving gas turbine engine. As a result, gas turbines are performing in more effective, sustainable ways, while burning a wider spectrum of fuels from waste gas to hydrogen.

Materials engineering innovations, such as Integrated Computational Materials Engineering, high entropy alloys and additive manufacturing, are driving progress in gas turbine technology development, application, and time-to-market. Other technological developments such as real-time condition monitoring, improved lifting methods, and innovative remanufacturing processes are bringing a sustainable advantage to owners and operators. These advancements, championed by a new generation of materials scientists and engineers, will further enhance and expand the performance and application of industrial gas turbine technology.

ASK LIVE QUESTIONS DURING THE PLENARY

Submit your questions during the plenary by visiting www.slido.com and entering #TMS2020. Or, select the "Plenary Questions" menu item within the TMS2020 app.

SEE THE TECHNOLOGY UP CLOSE

Visit the Solar Turbines display at **Booth 608** in the TMS2020 exhibit hall.

« YOU ARE INVITED:
 Attend a Technical Committee Meeting

Attend one of our open technical committee meetings this week to meet colleagues with similar technical interests and to become an engaged member of the TMS community. View a complete listing of committee meetings on page 24 for times and locations.



9TH INTERNATIONAL SYMPOSIUM ON LEAD AND ZINC PROCESSING (PbZn 2020)

PbZn 2020, established in 1970, is an international technical forum for the lead and zinc processing industries. This ninth installment of the symposium series is co-located with the TMS 2020 Annual Meeting & Exhibition, and all TMS2020 attendees are invited to attend plenary sessions and technical sessions for PbZn 2020. More than 20 technical sessions will be held Monday through Wednesday as part of the PbZn program.

PLENARY SESSIONS

Lead and Zinc Future Outlook: Plenary Session

Date: Monday, February 24, 2020

Time: 8:00 a.m. to 10:15 a.m.

Location: Room 15A



"EPD Distinguished Lecture: 'Around the Lead and Zinc Metallurgical World in Eighty Days: A Virtual Tour of World Lead and Zinc Operations and Technologies'"
Phillip Mackey, P.J. Mackey Technology Inc., Canada



"Evolution of Global Secondary Lead Production"
Huw Roberts, CHR Metals Limited, United Kingdom



"A Review of Zinc Smelting and Refining in North and South America"
Stephen James, Nyrstar, USA

Lead and Zinc Current Challenges and Opportunities: Plenary Session

Date: Tuesday, February 25, 2020

Time: 8:30 a.m. to 10:30 a.m.

Location: Room 15A



"Our Common Future in Metallurgy"
Maurits Van Camp, Umicore, Belgium



"Material Stewardship for Zinc"
Sabina Grund, International Zinc Association, Belgium



"Lead and Zinc Smelting Technology in China under Green Development"
Liu Cheng, China ENFI Engineering Corporation, China

PbZn 2020 ORGANIZERS

ORGANIZING COMMITTEE

Chair: Andreas Siegmund, LanMetCon LLC, USA
Shafiq Alam, University of Saskatchewan, Canada
Liu Cheng, China ENFI Engineering Corporation, China
Joseph Grogan, Gopher Resource, USA
Ulrich Kerney, Recylex, Germany
Etsuro Shibata, Tohoku University, Japan

ORGANIZING SOCIETIES

PbZn 2020 is organized by TMS, with sponsorship from the Hydrometallurgy and Electrometallurgy Committee and the Pyrometallurgy Committee

CO-ORGANIZING SOCIETIES

Metallurgy & Materials Society- Canadian Institute of Mining, Metallurgy and Petroleum
 Gesellschaft der Metallurgen und Bergleute
 The Mining and Materials Processing Institute of Japan

CO-SPONSORING SOCIETY

Nonferrous Metals Society of China

Lead and Zinc Sustainability and Social License: Plenary Session

Date: Wednesday, February 26, 2020

Time: 8:30 a.m. to 10:30 a.m.

Location: Room 15A



"The Global Zinc Market - Facts, Forecasts and Fundamentals"
Paul White, International Lead and Zinc Study Group, Portugal



"Developing a Sustainable Global Lead Battery Value Chain"
Andy Bush, International Lead Association, United Kingdom



"Regional Changes in Refined Zinc Output and Demand"
Claire Hassall, CHR Metals Ltd, United Kingdom

ADDITIONAL PbZn 2020 EVENTS

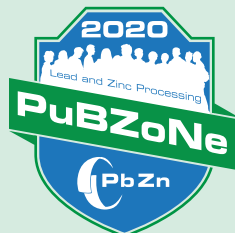
PuBZoNe: PbZn 2020 Networking Reception

Date: Monday, February 24, 2020

Time: 6:00 p.m. to 7:30 p.m.

Location: Barleymash Restaurant, San Diego's Gaslamp District

Tickets for this event can be purchased for \$75 at the Registration Desk until 10:00 a.m. on Sunday.



Connect in a relaxed, casual setting at a local San Diego restaurant. The venue for the event, Barleymash, is located in San Diego's Gaslamp District and calls itself "the fun, high-energy downtown restaurant and bar that celebrates the

richness of American culture through its appetizing and progressive bar fare." Drink tickets and light appetizers will be provided.

Note: You must be 21 or older to attend. Please be prepared to present a valid photo ID at the event.

Teck Trail Operations Tour

Date: Thursday, February 27, and Friday, February 28, 2020

Location: Spokane, Washington, USA, and Trail, British Columbia, Canada

Registration is now closed for this event.

After PbZn 2020 programming ends, registered tour participants will travel to Spokane, Washington, for a tour of Teck Trail Operations, one of the world's largest fully integrated zinc and lead smelting and refining complexes, located in southern British Columbia, Canada.

KEYNOTE SESSIONS

2020 Light Metals Keynote Session: Attracting and Growing the Next Generation of Technical Talent for the Light Metals Industry

Date: Monday, February 24, 2020

Time: 8:00 a.m. to 11:30 a.m.

Location: San Diego Convention Center, Room 6D

Sponsored by: TMS Light Metals Division; TMS Aluminum Committee

Organizer: Corleen Chesonis, Metal Quality Solutions, LLC

FEATURED SPEAKERS



"Feeding the Talent Pipeline: A New Zealand Perspective on Diversity in STEM"

Margaret Hyland, Victoria University of Wellington, New Zealand



"The Future of Light Metals Technology and Education: Opportunities and Challenges"

Alan A. Luo, The Ohio State University, USA



"Strong Leaders, Strong Companies: A Structure to Create Your Future"

Robert B. Wagstaff, Oculatus Inc., USA



"The Norwegian Perspective"

Nina Dahl, SINTEF Industry, Norway



"Talent Acquisition and Development from a Hatch Perspective"

Joe H. Lombard, Hatch, Canada

ADDITIONAL LIGHT METALS PROGRAMMING

TMS2020 will feature the following symposia, held throughout the week, as part of its Light Metals technical track:

- Alumina and Bauxite
- Aluminum Alloys: Processing and Characterization
- Aluminum Reduction Technology
- Cast Shop Technology
- Cast Shop Technology: Recycling and Sustainability Joint Session
- Electrode Technology for Aluminum Production
- Magnesium Technology 2020

View the full technical program on the TMS2020 App.

CHECK OUT THE

Light Metals Digital Library

An online collection of more than 5,200 technical papers from TMS's signature *Light Metals* proceedings series is now available through the TMS website. The Light Metals Digital Library includes papers published from 1971 to 2010.

View the collection at:

www.tms.org/LightMetalsLibrary



Magnesium Technology 2020 Keynote Session

Date: Monday, February 24, 2020
Time: 8:00 a.m. to 11:30 a.m.
Location: San Diego Convention Center, Room 6C

Sponsored by: TMS Light Metals Division, TMS Magnesium Committee

Organizers: J. Brian Jordon, University of Alabama; Victoria Miller, University of Florida; Vineet Joshi, Pacific Northwest National Laboratory; Neale Neelameggham, IND LLC

FEATURED SPEAKERS



“Twin Transmission Across Grain Boundaries in Magnesium”
Carlos Tome, Los Alamos National Laboratory, USA



“Hierarchically Structured Ultrafine Grained Magnesium Alloys”
Rajiv Mishra, University of North Texas, USA



“MultiStage Fatigue (MSF) Modeling of Magnesium in a Corrosion Environment”
Mark Horstemeyer, Liberty University, USA



“Novel Texture Controlling of Mg Alloys”
Bin Jiang, Chongqing University, China

Additive Manufacturing Keynote Session

Date: Monday, February 24, 2020
Time: 2:30 p.m. to 5:00 p.m.
Location: San Diego Convention Center, Room 6A

Sponsored by: TMS Additive Manufacturing Committee

Organizer: Ryan Dehoff, Oak Ridge National Laboratory

FEATURED SPEAKERS



“Roles of Thermal Cycles in the Microstructure and Property Controls in Low-Alloy High Strength Steels”
Tadashi Furuhashi, Tohoku University, Japan



“Microstructural Control for Additive Manufacturing—An Advanced Microscopy Approach”
Simon P. Ringer, University of Sydney, Australia



“Microstructural Control for Additive Manufacturing—An Advanced Microscopy Approach”
Anthony Rollett, Carnegie Mellon University, USA



TMS Young Innovator in the Materials Science of Additive Manufacturing Award: “Innovation in Additive Manufacturing: A Perspective on an Early Career in Metal Alloy Development”
Douglas Hofmann, NASA Jet Propulsion Laboratory/California Institute of Technology, USA

FEATURED SESSIONS

TMS2020 Acta Materialia Award Symposium

Date: Tuesday, February 25, 2020

Time: 3:00 p.m. to 5:00 p.m.

Location: San Diego Convention Center, Room 6D

Organizer: Carolyn Hansson, University of Waterloo

FEATURED SPEAKERS



Acta Materialia Gold Medal Lecture:
"Materials via Non-equilibrium
Processing"

Enrique Lavernia, University of
California, Irvine



Acta Materialia Silver Medal
Lecture: "Integrative Materials
Design and Additive Manufacturing
in the Context of Industry 4.0"

Diana Lados, Worcester
Polytechnic Institute



Acta Materialia Hollomon Award for
Materials and Society: "Reflections
on Materials and Society - An
Acceptance Speech"

Lynnette Madsen, National Science
Foundation

A poster session featuring student recipients of Acta Materialia Awards will follow the session.



TMS-AIME AWARDS CEREMONY

The award recipients listed on these two pages will formally receive their awards during the TMS-AIME Awards Ceremony, which begins at 6:30 p.m. on Wednesday. All TMS2020 attendees are welcome to attend the awards ceremony, but tickets must be purchased in advance for the banquet following the ceremony.

William D. Nix Lecture Symposium: Mechanistic Understanding of Mechanical Behavior Across Length Scales

Date: Wednesday, February 26, 2020

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

Location: San Diego Convention Center, Room 4

Organizers: Michael Mills, The Ohio State University; Kevin Hemker, Johns Hopkins University

FEATURED SPEAKERS



Nix Award Lecturer

"Damage-Tolerance in Materials"
Robert O. Ritchie, University of
California, Berkeley, and Lawrence
Berkeley National Laboratory

"Mechanical Properties of High-Entropy Alloys"

Easo P. George, Oak Ridge National Laboratory and
University of Tennessee

"Hybrid Nanocomposites at the Extreme Limits of
Molecular-Scale Confinement"

Reinhold H. Dauskardt, Stanford University and the
Stanford School of Medicine

"Amorphization: A New Dislocationless Deformation
Mechanism?"

Marc Meyers, University of California, San Diego

"Toughening and Energy-Dissipation in
Metamaterials"

Brad Boyce, Sandia National Laboratories

"Measurement of Mechanical Properties by
Nanoindentation: Recent Innovations in Testing
Methodology"

George Pharr, Texas A&M University

"The Role of Solutes and Short-Range Order (SRO) in
the Deformation of α -Ti Alloys"

Andy Minor, University of California, Berkeley, and
Lawrence Berkeley National Laboratory

"The Dynamics of Precipitate Shearing in fcc/L1₂
Alloys"

Tresa Pollock, University of California, Santa Barbara

"Early Nanoscale Dislocation Processes and Two
Creep Rate Minima in SX Ni-Base Superalloys"

Gunther Eggeler, Ruhr-University Bochum

NEW FOR 2020

FRONTIERS OF MATERIALS AWARD SYMPOSIA

TMS2020 will feature two special symposia as part of the inaugural Frontiers of Materials Award, a competitive award given to top-performing early career professionals. As part of the award, the honoree organizes a symposium on a hot or emergent technical topic and delivers a keynote lecture during the symposium. Meet this year's awardees and make time to hear these invited presentations.

Frontiers of Materials Award Symposium: Leveraging Materials in Topology Optimization

Date: Tuesday, February 25, 2020
Time: 8:30 a.m. to 5:00 p.m.
Poster Session Time: 4:00 p.m. to 5:00 p.m.
Location: San Diego Convention Center, Room 4



Organizer:
Natasha Vermaak, Lehigh University

"Leveraging Materials in Topology Optimization"
Natasha Vermaak, Lehigh University

"Multiscale/Level Design of Materials and Structures"
H. Alicia Kim, University of California San Diego

"Topology Optimization for Additive Manufacturing"
Albert To, University of Pittsburgh

"Nonlinear Composite Materials Design through Multi-material Topology Optimization Frameworks"
X. Shelly Zhang, University of Illinois at Urbana-Champaign

"Materials, Design and Emerging Objects"
Virginia San Fratello, San Jose State University

"Topology Optimization for Architected Materials"
James Guest, Johns Hopkins University

"Sustainable Fashion Design, 3D and 4D Printing, and The New Age Lab"
Julia Daviy, The New Age Lab

Presentations will be followed by the panel discussion, "Leveraging Materials in Topology Optimization," and a poster session featuring posters by the invited speakers.

Frontiers of Materials Award Symposium: Machine Learning and Autonomous Researchers for Materials Discovery and Design

Date: Thursday, February 27, 2020
Time: 8:30 a.m. to 5:00 p.m.
Location: San Diego Convention Center, Room 4



Organizer:
Keith Brown, Boston University

"Adaptive Machine Learning for Efficient Navigation of Materials Space"
Prasanna Balachandran, University of Virginia

"Unraveling Hierarchical Materials using Autonomous Research Systems"
Keith Brown, Boston University

"Combining Simulation and Autonomous Experimentation for Mechanical Design"
Aldair Gongora, Boston University

"Closing the Loop in Autonomous Materials Development"
Kristofer Reyes, University at Buffalo-the State University of New York

"Bayesian Methods for Concrete Creep Prediction and Learning Optimized Concrete Microstructure Design"
Mija Helena Hubler, University of Colorado Boulder

"Autonomous Research Systems for Materials Development"
Benji Maruyama, U.S. Air Force

"Application of Machine Learning and Federated Big Data Storage & Analytics for Accelerated Additive Process and Parameter Development"
Vipul Gupta, GE Research

"Design of Halide Perovskites via Physics-informed Machine-learning"
Shijing Sun, MIT Photovoltaics Research Laboratory

"Autonomous Systems for Alloy Design: Towards Robust Closed-loop Alloy Deposition and Characterization"
Brian DeCost, National Institute of Standards and Technology

"Turning Statistical Mechanics Models into Materials Design Engines"
Marc Miskin, University of Pennsylvania

MEETING INFORMATION

TMS is piloting two new programs at this annual meeting, with the addition of silent-session technology at select technical sessions and new interactive features planned throughout the poster session in the Exhibit Hall.

ABOUT SILENT SESSIONS

WHAT IS A SILENT SESSION?

Silent Sessions let attendees listen to presentations in a whole new way, using headset technology, which can be adjusted to your preferred volume level.

HOW DOES IT WORK?

Presenters deliver their talks from a podium with slides, as in a traditional session. They speak into a microphone at normal, conversation volume, and attendees listen to the presentation through a set of earphones.

WHY SILENT SESSIONS?

The benefits of this approach include the ability to group related symposia more closely together, making it easier for attendees to move between related sessions and to network in a shared lounge area.

WHERE WILL THIS TECHNOLOGY BE USED?

TMS is piloting this new approach to sessions with the Characterization and Nuclear Materials technical tracks in Hall A throughout the week. Stop by to try out this new technology!

ABOUT THE DIFFUSION ZONE PREVIEW

On Monday and Tuesday evening, the TMS Exhibit Hall will host a record number of poster presentations. Interspersed throughout the poster sessions will be sneak preview elements of The Diffusion Zone, set to launch officially at TMS2021. Be on the lookout for the following items each night during the poster session:

- **Experience Digital Posters:** Posters come to life with video, high-resolution images, and interactive features on digital monitors.
- **Explore Invited Posters:** Find invited posters on a variety of topics located throughout the Exhibit Hall.
- **Engage in a Live Demonstration:** Garritt Tucker of the Colorado School of Mines (CSM) presents an engaging virtual reality demonstration that explores microstructures, mineral phases, chemical segregation maps, and more.
- **Comment on Posters:** Like what you see? Let the poster presenter know! Use the TMS2020 App to vote for your favorites.

The Poster Session and the Diffusion Zone will take place on Monday and Tuesday from 5:30 p.m. to 7:00 p.m. Join us for an evening of networking, refreshments, and discovering new research!



MATERIALS AND MANUFACTURING INNOVATION SPOTLIGHT LUNCHEON

Materials and Manufacturing Innovation
Spotlight Luncheon**Date:** Thursday, February 27, 2020**Time:** Noon to 2:00 p.m.**Location:** San Diego Convention Center, Room 3

Note: The following lectures are open to all TMS2020 attendees. To receive a boxed lunch at the event, please purchase a ticket at the Registration desk no later than 10:00 a.m. on Wednesday.

MODERATOR



Charles H. Ward, Chief of the Manufacturing and Industrial Technologies Division, U.S. Air Force Research Laboratory's Materials and Manufacturing Directorate

FEATURED SPEAKERS



"Metamorphic Manufacturing: A New Frontier for Digital Manufacturing"

Glenn Daehn, The Ohio State University

ABOUT THE PRESENTATION

Imagine agile, robotic arms able to shape metals into highly precise parts, large and small, with almost no waste. Now, imagine that this methodology can also create new market opportunities and increased economic growth. Metamorphic Manufacturing, a new technology that forges metal objects to precise specifications, takes the skill and force of a human metalsmith and replicates it with a combination of robotic systems, intelligent machines, sensors, and integrated computational learning (i.e., artificial intelligence). Join us to learn how this technology could potentially shape the future of advanced manufacturing.

ABOUT THE PRESENTER

Glenn Daehn is the Fontana Professor of Metallurgical Engineering at The Ohio State University. His research, education, and service efforts are all related to the interwoven themes of manufacturing revival, which in turn depends on technology development, regional industry, and the development of a world-class workforce. Daehn is active in a number of manufacturing initiatives, including playing key roles in establishing the Lightweight Innovations for Tomorrow Manufacturing USA Institute, the Ohio State Center for Design and Manufacturing Excellence, and the Ohio Manufacturing Institute.



"Synthetic Biology: An Emerging Toolkit for Materials Manufacturing"
Maneesh Gupta, Air Force Research Laboratory

ABOUT THE PRESENTATION

The field of synthetic biology seeks to engineer organisms, unlocking manufacturing capabilities for the production of chemicals, pharmaceuticals, materials, sensors, and more. Biological systems have the unique capability to assemble materials from the bottom-up with molecular-level precision, enabling them to create unrivaled materials using a limited chemical palette. This talk will highlight synthetic biology efforts to enable new solutions to challenges faced by the U.S. Department of Defense that can have broader applications.

ABOUT THE PRESENTER

Maneesh Gupta is a materials scientist at the Air Force Research Laboratory, Materials and Manufacturing Directorate. His field of expertise is the processing and characterization of bio-inspired protein-based materials with specific emphasis on the ability to produce materials with tunable and graded properties.



"Materials for Quantum and Quantum for Materials"
Celia Merzbacher, Quantum Economic Development Consortium

ABOUT THE PRESENTATION

Quantum technologies are leading to novel applications, including sensors, communications, and computing. Advances in such applications depend on understanding materials and their relationship to device performance. The Quantum Economic Development Consortium, supported by government and industry, is aimed at enabling and growing the quantum ecosystem and related supply chain in the United States and to promote uses, including for design and manufacture of materials for diverse purposes.

ABOUT THE PRESENTER

Celia Merzbacher is the Associate Director of the Quantum Economic Development Consortium (QED-C), a consortium that aims to enable and strengthen the U.S. commercial quantum industry. QED-C is supported by the U.S. Department of Commerce's National Institute of Standards and Technology (NIST) and more than 80 industry members and is managed by SRI International.

SAVE THE DATE!



MARCH 14-18, 2021
ORLANDO WORLD CENTER MARRIOTT
ORLANDO, FLORIDA, USA

Get ready to make history
at TMS's 150th Annual Meeting on
March 14–18, 2021, at the beautiful
Orlando World Center Marriott in sunny
Florida, USA



ACT NOW: SPACE IS LIMITED

Housing reservations are now open at the Orlando World Center Marriott for what is shaping up to be the biggest TMS annual meeting yet.

Reserve your room today at www.tms.org/TMS2021.

DON'T MISS OUR 150TH ANNIVERSARY CELEBRATION AT THE TMS 2021 ANNUAL MEETING & EXHIBITION

CO-LOCATED EVENTS



Diversity in the Minerals, Metals, and Materials Professions 4 (DMMM4).

Now is your chance to experience the unique networking, training, and idea exchange opportunities offered by this TMS signature event. **DMMM4 will take place March 17-18.**

Ni-Co 2021

5th International Symposium on Nickel Cobalt

The call for abstracts for this symposium is now open. Submit your work by **February 29, 2020.**



TMS Bladesmithing Competition

Sign up your team today!
Acknowledgement letters are due
November 1, 2020

ANNIVERSARY EVENTS

Two Anniversary All-Conference Plenary Speakers

Already confirmed is Anne Lauvergeon, Founder/CEO of ALP; Chair, École des Mines de Nancy; former CEO, Areva S.A.

DIFFUSION ZONE

A Re-Imagined Poster Session

With the formal launch of a new digital poster session concept, the Diffusion Zone will be the place to create valuable professional connections while showcasing your best work.

TMS Anniversary Keynotes

High-level TMS Anniversary Keynote speakers will enrich each technical division's programming.

And, There's More. . .

A new type of student networking event, historical displays, and other celebratory elements are in the works to make TMS2021 the annual meeting to remember.

TMS2021 anniversary events
generously supported by:



LEARN MORE AND SIGN UP FOR UPDATES AT:
WWW.TMS.ORG/TMS2021



TMS TECHNICAL DIVISION HONORARY SYMPOSIA

The following symposia, open to all TMS2020 attendees, will honor distinguished members of the minerals, metals, and materials community.

Current Trends in Magnetocaloric Materials: An FMD Symposium in Honor of Ekkes Brueck

Dates: Monday, February 24, and Tuesday morning, February 25

Location: Marriott Marquis San Diego Marina, Marina Ballroom F

Sponsored by: TMS Functional Materials Division (FMD)

Organizers: Victorino Franco, Universidad de Sevilla; Frank Johnson, Niron Magnetics, Inc.

The magnetocaloric effect, i.e. the reversible temperature change of a magnetic material upon application/removal of a magnetic field, is a topic of current scientific interest for its potential application for magnetic refrigeration and thermomagnetic energy conversion. These applications are environmentally friendly due to the absence of ozone-depleting or green house effect gas, combined with the possibility of achieving increased energy efficiency.

This symposium will examine various aspects of magnetocaloric research, combining the state of the art of theory and experiment, ranging from materials design to device implementation, passing through issues related to sustainability. Closely related effects, like barocaloric, elastocaloric and electrocaloric materials will also be considered. This program will consist of three sessions on Monday and Tuesday:

- Characterization of Structure and Magnetic Properties of Magnetocaloric Materials
- Phase Equilibria and Magnetic Structure of Magnetocaloric Materials
- Strain Enhanced Magnetocaloric, Barocaloric Materials, and Thermomagnetic Generators

Innovations in High Entropy Alloys and Bulk Metallic Glasses: An SMD & FMD Symposium in Honor of Peter K. Liaw

Dates: Monday, February 24, and Tuesday, February 25

Location: Marriott Marquis San Diego Marina, Marina Ballroom G

Sponsored by: TMS Functional Materials Division (FMD), TMS Structural Materials Division (SMD), TMS Alloy Phases Committee

Organizers: Michael Gao, National Energy Technology Laboratory; E-Wen Huang, National Chiao Tung University; Yanfei Gao, University of Tennessee - Knoxville; Robert Maass, University of Illinois at Urbana-Champaign; Hahn Choo, University of Tennessee; Yunfeng Shi, Rensselaer Polytechnic Institute; Soo Yeol Lee, Chungnam National University; Xie Xie, FCA US LLC; Gongyao Wang, Alcoa Technical Center; Liang Jiang, Yantai University

Invited speakers from academia, industry, and government will discuss the current interest and progress in advanced structural and functional materials, including bulk-metallic glasses (BMGs), high-entropy alloys (HEAs), etc. This symposium honors Peter K. Liaw for his significant contributions to materials science and engineering and TMS. The process from the basic materials research to successful applications will be examined.

The symposium will have three sessions dedicated to High Entropy Alloys (Mechanical Properties, Alloy Design and Processing, and Other Properties and Modeling) and one devoted to Bulk Metallic Glasses and Other Materials, all areas in which Liaw has made contributions.

ELECTROMETALLURGY 2020

The Sadoway 70 honorary symposium (see top of next page) will be held as part of the **3rd International Symposium on Electrometallurgy (Electrometallurgy 2020)**. Sessions on hydrometallurgy, molten salts, and applications to battery or materials synthesis will be held on Monday and Tuesday, prior to the Sadoway 70 symposium on Wednesday and Thursday.

Process Metallurgy and Electrochemistry of Molten Salts, Liquid Metal Batteries, and Extra-terrestrial Materials Processing: An EPD Symposium in Honor of Don Sadoway (Sadoway 70)

Dates: Wednesday, February 26, and Thursday, February 27

Location: San Diego Convention Center, Room 14A

Sponsored by: TMS Extraction and Processing Division (EPD), TMS Hydrometallurgy and Electrometallurgy Committee, TMS Process Technology and Modeling Committee, TMS Pyrometallurgy Committee

Organizers: Antoine Allanore, Massachusetts Institute of Technology; Hojong Kim, Pennsylvania State University; Takanari Ouchi, The University of Tokyo; Yasuhiro Fukunaka, JAXA/Waseda University

Electrometallurgy 2020 in San Diego will host Sadoway 70, an Honorary Symposium dedicated to the innovative contributions of Donald Sadoway from the Massachusetts Institute of Technology (MIT), encompassing process metallurgy and electrochemistry of molten salts, liquid metal batteries, or extra-terrestrial materials processing. Invited presentations will be delivered at four sessions.

Progress towards Understanding the Synthesis and Behavior of Metals Far from Equilibrium: A SMD Symposium Honoring Enrique Lavernia on the Occasion of His 60th Birthday

Dates: Monday, February 24, to Thursday, February 27

Location: San Diego Convention Center, Room 31B

Sponsored by: TMS Structural Materials Division (SMD), TMS Mechanical Behavior of Materials Committee, TMS Advanced Characterization, Testing, and Simulation Committee, TMS Composite Materials Committee

Organizers: Haiming Wen, Missouri University of Science and Technology; Suveen Mathaudhu, University of California, Riverside; Yuntian Zhu, North Carolina State University; Manoj Gupta, National University of Singapore; Kaka Ma, Colorado State University; Troy Topping, California State University, Sacramento; Yizhang Zhou, University of California, Irvine; Joshua Yee, Sandia National Laboratories; Dalong Zhang, Pacific Northwest National Laboratory; Yaojun Lin and Fei Chen, Wuhan University of Technology

This symposium will honor the contributions of Enrique Lavernia to many fields in materials science in the last 30+ years. Lavernia has made seminal contributions to the synthesis and behavior of nanostructured and multi-scale materials with particular emphasis on processing fundamentals and physical behavior, thermal spray processing of nanostructured materials, spray atomization and deposition of structural materials, high temperature-high pressure atomization processes, and additive manufacturing of metals. This symposium will discuss the present status and recent advances in research areas related to the synthesis and behavior of metals far from equilibrium. Sessions will cover nanostructured metals, materials design and advanced characterization, additive manufacturing, high-entropy alloys, synthesis and mechanical behavior, and lightweight alloys.

Purveyors of Processing Science and ICME: A SMD Symposium to Honor the Many Contributions of Taylan Altan, Wei Tsu Wu, Soo-Ik Oh, and Lee Semiatin

Dates: Monday, February 24, to Wednesday, February 26

Location: San Diego Convention Center, Room 30E

Sponsored by: TMS Structural Materials Division (SMD), TMS Shaping and Forming Committee, TMS Titanium Committee

Organizers: Adam Pilchak, U.S. Air Force Research Laboratory; Ayman Salem, MRL Materials Resources LLC; Viola Acoff, University of Alabama; Nathan Levkulich, UES; Michael Glavicic, Rolls-Royce; Yufeng Zheng, University of Nevada, Reno; John Rotella, Purdue University

The contributions of Taylan Altan, Wei Tsu Wu, Soo-Ik Oh, and Lee Semiatin to the field of processing science are so vast and impactful that it is the Structural Materials Division's great pleasure to honor their lifetime of achievements at TMS2020. Paying homage to the honorees lifelong commitment to developing and validating process models, this symposium will remain alloy-agnostic and instead keep central themes of processing, process simulation, and modeling the evolution of microstructure/texture/defects during processing. Sessions throughout the week will cover superalloys, additive manufacturing, titanium alloys, modeling, enhanced properties via thermomechanical processing, and advances and challenges in ICME.

William Hume-Rothery Award

Date: Monday, February 24
Time: 8:10 a.m. to 8:50 a.m.
Location: San Diego Convention Center, Room 32A



SPEAKER
Ursula R. Kattner, National Institute of Standards and Technology

Lecture Title: "Phase Diagrams, Computational Thermodynamics and CALPHAD"

ABOUT THE PRESENTATION

Phase Diagrams are frequently hailed as roadmaps for materials and process development and are frequently graphical representations of phase equilibria as a function of composition, temperature, and/or pressure. The graphical representation imposes a limit on the information that can be communicated while computational thermodynamics is limited by the available computational resources. Within computational thermodynamics, the CALPHAD method has established itself as a pillar for computational materials and process design and its databases are viewed as part of a materials genome. The CALPHAD method was established several decades ago for thermodynamic modeling of phase equilibria, and its models have become increasingly sophisticated with time for efficient calculation of realistic phase diagrams and thermochemical properties. The conceptual design of CALPHAD models also makes them well suited for describing other phase-based properties, such as diffusion mobilities, molar volume, and other thermophysical properties. Recent advances in CALPHAD modeling and database development will be discussed.

Extraction & Processing Division Distinguished Lecturer

Date: Monday, February 24
Time: 8:15 a.m. to 8:45 a.m.
Location: San Diego Convention Center, Room 15A



SPEAKER
Phillip Mackey, P.J. Mackey Technologies Inc.

Lecture Title: "Around the Lead and Zinc Metallurgical World in Eighty Days: A Virtual Tour of World Lead and Zinc Operations and Technologies"

ABOUT THE PRESENTATION

Lead mining and smelting dates back to antiquity, while zinc as an alloying element with copper as brass has a similarly very long history. Today, lead and zinc are produced in large or small tonnages in almost all countries of the world—and lead is the most recycled metal with one of the highest recycling rates of any material. The scale of lead and zinc operations and the type of technologies employed varies widely around the world. This talk takes the audience on a virtual tour of the major lead and zinc plants throughout the world with a focus on metallurgical facilities. Operations and technology employed at each plant visited are discussed including a brief historical sketch. Future technology trends identified during the world tour are also discussed. The presenter needed sufficient time for a thorough study tour and settled on eighty days—the same as that for the celebrated fictional story of world circumnavigation in the 1870s, a time when world lead production far exceeded that of other non-ferrous metals.

Young Innovator in the Materials Science of Additive Manufacturing Award Lecture

Date: Monday, February 24
Time: 4:25 p.m.
Location: San Diego Convention Center, Room 6A



SPEAKER
Doug Hofmann, NASA Jet Propulsion Laboratory/California Institute of Technology

Lecture Title: "Innovation in Additive Manufacturing: A Perspective on an Early Career in Metal Alloy Development"

ABOUT THE PRESENTATION

The past decade has seen rapid and widespread adoption of additive manufacturing (AM) technology at NASA's Jet Propulsion Laboratory (JPL)/California Institute of Technology. This talk focuses on the establishment of AM capabilities at JPL and subsequent infusion opportunities in spacecraft, with particular emphasis on alloy development, prototyping, testing, and processing and property relationships. AM is an attractive capability for infusion into spacecraft, especially for complex part designs, multifunctional materials, extreme environment materials, hardware with reduced cost and schedule, and low mass structural parts. AM research topics that will be covered in this talk include functionally graded metals, bulk metallic glasses, metal-matrix composites, self-hammering excavating tools, graded dielectric antennas, and multi-functional materials.

Structural Materials Division Luncheon

Date: Monday, February 24
Time: 1:00 p.m. to 2:30 p.m.
Location: San Diego Convention Center, Room 6B



SPEAKER
Ricardo Lebensohn, Los Alamos National Laboratory

Lecture Title: "How Modelers Are Keeping up with Emerging Materials Characterization and Data Analytics Techniques"

ABOUT THE PRESENTATION

In this talk, Lebensohn will introduce recent advances coming out from the mechanics of materials community for the analysis of the micromechanical response and microstructure evolution of polycrystalline materials in three dimensions. This class of spectral methods provides a dramatic increase in numerical efficiency compared with pre-existing formulations. Moreover, owing to its image-processing lineage, these methods can use direct input from and/or their output directly compared with large voxelized microstructural datasets measured on deformed polycrystals. The development of this kind of numerical tool is crucial to keep up from a modeling point of view with the spectacular advances in in-situ 3-D characterization techniques taking place in, e.g., large experimental facilities, and, to a certain extent, to improve the data reconstruction process of these measurements. These methods are also ideally suited to complement novel data analytics applications to material science problems, in which high-fidelity/high-throughput material models are indispensable to populate/extrapolate the phase space of microstructure/mechanical response, to find reduced-order models representative of the material's mechanical behavior.

This lecture is open to all meeting attendees, but only those who purchased tickets in advance will receive a catered lunch. Luncheon tickets may be purchased at the Registration Desk until 10:00 a.m. on Sunday, February 23.

Japan Institute of Metals and Materials Young Leaders International Scholar

Date: Monday, February 24
Time: 4:30 p.m. to 5:00 p.m.
Location: San Diego Convention Center, Room 33B



SPEAKER
Xiao Xu, Tohoku University

Lecture Title: "Co-Based Heusler Alloys with Reentrant Martensitic Transformation Behavior: Fundamentals and Application Possibilities"

ABOUT THE PRESENTATION

This presentation will deliver a brief review of the unique reentrant martensitic transformation (RMT) behavior in Co-based Heusler alloys. In $\text{Co}_2\text{Cr}(\text{Ga},\text{Si})$ alloys, an $\text{L2}_1 \rightarrow \text{DO}_{22} \rightarrow \text{L2}_1$ RMT behavior was reported. By this phenomenon, novel physical phenomena, such as the cooling-induced shape memory effect and inverse temperature dependence of superelastic stress, were reported. For a deeper understanding on these phenomena, the experimental phase diagrams, including the composition versus temperature (x - T), magnetic field versus temperature (H - T) and uniaxial stress versus temperature (σ - T) phase diagrams, will be introduced. The occurrence of the RMT behavior was found to be the result of the competition between the entropy change of the martensitic transformation and magnetic entropy of parent phase. A brief explanation of the thermodynamic analysis on the RMT behavior will be provided. Furthermore, application possibilities for the use of RMT behavior will also be discussed in this talk.

Extraction & Processing Division/Materials Processing & Manufacturing Division/PbZn2020 Luncheon

Date: Tuesday, February 25
Time: Noon to 2:00 p.m.
Location: San Diego Convention Center, Room 6B



SPEAKER
Markus Reuter, Helmholtz Institute Freiberg for Resource Technology

Lecture Title: "Process Metallurgy as a Key Enabler of the Circular Economy: Digital Twinning of the Resource and Processing System"

ABOUT THE PRESENTATION

Process metallurgy is a key enabler of the Circular Economy (CE) of circular cities and society in general. Therefore, metallurgical simulation and evaluation of the resource efficiency of these systems are of key importance. Its fundamental value must be quantified with the tools of our industry to show its central enabling role. We will show the present simulation-based state-of-the-art approach to understand the resource efficiency of large circular systems. We integrate metallurgical process simulation platforms

with water and energy production systems while estimating environmental footprint as well as exergy destruction. Various industrial examples will illustrate this digital twinning with a focus on base metals but also on all materials i.e. from steel to plastics and composites as well as added manufactured modules, which are integrated in complex products in PV cells, mobile phones etc. It will be shown how one can start to estimate the effect and limits of consumption while focusing on the criticality of the metallurgical infrastructure to maximize resource efficiency in a circular society. The role of consumer models as well as policy will be touched on, and we will show the recycling index of products we developed based on the discussed approach. In summary, the integration of digital simulation tools will provide consumers with the systemic-based information to decide on their consumption patterns, suggest where we as a society have to throttle consumption to a level at which we can survive, and suggests and advises which materials and products should not be consumed due to a too-high destruction of exergy in the CE system.

This lecture is open to all meeting attendees, but only those who purchased tickets in advance will receive a catered lunch. Luncheon tickets may be purchased at the Registration Desk until 10:00 a.m. on Monday, February 24.

MEETING INFORMATION

Goodfellow

Your global supplier for materials™

Visit Us at
Booth #421

Have a materials question?

We have materials answers!

Metals

Alloys

Ceramics

Polymers

Composites

Compounds

www.goodfellowusa.com
 info@goodfellowusa.com
 1-800-821-2870

Young Professional Tutorial Luncheon Lecture

Date: Tuesday, February 25

Luncheon: Noon to 12:45 p.m.

(Tickets can be purchased at the registration desk until 10:00 a.m. on Monday, February 24)

Lecture: 12:45 p.m. to 2:00 p.m. (No tickets required; all are welcome to attend)

Location: San Diego Convention Center, Room 6A



SPEAKER

Jessica A. Krogstad, University of Illinois, at Urbana-Campaign

Lecture Title: "Challenging the Paradigm for Materials in Extreme Environments: Embracing Dynamic Material Properties"

ABOUT THE PRESENTATION

Faced with longer service lifetimes, higher operating temperatures, more complex loading configurations, and aggressive environments, reliable operation of many key technologies hinges upon the durability of materials or material systems. In these extreme environments, understanding the evolution of material properties may be even more important than the initial performance of the material. This is something that, as a community, we have long known, but we have typically considered such evolution only in the context of degradation and failure. However, if we consider the concepts underlying Integrated Computational Materials Engineering (ICME), which not only acknowledged the link between processing/manufacturing and materials properties, but directly integrated dynamic aspects of the processing steps to optimize those properties, we find inspiration for a further step in this paradigm shift. Specifically, service conditions can and should be considered as part of the same processing window. Recent advancements in both *in situ* experimental tools and computational methods enable an unprecedented perspective on the combined effects of extreme temperatures, loads, and chemically aggressive environments, which are common to both processing and service. By removing the barrier between processing and service, we may apply or expand these tools to tackle the complexity of materials in extreme environments, introducing deliberately dynamic materials systems and alleviating materials limitations across a broad spectrum of critical technology sectors.



SPEAKER

C. Cem Tasan, Massachusetts Institute of Technology

Lecture Title: "Resettable Steels: Alloy Design-for-Reuse Towards Continuous Damage-Resistance"

ABOUT THE PRESENTATION

Metals are poor at self-repair due to the ambient temperature sluggishness of transformations compared to, e.g., polymers. On the other hand, they respond well to non-autonomous repair treatments aimed at macroscopic discontinuities (see, for example, repair of bridge steel cracks, worn turbine blades, forging of casting defects, etc.). This forgiving nature of metals, however, has not been systematically utilized to focus on early stages of microscopic damage nucleation, where preventive healing becomes a feasible option. The challenge thereof arises due to the complexity of plasticity and damage micro-mechanics, and phase transformation kinetics in multi-phase microstructures. In the Tasan Group at MIT, by developing multi-field mapping tools and methods, we improve our understanding of these microstructural processes, and by utilizing this understanding, we design resettable alloys: alloys where each microstructural constituent has the capability to revert to its exact pre-deformation state, with feasible resetting treatments. This design-for-reuse approach thus sets the foundations for the introduction of metals that can be used continuously.

William D. Nix Award Lecturer

Date: Wednesday, February 26
Time: 8:30 a.m. to 9:30 a.m.
Location: San Diego Convention Center, Room 4



SPEAKER
Robert O. Ritchie, University of California, Berkeley

Lecture Title: "Damage Tolerance in Materials"

ABOUT THE PRESENTATION

A material's capacity for limited deformation is a critical aspect of toughness as this enables the local dissipation of stresses that would otherwise cause fracture. Such inelastic deformation mechanisms are diverse; they include dislocation motion in crystalline materials, in-situ phase-transformations in certain metals and ceramics, sliding of collagen fibrils in bone, rotation of fibrils in skin, frictional motion between mineral "platelets" in seashells, and through mechanisms that also cause fracture such as shear-banding in glasses and microcracking in rocks. Resistance to fracture is thus a compromise: either a combination of the mutually exclusive properties of strength and deformability, as in intrinsic toughness, or between intrinsic and extrinsic (shielding) mechanisms that act to induce toughness, respectively, ahead or behind, the tip. We examine the interplay between such mechanisms in biological materials, including skin and bone, high-temperature materials, such as ceramic-matrix composites and nuclear graphite, and in bulk-metallic glasses and high-entropy alloys.

Light Metals Division Luncheon

Date: Wednesday, February 26
Time: Noon to 2:00 p.m.
Location: San Diego Convention Center, Room 6B



SPEAKER
Mark Easton, RMIT University

Lecture Title: "Near Net Manufacturing of Light Metal Alloys"

ABOUT THE PRESENTATION

Near net shape manufacturing of a component shape and appropriate properties for its function can be achieved in one processing step. Benefits can include processing and material efficiency resulting in low cost and a potentially lower environmental impact. Light Metals have been commonly used in near net shape manufacture. Aluminium castings are almost ubiquitous in automotive applications as gravity, permanent mould, and high pressure die castings. Magnesium alloys can enable further design freedom, with thinner walled and more complex castings enabling part consolidation and great functionality. More recently, additive manufacturing has taken net shape processing to another level with highly complex structures, with graded properties enabling applications in biomedical, aerospace, and other industries that were unthought of just a few years ago. Whilst there appears to be a big difference between an automotive wheel casting and an orthopedic lattice structure implanted in a hip joint, the manufacturing challenges are similar: control of microstructure, accommodating solidification shrinkage and defect formation, optimization of properties, and design innovation through increasing part complexity. This talk will highlight the development of near net shape manufacturing of light metal alloys.

This lecture is open to all meeting attendees, but only those who purchased tickets in advance will receive a catered lunch. Luncheon tickets may be purchased at the Registration Desk until 10:00 a.m. on Tuesday, February 25.

HELP US DETERMINE NEXT YEAR'S AWARD LECTURERS

Nominations are now being accepted for the majority of TMS society and division awards, including several TMS2021 award lecturers.

Submit your nominees by April 1, 2020.

Find out how at www.tms.org/Awards

Institute of Metals/Robert Franklin Mehl Award

Date: Wednesday, February 26

Time: 12:15 p.m.

Location: Marriott Marquis Hotel, Carlsbad Room



SPEAKER

Yuntian Zhu, North Carolina State University

Lecture Title: "Heterostructured Materials: A New Paradigm for Designing Metals with Superior Mechanical Properties"

ABOUT THE PRESENTATION

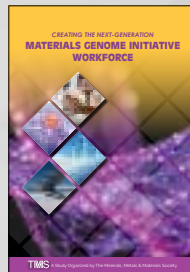
Strong and tough materials are desired for light-weight applications such as electric cars. Recently, heterostructures have been found to produce unprecedented strength and ductility that are considered impossible from our textbook knowledge and materials history. Heterostructured (HS) materials consist of domains with dramatic strength differences, which causes hetero-deformation, which induces back stress in the soft domain and forward stress in the hard domain. This collectively produces hetero-deformation induced (HDI) hardening, and HDI stress, making the materials strong and tough. Importantly, HS materials can be produced by current industrial facilities at large scale and low cost. There are many scientific issues with such materials that challenge the communities of experimental materials science and computational material mechanics. Heterostructured materials is quickly becoming a hot research field in the post-nanomaterials era. In this talk, the presenter will discuss the current advances as well as future challenges and issues in this emerging field.

A CLOSER LOOK AT MGI WORKFORCE STUDY RESULTS



Join David McDowell of the Georgia Institute of Technology to learn more about the recently released TMS study, *Creating the Next-Generation Materials Genome Initiative Workforce*. McDowell, who served as chair of the study team, will deliver a

presentation on Monday afternoon at 2:30 p.m., as part of the symposium **Expanding the Boundaries of Materials Science: Unconventional Collaborations**.



PICK UP YOUR COPY

of the study at the TMS Member Welcome Center and attend the presentation in Room 4 of the Convention Center.

NETWORKING & SOCIAL EVENTS

SUNDAY, FEBRUARY 23

LGBTQ+ and Allies Networking Mixer



Date: Sunday, February 23
Time: 8:00 p.m. to 10:00 p.m.
Location: San Diego Convention Center, Room 3

Enjoy an evening of informal networking in a safe space to celebrate shared experiences as TMS LGBTQ+ individuals and allies. Cash bar, with light snacks provided. Organized by TMS Pride of the TMS Diversity Committee.

MONDAY, FEBRUARY 24

Lunch in the Exhibit Hall



Date: Monday, February 24
Time: 1:00 p.m. to 2:30 p.m.
Location: San Diego Convention Center, Sails Pavilion

Enjoy lunch in the exhibit hall and browse exhibitor displays between the morning and afternoon technical sessions. Check your registration badge for lunch tickets.

Exhibit Opening Reception and Poster Session I Featuring the Diffusion Zone Preview



Date: Monday, February 24
Time: 5:30 p.m. to 7:00 p.m.
Location: San Diego Convention Center, Sails Pavilion

All attendees are invited to meet in the exhibit hall for appetizers, beverages, and networking with exhibitors, poster presenters, and other colleagues on the first day of the TMS2020 Exhibition. Look for new features throughout this year's poster session, such as digital presentations, invited posters, and a virtual reality demonstration—all elements of the Diffusion Zone, a new approach to the TMS poster session that is set to formally launch at TMS2021.

PuBZoNe: PbZn 2020 Networking Reception*



Date: Monday, February 24
Time: 6:00 p.m. to 7:30 p.m.
Location: Barleymash Restaurant, San Diego's Gaslamp District



Held in connection with the 9th International Symposium on Lead and Zinc Processing (PbZn 2020), the PuBZoNe event lets attendees connect in a relaxed, casual setting at a local San Diego restaurant. Drink tickets and light appetizers will be provided.

Note: You must be 21 or older to attend. Please be prepared to present a valid photo ID at the event.

**Tickets Required. Tickets for this event can be purchased for \$75 at the Registration Desk until 10:00 a.m. on Sunday.*

TUESDAY, FEBRUARY 25

Lunch in the Exhibit Hall

Date: Tuesday, February 25, 2020
Time: 11:30 a.m. to 1:30 p.m.
Location: San Diego Convention Center, Sails Pavilion

Enjoy lunch in the exhibit hall and browse exhibitor displays between the morning and afternoon technical sessions. Check your registration badge for lunch tickets.

Exhibit Opening Reception and Poster Session II Featuring the Diffusion Zone Preview

Date: Tuesday, February 25
Time: 5:30 p.m. to 7:00 p.m.
Location: San Diego Convention Center, Sails Pavilion

All attendees are invited to gather in the exhibit hall for appetizers, beverages, and networking with exhibitors, poster presenters, and colleagues. Look for new features throughout this year's poster session, such as digital presentations, invited posters, and a virtual reality demonstration—all elements of the Diffusion Zone, a new approach to the TMS poster session that is set to formally launch at TMS2021.

WEDNESDAY, FEBRUARY 26, 2020

**Fresh Coffee, Fresh Ideas:
Diversity and Inclusion Breakfast***



Date: Wednesday, February 26
Time: 7:00 a.m. to 8:00 a.m.
Location: San Diego Convention Center, Room 6B

Organized by the TMS Diversity Committee, this event offers an opportunity for TMS members to network and discuss issues related to diversity and inclusion in the minerals, metals, and materials professions. This year's program will feature facilitated small group discussion on diversity, equity, and inclusion topics of interest to TMS members.

** Tickets required. Tickets must be purchased by Monday at 5:00 p.m. at the Registration Desk.*

Lunch in the Exhibit Hall

Date: Wednesday, February 26
Time: 11:30 a.m. to 1:30 p.m.
Location: San Diego Convention Center, Sails Pavilion

Enjoy lunch in the exhibit hall and browse exhibitor displays between the morning and afternoon technical sessions. Check your registration badge for lunch tickets.

2020 TMS-AIME Awards Ceremony & Banquet



Date: Wednesday, February 26
Reception Time: 5:30 p.m. to 6:00 p.m.
Awards Ceremony: 6:00 p.m. to 7:30 p.m.
Banquet*: 7:30 p.m. to 8:30 p.m.
Dessert*: 8:30 p.m. to 10:00 p.m.
Location: Marriott Marquis San Diego Marina, Marriott Ballroom F/G (Ceremony) and Marriott Ballroom D/E (Banquet)

Show your support for colleagues who will be accepting awards from TMS and the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME) at the 2020 TMS-AIME Awards Ceremony & Banquet. There is no cost to attend the awards ceremony to honor those individuals who are being recognized for excellence in their fields. If you would like to attend the banquet and reception following the awards ceremony, however, you must purchase a ticket.

** Tickets are required to attend the Banquet and Dessert portions of the evening. Tickets must be purchased by Tuesday at 10:00 a.m. at the Registration Desk.*

STUDENT & YOUNG PROFESSIONAL EVENTS

STUDENT EVENTS

TMS2020 Materials Bowl



Date: Sunday, February 23
Time: 3:00 p.m. to 7:00 p.m.
Location: San Diego Convention Center, Room 6A

Even if you aren't competing in the materials-themed quiz-show competition, you're welcome to attend the elimination rounds or the final championship round. Play along to test your materials science and engineering knowledge or cheer on your favorite school. This event is sponsored by Goodfellow.

Student Networking Mixer



Date: Sunday, February 23
Time: 7:00 p.m. to 8:30 p.m.
Location: San Diego Convention Center, Room 6B

Take a break and have some fun at this informal social event. Students will have the opportunity to interact with each other and with professionals in a relaxed setting. Refreshments will be provided.

Student Poster Contest

Date: Monday, February 24
Time: 5:30 p.m. to 7:00 p.m.
Location: San Diego Convention Center, Sails Pavilion

Stop by and browse the student poster displays at your leisure or attend the official judging session to ask questions of the participants. If you are participating in the student poster contest, you must be present at the judging session to answer questions about your work.

Student Career Forum



Date: Tuesday, February 25
Time: 2:00 p.m. to 4:00 p.m.
Location: San Diego Convention Center, Room 19

"When should I start my job search?" "Should I continue to graduate school or begin my career?" "How important is networking to my career?" If you find yourself asking questions like these about your future, then you should attend the Student Career Forum. Organized by the TMS Young Professional Committee, this session will feature speakers from various stages of their careers and diverse materials science backgrounds to discuss how to navigate a successful career path in the fields of minerals, metals, and materials.

YOUNG PROFESSIONAL EVENTS

Young Professionals Committee Meeting

Date: Tuesday, February 25
Time: 8:00 a.m. to 9:30 a.m.
Location: Marriott Marquis San Diego Marina, Catalina Room

The mission of the TMS Young Professionals Committee is to create opportunities and provide avenues for young professionals to increase their involvement in TMS. This committee meeting is open to all TMS members, age 40 or younger, who have graduated.

Preparing a Winning Application Package Workshop

Date: Tuesday, February 25
Time: 4:00 p.m. to 6:00 p.m.
Location: San Diego Convention Center, Room 6A
Instructors: Mohsen Asle Zaeem, Colorado School of Mines; additional instructors to be announced
Sponsored by: TMS Young Professionals Committee

In this workshop, instructors from a national laboratory, university, and industry will share their experiences in obtaining and/or recruiting entry-level positions (postdocs, tenure-track faculty positions, etc.) and help guide the young professional on their journey from recent graduate to career professional. Pre-registration required to participate.



TMS FOUNDATION

Learn about more success stories made possible by the TMS Foundation—and how you can be part of future ones.



“The deliberate and dedicated support of young professionals in TMS, made possible by both the TMS Foundation and so many engaged, uplifting members, has helped advance my career and has made TMS Feel like home. I am excited to continue working within TMS and alongside the Foundation to ensure that our membership will be diverse, vibrant, and dynamic as we tackle the most pressing technological challenges now and into the future.”

—Jessica Krogstad,
University of Illinois at Urbana-Champaign
2020 Early Career Faculty Fellow

Stop by the TMS Member Welcome Center, located in the Ballroom 6 Lobby (near the Exhibit Hall) at the San Diego Convention Center, to learn more about the TMS Foundation. Or visit www.TMSFoundation.org/Contribute to offer your support and make an online donation.

www.TMSFoundation.org



TMS 2020

TMS-AIME AWARDS CEREMONY & BANQUET

SCHEDULE OF EVENTS

Date: Wednesday, February 26, 2020
Location: Marina Ballroom,
 Marriott Marquis San Diego Marina
Reception: 5:30 p.m.
 (Open to all TMS2020 attendees)
Awards Ceremony: 6:00 p.m.
 (Open to all TMS2020 attendees)
Banquet: 7:30 p.m. (Tickets required)
Dessert Party: 8:30 p.m.
 (Ticket included with banquet)

The reception and ceremony are open to all meeting attendees, but tickets are required for the dinner and dessert portion of the evening. Tickets must be purchased by Tuesday at 10:00 a.m. at the Registration Desk.

The 2020 TMS-AIME Awards Ceremony and Banquet will be an elegant event, designed to honor the significant professional achievements of members of the minerals, metals, and materials communities. The ceremony includes presentations of awards from both TMS and the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME), of which TMS is a member society. Additional awards from Acta Materialia will also be presented.

The evening will consist of four parts. First, award recipients and their guests will be welcomed at a cocktail reception. Following the reception, participants will be seated for the awards ceremony, where individual recipients will be honored for their accomplishments. After the ceremony, those participants who have purchased banquet tickets will proceed to the formal dinner. Attendees who purchased a banquet ticket will also receive a ticket to the Dessert Party which immediately follows dinner. Attendees can network while enjoying after-dinner drinks and dessert.

INSTALLATION OF THE 2020 TMS PRESIDENT:



Thomas P. Battle

During the 2020 TMS-AIME Awards Banquet, TMS will install Thomas P. Battle as the Society's 2020 president. Battle currently works as an extractive metallurgy consultant. He graduated from The University of Michigan with bachelor's degrees in materials engineering and astronomy and a doctorate in materials and metallurgical engineering. He also earned a master's in metallurgical engineering at the Colorado School of Mines. After a post-doc at Thames Polytechnic in the United Kingdom, he launched a 25-year career in industry with the White Pigments and Mineral Products business of DuPont, with terms both at a plant site and in long-term research and development for titanium dioxide pigment production. He then spent nearly seven years as Senior Metallurgist at Midrex Technologies, focusing on raw materials testing for iron oxide pellets to be used in the production of direct-reduced iron by the Midrex Process.

Battle has been a member of the Extraction & Processing Division (EPD) Council for nearly 20 years, serving as representative to the TMS Membership & Student Development Committee, TMS Program Committee, and the North American Extractive Metallurgy Council, as well as Exhibit Liaison. This work culminated in his 2008-2011 TMS Board of Directors service as the EPD Chair. He has also participated in several Society-wide committees, has organized twelve major symposia for TMS, and has been lead editor of three conference proceedings publications.

AWARDS CEREMONY PRESENTERS

The ceremony will be hosted by the following presenters:

- **James Foley**, Los Alamos National Laboratory and 2019 TMS President
- **Thomas Battle**, Extractive Metallurgy Consultant and 2020 TMS President
- **Hani Henein**, University of Alberta and 2020 AIME President
- **Michele Lawrie-Munro**, AIME Executive Director
- **Carolyn Hansson**, University of Waterloo and Acta Materialia Executive Secretary
- **George T. "Rusty" Gray, III**, Los Alamos National Laboratory and Acta Materialia Chair & Treasurer
- **Katsuyo Thornton**, University of Michigan and 2018 Brimacombe Medalist
- **Garry Warren**, University of Alabama, 2018 Julia and Johannes Weertman Educator Award Recipient, and 2011 TMS President
- **Elizabeth Holm**, Carnegie Mellon University, 2019 TMS Fellow, and 2013 TMS President

TMS EXTENDS ITS CONGRATUALIONS TO THE FULL 2020 CLASS OF AWARD RECIPIENTS.

SOCIETY AWARDS

TMS FELLOWS – CLASS OF 2020

- **Mark Asta**
Professor
University of California, Berkeley
- **Rodney Boyer**
Retired
RBTi Consulting
- **Marc De Graef**
Professor
Carnegie Mellon University
- **Diana Farkas**
Professor
Virginia Polytechnic Institute
- **Dorte Juul Jensen**
Professor
Technical University of Denmark
- **Karl Ulrich Kainer**
Retired Director Institute of Materials Research and Head of MAgIC
Helmholtz-Zentrum Geesthacht
- **David McDowell**
Regents' Professor
Georgia Institute of Technology
- **Neville Moody**
Retired
Sandia National Laboratories

BRIMACOMBE MEDALISTS – CLASS OF 2020

- **Brad Boyce**
Distinguished Member of the Technical Staff
Sandia National Laboratories
- **Kyle Brinkman**
Department Chair
Clemson University
- **Amy Clarke**
Associate Professor
Colorado School of Mines
- **Nikhil Gupta**
Professor
New York University
- **Christina Meskers**
Senior Manager
Umicore
- **André Phillion**
Associate Professor
McMaster University

APPLICATION TO PRACTICE AWARD

- **Alan Taub**
Professor
University of Michigan

BRUCE CHALMERS AWARD

- **David StJohn**
Emeritus Professor
University of Queensland

MORRIS COHEN AWARD

- **Eduard Arzt**
Director
INM - Leibniz Institute for New Materials

FRANK CROSSLEY DIVERSITY AWARD

- **Raul Rebak**
Corrosion Engineer
GE Global Research

ELLEN SWALLOW RICHARDS DIVERSITY AWARD

- **Oscar Marcelo Suarez**
Professor & Graduate Program Coordinator
University of Puerto Rico – Mayaguez

EARLY CAREER FACULTY FELLOW AWARD

- **Jessica Krogstad**
Assistant Professor
University of Illinois at Urbana-Champaign
- **C. Cem Tasan**
Associate Professor
Massachusetts Institute of Technology

FRONTIERS OF MATERIALS AWARD

- **Keith Brown**
Assistant Professor
Boston University
- **Natasha Vermaak**
Assistant Professor
Lehigh University

JULIA & JOHANNES WEERTMAN EDUCATOR AWARD

- **Andrea Hodge**
Vice Provost for Undergraduate Programs
University of Southern California

WILLIAM HUME-ROTHERY AWARD

- **Ursula Kattner**
Physical Scientist
National Institute of Standards and Technology

INSTITUTE OF METALS/ ROBERT FRANKLIN MEHL AWARD

- **Yuntian Zhu**
Distinguished Professor
North Carolina State University

LEADERSHIP AWARD

- **Sergio Nves Monteiro**
Professor
Military Institute of Engineering

WILLIAM D. NIX AWARD

- **Robert Ritchie**
Distinguished Professor
University of California Berkeley

ALEXANDER SCOTT DISTINGUISHED SERVICE AWARD

- **Elizabeth Holm**
Professor
Carnegie Mellon University

OLEG D. SHERBY AWARD

- **Farghalli Mohamed**
Professor Emeritus
University of California

CYRIL STANLEY SMITH AWARD

- **Yunzhi Wang**
Professor
The Ohio State University

AIME AWARDS

TMS/SME/AIME JAMES DOUGLAS GOLD MEDAL

- **James Orlich**
Senior Director of Metallurgical Technology
Newmont Goldcorp

AIME ROBERT LANSING HARDY AWARD

- **Ravishankar Sundararaman**
Assistant Professor
Rensselaer Polytechnic Institute

AIME ROSSITER W. RAYMOND MEMORIAL AWARD

- **Timothy Rupert**
Associate Professor
University of California, Irvine
- **Amirhossein Khalajhedayat**
R&D Engineer
University of California, Irvine and Tower Semiconductor

AIME MINERAL INDUSTRY EDUCATION AWARD

- **Ramana Reddy**
Professor
University of Alabama

AIME CHAMPION H. MATHEWSON AWARD

- **Peter C. Collins**
Professor
Iowa State University
- **Santhosh Koduri**
Intel Corp
- **Vikas Dixit**
Process Engineer
Intel Corp
- **Hamish Fraser**
Professor
The Ohio State University

AIME HENRY DEWITT SMITH SCHOLARSHIP

- **Kathleen Chou**
Student
University of Michigan
- **Murtatha Jamel**
Student
University of Wisconsin Milwaukee

ACTA MATERIALIA AWARDS

ACTA MATERIALIA GOLD MEDAL AWARD

- **Enrique Laverna**
Provost and Executive Vice Chancellor
University of California, Irvine

ACTA MATERIALIA SILVER MEDAL AWARD

- **Diana Lados**
Distinguished Professor
Worcester Polytechnic Institute

ACTA MATERIALIA HOLLOWAY MATERIALS & SOCIETY AWARD

- **Lynnette D Madsen**
Program Director
National Science Foundation

ACTA MATERIALIA UNDERGRADUATE SCHOLARSHIP

- **William Carpenter**
Student
South Dakota School of Mines & Technology
- **William Jeang**
Student
Northwestern University

ACTA MATERIALIA INC STUDENT POSTER AWARDS

- **Nisar Ahmed**
- **Jae Wung Bae**
- **Yanhao Dong**
- **Bo Huang**
- **Shashank Kaira**
- **William Kelley**
- **Yageng Li**
- **Fabián Ruiz**
- **Jan Schultheiss**
- **Mallikarjuna Heggadadevanapura Thammaiah**
- **Logan Ware**
- **Huan Zhao**

DIVISION AWARDS

EXTRACTION & PROCESSING DIVISION (EPD)

EPD DISTINGUISHED LECTURER AWARD

- **Phillip Mackey**
President
P J Mackey Technology Inc

EPD DISTINGUISHED SERVICE AWARD

- **Michael Free**
Professor
University of Utah

EPD SCIENCE AWARD

- **Jungho Heo**
R&D Center Researcher
LS-Nikko Copper
- **Joohyun Park**
Professor
Hanyang University

EPD TECHNOLOGY AWARD

- **Manuel Perez-Tello**
Universidad de Sonora
- **Victor R. Parra-Sanchez**
Universidad de Concepcion
- **Victor Manuel Sanchez-Corrales**
Univerisdad de Sonora
- **Agustin Gomez-Alvarez**
Univerisdad de Sonora
- **Francisco Brown Bojorquez**
Professor
Univerisdad de Sonora
- **Roberto A. Parra-Figueroa**
Professor
Univerisdad De Concepcion
- **Eduardo R. Balladares-Varela**
Associate Professor
Univerisdad De Concepcion
- **Eugenia Aranedá-Hernandez**
Assistant Professor
Univerisdad De Concepcion

EPD PYROMETALLURGY BEST PAPER AWARD

- **Yu-Ki Taninouchi**
Research Fellow
The University of Tokyo
- **Toru H. Okabe**
Vice President, Professor
University of Tokyo

EPD/LMD JOURNAL OF SUSTAINABLE METALLURGY BEST PAPER AWARD

- **Chuan-ming Du**
Professor
Northeastern University
- **Xu Gao**
Tohoku University
- **Shigeru Ueda**
Tohoku University
- **Shin-ya Kitamura**
Professor
Tohoku University

NAGY EL-KADDAH AWARD FOR BEST PAPER IN MHD IN MATERIAL PROCESSING

- **Mark Stoudt**
Materials Research Engineer
National Institute of Standards and Technology
- **Eric Lass**
Professor
University of Tennessee, Knoxville
- **Daniel Ng**
Massachusetts Institute of Technology
- **Maureen Williams**
National Institute of Standards and Technology
- **Fan Zhang**
Physicist
National Institute of Standards and Technology
- **Carelyn Campbell**
Metallurgist
National Institute of Standards and Technology
- **Greta Lindwall**
Assistant Professor
KTH Royal Institute of Technology
- **Lyle Levine**
Project Lead, Additive Manufacturing of Metals
National Institute of Standards and Technology

EPD MATERIALS CHARACTERIZATION AWARDS

Best Paper - First Place (Tied)

- **Shadia Jamil Ikhmayies**
Associate Professor
Al Isra University
- **Hassan K. Juwhari**
Professor
University of Jordan
- **Bashar Ibrahim Mahmoud Lahlouh**
Associate Professor
University of Jordan

Best Paper - First Place (Tied)

- **Jianhui Peng**
Central South University
- **Zhiwei Peng**
Central South University
- **Liancheng Wang**
Central South University
- **Leixia Zheng**
Central South University
- **Zhongping Zhu**
Associate Professor
Central South University
- **Guanghui Li**
Professor
Central South University
- **Tao Jiang**
Central South University

Best Paper - Third Place

- **Qiang Ren**
Student
University of Science and

- Technology Beijing
- **Lifeng Zhang**
Professor
University of Science and Technology Beijing
- **Yan Luo**
Postdoctoral Scholar
University of Science and Technology Beijing
- **Lin Cheng**
University of Pittsburgh
- **Piotr Roman Scheller**
Professor
TU Bergakademie Freiberg

Best Poster - First Place

- **Yifan Sun**
Osaka University
- **Hiroaki Muta**
Osaka University
- **Ken Kurosaki**
Professor
Osaka University
- **Yuji Ohishi**
Osaka University

Best Poster - Second Place

- **Prakash Parajuli**
Postdoctoral Research Associate
University of Illinois at Chicago
- **Ruben Mendoza-Cruz**
University of Texas at San Antonio
- **Miguel Yacaman**
University of Texas at San Antonio
- **Arturo Ponce**
University of Texas at San Antonio

Best Poster - Third Place

- **Kyungjun Lee**
Researcher
Oak Ridge National Laboratory
- **Sougata Roy**
Researcher
Oak Ridge National Laboratory
- **Jeffrey Lacey**
Staff Scientist
Idaho National Laboratory
- **Jun Qu**
Distinguished R&D Staff Scientist
Oak Ridge National Laboratory
- **James Keiser**
Distinguished R&D Staff
Oak Ridge National Laboratory
- **Vicki Thompson**
Idaho National Laboratory
- **Erik Kuhn**
Research Operations Manager
National Renewable Energy Laboratory
- **Ed Wolfrum**
Principal Researcher & Manager
National Renewable Energy Laboratory

FUNCTIONAL MATERIALS DIVISION (FMD)

FMD DISTINGUISHED SCIENTIST/ENGINEER AWARD

- **C. Robert Kao**
Professor
National Taiwan University

FMD DISTINGUISHED SERVICE AWARD

- **James R. Morris**
Chief Research Officer
Ames Laboratory

FMD JOHN BARDEEN AWARD

- **James Coleman**
Professor
University of Texas at Arlington

FMD JEM BEST PAPER AWARD

- **Guoxu Wang**
Hebei University of Science and Technology
- **Lei Liu**
Hebei University of Science and Technology
- **Lili Zhang**
Hebei University of Science and Technology
- **Xinyu Fu**
Hebei University of Science and Technology
- **Meng Liu**
Hebei University of Science and Technology
- **Yixin Zhang**
Hebei University of Science and Technology
- **Yifeng Yu**
Hebei University of Science and Technology
- **Aibing Chen**
Hebei University of Science and Technology
- **Ryoichi Akimoto**
National Institute of Advanced Industrial Science and Technology

LIGHT METALS DIVISION (LMD)

LMD DISTINGUISHED SERVICE AWARD

- **Donna Post Guillen**
Distinguished Research Engineer
Idaho National Laboratory

LMD TECHNOLOGY AWARD

- **Alan Luo**
Professor
The Ohio State University

LMD JOM BEST PAPER AWARD

- **Liuqing Peng**
Student
Imperial College London
- **Guang Zeng**
Central South University

- **Te-Cheng Su**
Postdoctoral Research Associate
Imperial College London
- **Hideyuki Yasuda**
Kyoto University
- **Kazuhiro Nogita**
The University of Queensland
- **Christopher Gourlay**
Reader
Imperial College London

LIGHT METALS AWARD

- **Sébastien Guérard**
Research Scientist
Rio Tinto Aluminum, Arvida
Research and Development Center
- **Patrice Côté**
Principal Advisor, Data Science and Artificial Intelligence
Rio Tinto Aluminum, Arvida
Research and Development Center

LMD MAGNESIUM TECHNOLOGY AWARDS

Application

- **Petra Maier**
Professor
Stralsund University of Applied Sciences
- **Adam Griebel**
Senior R&D Engineer
Fort Wayne Metals
- **Matthias Jahn**
University of Applied Sciences Stralsund
- **Maximilian Bechly**
University of Applied Sciences Stralsund
- **Roman Menze**
MeKo Laser Material Processing
- **Benjamin Bittner**
MeKo Laser Material Processing
- **Jeremy Schaffer**
Director of Research and Development
Fort Wayne Metals

Fundamental Research

- **Arul Kumar Mariyappan**
Scientist
Los Alamos National Laboratory
- **Brandon Leu**
Ph.D. Candidate
University of California Santa Barbara
- **Paul Rottmann**
University of Kentucky
- **Irene Beyerlein**
Robert Mehrabian Interdisciplinary Chair
University of California, Santa Barbara

Student Paper

- **Joshua Herrington**
Graduate Student
Texas A&M University
- **Yazid Madi**
EPF Ecole D'Ingenieur-e-s

- **Jacques Besson**
Ecole Des Mines
- **Amine Benzerga**
Assistant Professor
Texas A&M University

Best Posters

- **Rachel Davidson**
Graduate Student
Texas A&M University
- **Sarbajit Banerjee**
Davidson Professor of Chemistry & Chancellor EDGES Fellow
Texas A&M University
- **Zachary Brunson**
Ph.D. Candidate
Colorado School of Mines
- **Aaron Stebner**
Associate Professor
Colorado School of Mines

LIGHT METALS SUBJECT AWARDS

Alumina/Bauxite

- **Mariana A. L. Braulio**
Materials Engineering Ph.D.
4Cast—Technical Assistance and Consultancy on Refractories
- **José R. Cunha**
Alumar
- **Austin J. Maxwell**
Alcoa
- **Dean Whiteman**
Alcoa
- **Victor C. Pandolfelli**
Professor
Alcoa Laboratory, Federal University of Sao Carlos

Aluminum Reduction Technology

See overall Light Metals Award.

Electrode Technology for Aluminum Production

- **Pierre Mahieu**
Process Engineer
Fives Solios
- **Xavier Genin**
Fives Solios
- **Christophe Bouché**
Innovation & Carbon Technical Director
Fives Solios
- **David Brismalein**
Aluminium Dunkerque
- **Hervé Pédroli**
Process Engineer
Liberty Aluminium Dunkerque

Warren Peterson Cast Shop for Aluminum Production

- **Georg Rombach**
Senior Advisor
Hydro Aluminium Rolled Products GmbH
- **Nils Bauerschlag**
Head of Technical Customer Service and Product Development Business Unit Foil
Hydro Aluminium Rolled Products GmbH

Aluminum Alloys

- **Alexis Deschamps**
Professor
Grenoble Institute of Technology
- **Michael Langille**
R&D Metallurgist
Constellium Technology Center (C-TEC)
- **Brad J. Diak**
Professor
Mechanical and Materials Engineering, Queen's University
- **Frederic De Geuser**
Research Scientist
Grenoble Institute of Technology
- **Gilles Guiglionda**
Staff R&D Engineer
Constellium Technology Center (C-TEC)
- **Sami Meddeb**
Engineer
CEA Saclay
- **Huan Zhao**
Max-Planck-Institut Fr Eisenforschung
- **Baptiste Gault**
Group Leader
Max-Planck-Institut Fr Eisenforschung
- **Dierk Raabe**
Chief Executive
Max-Planck-Institut Fr Eisenforschung

LMD/EPD SUBJECT AWARD

Recycling

- **Blake Fullenwider**
US Army Research Laboratory
- **Parnian Kiani**
Ph.D. Candidate
University of California Irvine
- **Julie M. Schoenung**
Professor and Department Chair
University of California Irvine
- **Kaka Ma**
Assistant Professor
Colorado State University

MATERIALS PROCESSING & MANUFACTURING DIVISION (MPMD)

MPMD DISTINGUISHED SERVICE AWARD

- **Yunzhi Wang**
Professor
The Ohio State University

MPMD Distinguished Scientist/Engineer Award

- **Douglas Spearot**
Associate Professor
University of Florida

STRUCTURAL MATERIALS DIVISION (SMD)

SMD DISTINGUISHED SCIENTIST/ENGINEER AWARD

- **Rajiv Mishra**
Distinguished Research Professor
University of North Texas

SMD DISTINGUISHED SERVICE AWARD

- **Ellen Cerreta**
Deputy Division Leader
Los Alamos National Laboratory

SMD JOM BEST PAPER AWARD

- **Jiachen Pang**
General Motors Global Research and Development
- **Hongliang Yi**
Professor
Northeastern University
- **Qi Lu**
General Motors Global Research and Development
- **Charles Matthew Enloe**
Senior Manager
CBMM North America
- **Jeff Wang**
Manager
General Motors Global Research and Development

YOUNG PROFESSIONAL AWARDS

YOUNG INNOVATOR IN THE MATERIALS SCIENCE OF ADDITIVE MANUFACTURING AWARD

- **Doug Hofmann**
Principal
NASA JPL/Caltech

EPD YOUNG LEADERS PROFESSIONAL DEVELOPMENT

- **Gisele Azimi**
Professor
University of Toronto
- **Hong Peng**
Amplify Fellow
University of Queensland

FMD YOUNG LEADERS PROFESSIONAL DEVELOPMENT

- **Aurelien Perron**
Materials Scientist and Deputy Group Leader
Lawrence Livermore National Laboratory
- **Jayakanth Ravichandran**
Assistant Professor
University of Southern California

LMD YOUNG LEADERS PROFESSIONAL DEVELOPMENT

- **Abdallah Elsayed**
Assistant Professor
University of Guelph
- **Julien Lauzon-Gauthier**
Research Engineer - Carbon
Alcoa Corporation

MPMD YOUNG LEADERS PROFESSIONAL DEVELOPMENT

- **Damien Turret**
Researcher
IMDEA Materials Institute
- **Somayeh Pasebani**
Assistant Professor
Oregon State University

SMD YOUNG LEADERS PROFESSIONAL DEVELOPMENT

- **Aeriel Murphy-Leonard**
NRC Postdoctoral Fellow
United States Naval
Research Laboratory
- **Richard Oleksak**
Research Scientist
National Energy Technology
Laboratory

TMS/JIM YOUNG LEADERS INTERNATIONAL SCHOLAR

- **Michael Titus**
Assistant Professor
Purdue University

JIM YOUNG LEADERS INTERNATIONAL SCHOLAR

- **Xiao Xu**
Assistant Professor
Tohoku University

STUDENT AWARDS

EPD SCHOLARSHIP

- **William Carpenter**
Student
South Dakota School of
Mines & Technology

FMD GILBERT CHIN SCHOLARSHIP

- **Thomas Colburn**
Student
Stanford University

LMD SCHOLARSHIP

- **Samantha Schloder**
Student
University of Pittsburgh

MPMD SCHOLARSHIP

- **Natalie Wieber**
Student
University of Tennessee,
Knoxville

SMD SCHOLARSHIP

- **Jadzia Graves**
Student
University of Idaho

KAUFMAN CALPHAD SCHOLARSHIP

- **Emily Proehl**
Student
University of Wisconsin
Madison

TMS INTERNATIONAL SYMPOSIUM ON SUPERALLOYS SCHOLARSHIP

- **Hannah Walker**
Student
University of Wisconsin
Madison
- **Kyle Ventura**
Student
University of Florida

TMS BEST STUDENT PAPER

Graduate – First Place

- **Yuan Li**
Student
University of Tennessee

Graduate – Second Place

- **Keyou Mao**
Student
Purdue University

Undergraduate – First Place

- **Benjamin Suslavich**
Student
Montana Tech



March 14–18, 2021
Orlando, Florida, USA



Register Your Team for the 2021 TMS Bladesmithing Competition by November 1, 2020

Interested teams and individuals must submit a Letter of Acknowledgement signed by their faculty department chair by November 1, 2020.

Visit www.tms.org/Bladesmithing for more information and a sample Letter of Acknowledgement.

**Competition Spaces
Are Limited. Register Today!**
www.tms.org/Bladesmithing



Cash Prizes

TMS Wadsworth-Sherby Bladesmithing
Grand Prize: \$2,000
2nd place: \$500
3rd place: \$250
Honorable mention(s): \$100

Special Citations

In addition to the main prize categories, citations may also be awarded to deserving teams in the following areas:

Beauty
Historical Accuracy
Creative Use of Materials
Hands-On Process
Resourcefulness

Citations may also be awarded to recognize an excellent report, poster, and video among the submissions.



2019–2020 TMS BOARD OF DIRECTORS

OFFICERS

2019 TMS President

James C. Foley

Sigma-1 Group Leader, Los Alamos National Laboratory

2019 Vice President/Incoming 2020 President

Thomas Battle

Extractive Metallurgy Consultant

Incoming 2020 Vice President

Ellen K. Cerreta

Deputy Division Leader, Explosive Science and Shock Physics Division, Los Alamos National Laboratory

Past President

Kevin J. Hemker

Professor and Chair, Johns Hopkins University

Financial Planning Officer

Adrian C. Deneys

Business Development Manager, Praxair Inc.

Incoming 2020 Financial Planning Officer

Charles H. Ward

Chief of the Manufacturing and Industrial Technologies Division, U.S. Air Force Research Laboratory's Materials and Manufacturing Directorate

TMS Secretary (non-voting)

James J. Robinson

Executive Director, TMS

FUNCTIONAL AREA DIRECTORS

Membership & Student Development Director/Chair

Alexis C. Lewis

Program Director, National Science Foundation

Programming Director/Chair

Brad L. Boyce

Distinguished Member for the Technical Staff, Sandia National Laboratories

Professional Development Director/Chair

Chester J. Van Tyne

Professor Emeritus, Colorado School of Mines

Incoming Professional Development Director/Chair

David L. Bourell

Temple Foundation Professor of Mechanical Engineering, The University of Texas at Austin

Content Development & Dissemination Director/Chair

Michele V. Manuel

Professor, University of Florida

Incoming Content Development & Dissemination Director/Chair

Judith Schneider

Professor, University of Alabama at Huntsville

Public & Governmental Affairs Director/Chair

John A. Howarter

Assistant Professor, Purdue University

Incoming Public & Governmental Affairs Director/Chair

Eric N. Brown

Division Leader, Explosive Science and Shock Physics Division, Los Alamos National Laboratory

TECHNICAL DIVISION DIRECTORS

Extraction & Processing Division Director/Chair

Cynthia K. Belt

Energy Management Consultant, Metals Energy Management LLC

Incoming Extraction & Processing Division Director/Chair

Christina Meskers

Senior Manager, Open Innovation, Umicore

Functional Materials Division Director/Chair

Raymundo Arróyave

Professor, Texas A&M University

Incoming Functional Materials Division Director/Chair

Paul R. Ohodnicki Jr.

Associate Professor, University of Pittsburgh

Light Metals Division Director/Chair

Eric Nyberg

Technology Development Manager, Tungsten Heavy Powder & Parts

Materials Processing & Manufacturing Division Director/Chair

Mark R. Stoudt

Materials Research Engineer, National Institute of Standards and Technology

Structural Materials Division Director/Chair

Daniel Miracle

Senior Scientist, Air Force Research Laboratory



Anton Paar



BOOTH
#620

FACE YOUR SURFACE WITH PEAK PERFORMANCE AFM: Tosca series

- Fully automatic laser alignment – in just two mouse-clicks
- The easiest engagement procedure on the market – ready for scanning within seconds
- Probemaster cantilever exchange tool suitable also for inexperienced users
- The fastest sample navigation procedure – change positions with one click



TMS UPCOMING MEETINGS

TMS offers programming that spans the technical interests of the global minerals, metals, and materials community.



Congress on Safety in Engineering and Industry
June 21–24, 2020 • Philadelphia, Pennsylvania, USA
www.safetycongress.org



The 5th International Congress on 3D Materials Science
June 28–July 1, 2020 • Washington, D.C., USA
www.tms.org/3DMS2020



The 13th International Conference on the Technology of Plasticity
July 26–31, 2020 • Columbus, Ohio, USA
www.tms.org/ICTP2020



The 14th International Symposium on Superalloys
September 13–17, 2020 • Seven Springs, Pennsylvania, USA
www.tms.org/Superalloys2020



Materials Science & Technology 2020
October 4–8, 2020 • Pittsburgh, Pennsylvania, USA
www.matscitech.org/MST20



TMS 2021 Annual Meeting & Exhibition
Co-located with 5th International Symposium on Nickel and Cobalt (Ni-Co 2021) and Diversity in the Minerals, Metals, and Materials Professions (DMMM4)
March 14–18, 2021 • Orlando, Florida, USA
www.tms.org/TMS2021



12th International Conference on Magnesium Alloys and their Applications
June 15–18, 2021 • Montreal, Quebec, Canada
www.tms.org/Mg2021



Materials in Nuclear Energy Systems 2021
September 19–23, 2021 • Pittsburgh, Pennsylvania, USA
www.tms.org/MiNES2021

For a complete listing of upcoming events, visit
www.tms.org/UpcomingMeetings

Thermo-Calc Software

Empowering Metallurgists, Process Engineers and Researchers

Do you rely on handbook data?

What if the materials data you need doesn't exist?

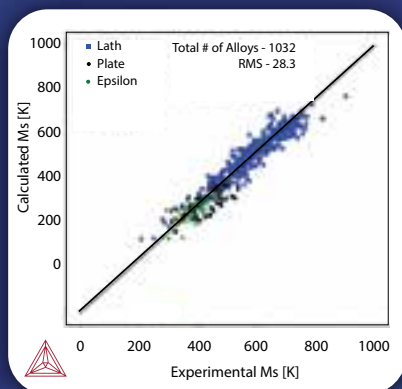
With Thermo-Calc you can:

- ✓ **Calculate** phase-based properties as a function of composition, temperature and time
- ✓ **Fill in** data gaps without resorting to costly, time-consuming experiments
- ✓ **Predict** how actual vs nominal chemistries will affect property data
- ✓ **Base Decisions** on scientifically supported models
- ✓ **Accelerate** materials development while reducing risk
- ✓ **Troubleshoot** issues during materials processing

Over 40 Thermodynamic and Kinetic Databases

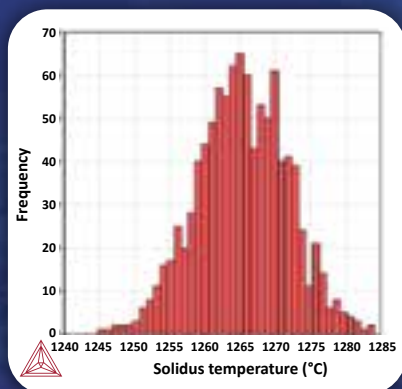
Choose from an extensive selection of thermodynamic and mobility databases in a range of materials, including:

Steel and Fe-Alloys



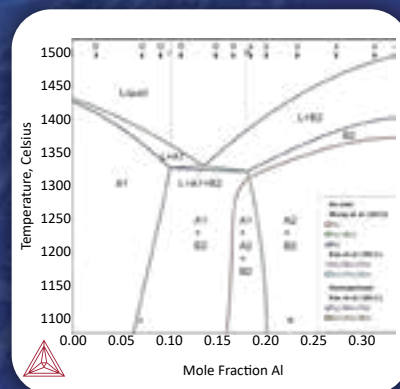
Comparison of calculated and experimental Ms temperatures for a wide range of steels

Nickel



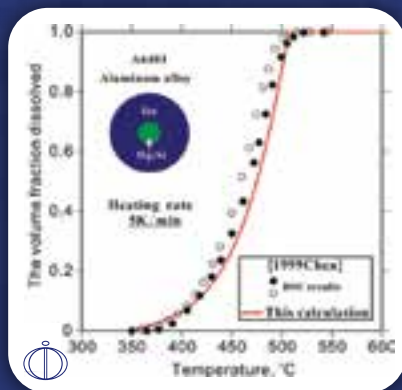
Variation in solidus temperature over 1000 compositions within alloy 718 specification

High Entropy Alloys



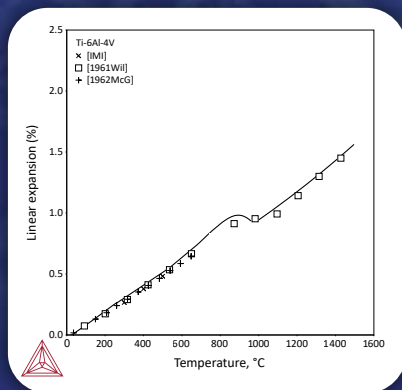
Calculated phase diagram along the composition line of CoCrFeNi-Al

Al Alloys



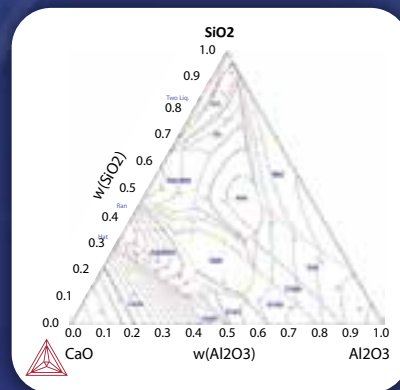
Dissolution of Mg₂Si precipitate in Alloy A6401

Ti and TiAl Alloys



Linear expansion vs Temperature for Ti-6Al-4V

Oxides



Ternary liquidus projection in oxide systems



THE ADVANCED MATERIALS MANUFACTURER®

1 H 1.00784 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 14.0067 Nitrogen	8 O 15.9994 Oxygen	9 F 18.9984032 Fluorine	10 Ne 20.1797 Neon
11 Na 22.98976928 Sodium	12 Mg 24.305 Magnesium											13 Al 26.9815386 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 47.867 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 (98.0) 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 121.76 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 138.90547 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 192.217 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 (268) Dubnium	106 Sg (271) Seaborgium	107 Bh (272) Bohrium	108 Hs (270) Hassium	109 Mt (276) Meitnerium	110 Ds (281) Darmstadtium	111 Rg (280) 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 144.91274 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 174.967 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

Over 15,000 certified high purity laboratory chemicals, metals, & advanced materials and a state-of-the-art Research Center. Printable GHS-compliant Safety Data Sheets. Thousands of new products. And much more. All on a secure multi-language "Mobile Responsive" platform.

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

www.americanelements.com