Welcome to the TMS 2013 Annual Meeting & Exhibition!

Dear colleagues and friends from all over the world,

Thank you for joining us at the 142nd installment of the TMS Annual Meeting & Exhibition. Over the next several days, I encourage you to make the most of your time here by participating in all that this conference has to offer. That includes:

Technical Sessions: More than 3,000 technical presentations are scheduled at nearly 70 symposia over the next few days. Use the technical program in this book as your guide to the many offerings. To take a more detailed look at the technical papers being presented--and to compile a personalized electronic schedule for the meeting--be sure to download the TMS2013 Mobile Application. (See page 2 for more information on the app.)

Spotlight Sessions: This year, we have four all-conference spotlight sessions planned on topics of broad interest to the materials science and engineering community. All of these events will take place in the spacious Lila Cockrell Theatre. Descriptions begin on page 20.

Networking Events: Whether you are a young professional, a long-time attendee, a dedicated volunteer, a student, or new to the society, TMS2013 offers networking events that let you meet and connect with others in your field. Browse the listing of events on page 32 for a complete look at the conference's networking, student, and social events. Some require advance registration to attend, but others, like the Networking Meeting of the Membership, are open to all. (I especially encourage you to stop by this meeting to find out what TMS has in store for the coming years.)

Exhibition Hall: Another natural venue for making new contacts and networking with your peers is the TMS2013 Exhibit Hall. Special lunches and receptions (open to all TMS2013 attendees) will be held in the hall throughout the week. Exhibiting companies are listed in the Exhibit Directory portion of this program.

Committee Meetings: Become more involved in the society by attending a technical committee meeting in an area that matches your interests and expertise. Technical committee meetings are open to all attendees, and a complete listing of when and where these groups will meet is available in the Schedule of Events, beginning on page 5.

Browse this conference program to make sure that you don't miss any of the highlights of this year's meeting, and enjoy your time with TMS in San Antonio!

Sincerely,

Wolfgang Schneider

MEETING INFORMATION

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MEETING INFORMATION

REGISTRATION

Your full-conference registration badge provides you access to:

- Technical and Poster Sessions
- Three-Day Pass to the TMS2013 Exhibition
- President's Welcoming Reception and Happy Hour Reception (located in the exhibit hall)
- General Poster Session Reception
- TMS Materials Bowl Competition
- Technical Division Student Poster Displays
- Admission to select social and networking events
- On-line access to the complete collected conference proceedings

All attendees and meeting participants (authors, exhibitors, etc.) must register for the meeting. Conference badges must be worn for admission to technical sessions, the exhibition hall, social functions, and other conference events.

TMS2013 MOBILE APPLICATION

Download the TMS2013 mobile application to serve as your hand-held guide to the meeting. Attendees will be able to easily download this free conference tool from the Apple iTunes Store for your iPhone or iPad or through the Android Marketplace.

The App's features include:

- Latest programming schedule
- Build your personal schedule and download to your device or Outlook calendar
- Speaker information
- Interactive exhibit map
- Exhibitors and sponsors
- Venue information
- San Antonio city guide and discount offers
- Much more!

Through the App, you will also be able to organize and track those events you wish to attend by building a "My Schedule" list, plus quickly narrow current presentations with the "What's on Now?" feature. To download the TMS Mobile Application, search "TMS Annual Meeting" in your respective device store. If you do not have a smart phone device or iPad, a website version of the App is available for access from any internet-connected device. Please visit **http://tms2013.quickmobile.mobi**

INTERNET ACCESS

Free wireless internet access is available in public areas of the Henry B. Gonzalez Convention Center. This includes the East Registration Lobby, Towerview and Parkview Lobbies, and Café. Please select the "FreeInternet" network for access.

FOOD AND BEVERAGES

The Henry B. Gonzalez Convention Center features three cafes where attendees may purchase beverages and snacks. Located in the main lobby of the convention center, the Café offers hot and cold beverages and light meal options and seating. The Mural Café in the Parkview Lobby and the Coffee Shop near the main entrance both offer hot and cold beverages and light snacks. Complimentary mid-morning and mid-afternoon coffee breaks will provide attendees with refreshments during technical sessions. In addition, full-conference registrants may use the $10 vouchers provided at registration toward lunch concessions in the exhibit hall on Monday and Wednesday, and a complimentary light buffet lunch will be provided in the exhibit hall to all full-conference attendees on Tuesday.

NEW FOR 2013:

Downloadable Collected Proceedings

For 2013, TMS is distributing the complete collection of published conference proceedings to all full-conference attendees. In place of the traditional CD-ROM format, TMS will instead provide free on-line access to the proceedings. All full-conference registrants will be given a web address and a redemption code to access the proceedings in one of two ways: as an e-book bundle (which will provide all papers through a single download) or as single-paper PDF files. Registrants will be able to download the proceedings at no charge between March 3, 2013 and September 3, 2013; thereafter standard member pricing will take effect.

BUSINESS CENTER

There is a full service UPS Store located just inside the main entrance of the Henry B. Gonzalez Convention Center. Services include packing and shipping, photocopying, faxing, laminating, notary, and general supplies for sale. The UPS Store is open Monday-Friday from 8:00 a.m. – 6:30 p.m. and on Saturday from 9:00 a.m. – 5:00 p.m. The store is not open on Sundays. For more information on available services, please visit www.theupsstorelocal.com/4180 or email store4180@theupsstore.com.

A NOTE ABOUT TIME

All times printed in this program refer to Central Standard Time.

MEETING POLICIES

Badges

All attendees must wear registration badges at all times during the conference to ensure admission to events included in the paid fee such as technical sessions, exhibition, and receptions. "Exhibit Only" badges only provide admittance to the show floor for events in the exhibit hall. "Guest" badges are for spouses or companions of registered attendees and are used as identification only. "Guest" and "Exhibit Only" attendees may not attend technical sessions.

Refund Policy

The deadline for all refunds was February 1, 2013. No refunds will be issued at the conference. Fees and tickets are nonrefundable.

Photography Notice

By registering for this conference, 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.

Audio/Video Recording Policy

TMS reserves the right to all audio and video reproductions of presentations at TMS-sponsored meetings. 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. Contact TMS to obtain a copy of the waiver release form.

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 contact TMS Meeting Services in advance.

Cell Phone Use

In consideration of attendees and presenters, TMS kindly requests that you minimize disturbances by setting all cell phones or PDAs on "silent" while in meeting rooms.

Recycling

Discard badges and programs after the conference in the bins located in the Registration area.

Be materials-minded. *Join* TMS *in reducing, reusing and recycling.*

Thinking differently has helped us achieve more with less. Less energy. Less fuel. Less impact on the environment.

Tayeb Al Awadhi
Vice President: Power & Desalination

Investment in energy efficient technology today means a brighter future tomorrow.

Since our inception in 1979 we have dedicated ourselves to establishing DUBAL as a world-class supplier of aluminium to global markets. You might put our success down to an unswerving focus on quality and the unparalleled 99.99% purity of our products.

But it is also our commitment to finding ways to reduce the energy consumption of our operations through state-of-the-art technologies, equipment and processes which has helped make us what we are today.

Continually striving to do more with less. That's what sets us apart. And you can quote us on that.

Together we shine
For more information call: +971 4 884 6666
www.dubal.ae

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Dubai Aluminium

Schedule of Events

as of February 6, 2013

TMS Meetings & Events are scheduled on the following days, times and locations:

Venue Key: CC Henry B. Gonzalez Convention Center GH Grand Hyatt Hotel

Function	Time	Venue	Room	Access*
SATURDAY, MARCH 2				
TMS 2013 Exhibition				
Exhibit Move-In	8:00 a.m. to 5:00 p.m.	CC	Exhibit Hall C	R
Continuing Education and Special Presentations				
Continuing Education Temporary Registration Desk (for Saturday courses only)	7:00 a.m. to 10:30 a.m.	CC	207/208 Foyer	O
Short Courses Breakfast	7:00 a.m. to 8:00 a.m.	CC	206B	R
Extractive Metallurgy of Nickel & Cobalt, Day 1	8:00 a.m. to 4:30 p.m.	CC	207A	T
Titanium: History, Science, Technology, & Applications, Day 1	8:00 a.m. to 5:00 p.m.	CC	207B	T
Short Courses Lunch	12:00 p.m. to 1:00 p.m.	CC	206B	R
Committee Meetings				
Professional Registration Writers Workshop and Committee Meeting	9:00 a.m. to 5:00 p.m.	GH	Presidio B	R
Financial Planning Committee	1:00 p.m. to 5:00 p.m.	GH	Presidio C	R
Professional Registration Committee Dinner	6:00 p.m. to 8:00 p.m.	GH	Presidio A	R

* O - Open to all attendees
R - Restrictions Apply

T - Ticketed Event, Pre-registration required
T2 - Ticketed Event
(T2 - Tickets may be purchased onsite 24 hours before event)

Meet the TMS2013 Reporters:

Graduate Students to Provide Technical Coverage for TMS2013 Newsletter

The following two TMS graduate students have been selected to act as reporters at the TMS 2013 Annual Meeting & Exhibition. Because TMS2013 attendees can't be everywhere at once, these reporters will help to provide attendees with a look at technology being covered at a sampling of events taking place over the course of the week. Read their observations and summaries in the TMS2013 daily newsletter (e-mailed each night to attendees). Please welcome them at your sessions.

This service is made possible through grants provided by the International Center for Materials Research (ICMR) Apprentice Science Reporter Program, University of California, Santa Barbara.

Check your inbox daily for your electronic TMS2013 newsletter!

Graham Sanborn
Ph.D. Student in Materials Science and Engineering
Georgia Institute of Technology
Atlanta, Georgia

Alex Leary
Materials Science
Graduate Student
Carnegie Mellon University
Pittsburgh, Pennsylvania

Schedule of Events

as of February 6, 2013

Venue Key: CC Henry B. Gonzalez Convention Center GH Grand Hyatt Hotel

Function	Time	Venue	Room	Access*
SUNDAY, MARCH 3				
All-Conference Events				
Registration	7:00 a.m. to 6:00 p.m.	CC	East Reg Lobby	O
TMS Member Welcome Center	7:00 a.m. to 6:00 p.m.	CC	East Reg Lobby	O
TMS Foundation Center	7:00 a.m. to 6:00 p.m.	CC	East Reg Lobby	O
Poster Session Set-Up	12:00 p.m. to 5:00 p.m.	CC	Park & Towerview Lobbies	O
Technical Programming Support Center	2:00 p.m. to 5:00 p.m.	CC	Bridge Hall	O
Young Leader Meet the Candidate Poster Session	6:30 p.m. to 7:45 p.m.	CC	213	O
Poster Session Set Up	12:00 p.m. to 6:00 p.m.			
Networking Meeting of the Membership	7:00 p.m. to 8:00 p.m.	CC	217	O
TMS 2013 Exhibition				
Exhibit Move-In	8:00 a.m. to 5:00 p.m.	CC	Exhibit Hall C	R
Continuing Education and Special Presentations				
Short Courses Breakfast	7:30 a.m. to 8:15 a.m.	CC	205	R
Extractive Metallurgy of Nickel & Cobalt, Day 2	9:00 a.m. to 4:30 p.m.	CC	207A	T
Modeling Electrodeposition in Materials Processing Operations	8:00 a.m. to 4:30 p.m.	CC	206B	T
Managing Technical and Financial Risk in a New Technology Project Environment	8:00 a.m. to 4:30 p.m.	CC	210A	T
Titanium: History, Science, Technology, & Applications, Day 2	8:00 a.m. to 4:30 p.m.	CC	207B	T
Furnace Systems Technology Workshop	8:00 a.m. to 4:30 p.m.	CC	206A	T
9th Annual Lead-Free Solder and Interconnect Technology Workshop. *Continental breakfast & beverage breaks served in room. Lunch not included.*	9:00 a.m. to 4:30 p.m.	CC	211	T
Short Courses Lunch	12:00 p.m. to 1:00 p.m.	CC	205	R
New Applications for Small-Scale Mechanical Testing Tutorial *Beverage break served in room. Lunch not included*	1:00 p.m. to 5:45 p.m.	CC	210B	T
ABET Refresher Training	3:00 p.m. to 5:00 p.m.	GH	Bonham E	R

* O - Open to all attendees
R - Restrictions Apply

T - Ticketed Event, Pre-registration required
T2 - Ticketed Event
(T2 - Tickets may be purchased onsite 24 hours before event)

DID YOU KNOW?

If you registered for TMS2013 at the nonmember rate, your registration includes membership in TMS for the remainder of 2013. In addition to discounts on future conferences, TMS membership provides you with a print and electronic subscription to *JOM*, electronic subscriptions to the *Journal of Electronic Materials* and *Metallurgical and Materials Transactions A* and *B*, access to the new TMS Member Library and to a collection of career resources, and a variety of opportunities for networking with your peers.

Upon activation, you will be able to explore all of your TMS member benefits by logging in to **members.tms.org**. Or visit the TMS Member Welcome Center in the East Registration Lobby today to talk with a TMS staff representative about your membership benefits.

Schedule of Events

as of February 6, 2013

Venue Key: CC Henry B. Gonzalez Convention Center GH Grand Hyatt Hotel

Student Events				
Materials Bowl	12:00 p.m. to 8:30 p.m.	CC	Grand BR C3	O
Elimination Rounds	12:00 p.m. to 3:00 p.m.			
Championship Round	8:00 p.m. to 8:30 p.m.			
Student Networking Mixer	8:30 p.m. to 10:30 p.m.	CC	Grand BR C2	O
Social Functions				
Fellows and Invited Guests Reception	4:30 p.m. to 6:30 p.m.	GH	Bowie B	R
Committee Meetings				
Board of Directors Meeting	7:30 a.m. to 1:30 p.m.	GH	Travis CD	R
Professional Registration Leadership Committee	8:00 a.m. to 10:00 a.m.	GH	Goliad	R
Recycling & Environmental Technologies Committee	12:00 p.m. to 1:30 p.m.	GH	Presidio B	O
Professional Registration Committee - PAKS Survey Meeting	12:00 p.m. to 9:00 p.m.	GH	Presidio A	R
Accreditation Committee	12:30 p.m. to 2:30 p.m.	GH	Presidio C	R
Aluminum Processing Committee	1:00 p.m. to 2:00 p.m.	GH	Bowie A	O
Audit Committee	1:30 p.m. to 2:00 p.m.	GH	Travis CD	R
Magnesium Committee	1:30 p.m. to 3:00 p.m.	GH	Bowie C	O
Nominating Committee	2:00 p.m. to 3:00 p.m.	GH	Goliad	R
Aluminum Committee	2:00 p.m. to 4:00 p.m.	GH	Mission B	O
Program Committee	2:00 p.m. to 4:00 p.m.	GH	Presidio B	R
Materials Characterization Committee	2:30 p.m. to 4:00 p.m.	GH	Mission A	O
Public & Governmental Affairs Committee	3:30 p.m. to 5:00 p.m.	GH	Bowie A	O
Nanomaterials Committee	4:00 p.m. to 5:00 p.m.	GH	Bowie C	O
Thin Films & Interfaces Committee	4:00 p.m. to 5:00 p.m.	GH	Presidio C	O
PRICM8 Planning Committee	4:00 p.m. to 6:00 p.m.	GH	Bonham B	R
LMD Council	4:30 p.m. to 6:00 p.m.	GH	Presidio B	R
Content Development & Dissemination Committee	5:00 p.m. to 7:00 p.m.	GH	Bonham C	R
NanoNuclear Meeting	5:30 p.m. to 7:00 p.m.	GH	Goliad	R
Materials Innovation Committee	5:30 p.m. to 7:00 p.m.	GH	Presidio C	O
Nanomechanical Materials Behavior Committee	5:45 p.m. to 6:45 p.m.	GH	Bowie C	O
Pyrometallurgy Committee	6:00 p.m. to 7:30 p.m.	GH	Mission B	O
Mechanical Behavior of Materials Committee	7:00 p.m. to 8:30 p.m.	GH	Bowie C	O
Alloy Phases Committee	7:30 p.m. to 9:30 p.m.	GH	Presidio C	O
Phase Transformations Committee	7:30 p.m. to 9:30 p.m.	GH	Presidio B	O

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Schedule of Events

as of February 6, 2013

Venue Key: CC Henry B. Gonzalez Convention Center GH Grand Hyatt Hotel

Function	Time	Venue	Room	Access*
MONDAY, MARCH 4				
All-Conference Events				
Registration	7:00 a.m. to 6:00 p.m.	CC	East Reg Lobby	O
Presenters' Coffee	7:00 a.m. to 8:00 a.m.	CC	Bridge Hall	R
Technical Programming Support Center	7:00 a.m. to 5:00 p.m.	CC	Bridge Hall	O
TMS Member Welcome Center	7:00 a.m. to 6:00 p.m.	CC	East Reg Lobby	O
TMS Foundation Center	7:00 a.m. to 6:00 p.m.	CC	East Reg Lobby	O
General Poster Session Gallery	7:00 a.m. to 8:30 p.m.	CC	Park & Towerview Lobbies	O
Young Professional Poster Gallery	7:00 a.m. to 8:30 p.m.	CC	Park & Towerview Lobbies	O
Technical Symposia	8:30 a.m. to 6:00 p.m.	See Technical Program for complete schedule and locations		
Morning Break	9:30 a.m. to 10:20 a.m.	CC & GH		O
Afternoon Break	3:20 p.m. to 4:00 p.m.	CC & GH		O
President's Welcoming Reception	5:00 p.m. to 6:30 p.m.	CC	Exhibit Hall C	O
General Poster Session Presentations and Reception	6:30 p.m. to 8:30 p.m.	CC	Park & Towerview Lobbies	O
TMS 2013 Exhibition				
TMS 2013 Exhibition Hours	12:00 p.m. to 6:30 p.m.	CC	Exhibit Hall C	O
Lunch Concessions	12:00 p.m. to 2:00 p.m.	CC	Exhibit Hall C	O
Materials Innovation (MI) Learning Center	12:00 p.m. to 6:30 p.m.	CC	Exhibit Hall C	O
Special Presentations				
Congressional Science and Engineering Fellowship Informational Session	8:00 a.m. to 9:00 a.m.	GH	Presidio C	O
2013 Aluminum Plenary: Impurities in the Aluminum Supply Chain	8:30 a.m. to 12:20 p.m.	CC	Lila Cockrell Theatre	O
REWAS 2013: Realizing Materials Sustainability	2:00 p.m. to 5:30 p.m.	CC	Lila Cockrell Theatre	O
REWAS 2013 Reception	5:30 p.m. to 6:30 p.m.			

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Monday Programming Highlight

Ni-Co 2013 Plenary • Henry B. Gonzalez Convention Center, Room 007D

This opening session of Ni-Co 2013—a symposium jointly sponsored by TMS and several international materials societies—will begin immediately following the EPD Distinguished Lecture and will feature the following talks: "Laterites - Still a Frontier of Nickel Process Development," "Nickel and Stainless Steels: 100 Years of Working Together," "Cobalt - The Technology Enabler," and "The Recycling of Cobalt from Alloy Scrap, Spent Batteries or Catalysts and Metallurgical Residues- An Overview."

Schedule of Events

as of February 6, 2013

Venue Key: CC Henry B. Gonzalez Convention Center GH Grand Hyatt Hotel

Student Events				
Technical Division Student Poster Contest Judging	3:30 p.m. to 5:30 p.m.	CC	Park & Towerview Lobbies	O
Social Functions				
Energy Networking Breakfast	7:00 a.m. to 8:00 a.m.	GH	Republic B	R
Women In Science Breakfast	7:00 a.m. to 8:00 a.m.	GH	Texas BR A	T2
Speed Networking - Volunteer Event	11:30 a.m. to 1:30 p.m.	GH	Texas BR B	T
TMS BOD & ASM BOD Dessert Social	8:30 p.m. to 9:30 p.m.	GH	Travis CD	R
Committee Meetings				
Metallurgical & Materials Transactions A Board of Review	7:00 a.m. to 8:00 a.m.	GH	Crocket CD	R
Process Technology & Modeling Committee	7:00 a.m. to 8:00 a.m.	GH	Presidio A	O
Membership & Student Development Committee Meeting	8:45 a.m. to 10:00 a.m.	GH	Presidio A	R
TMS-MetSoc Leadership Meeting	9:00 a.m. to 10:00 a.m.	GH	Goliad	R
Executive Committee	10:00 a.m. to 11:00 a.m.	GH	San Jacinto	R
Past Presidents Meeting	11:30 a.m. to 1:00 p.m.	GH	Mission B	R
EPD Council	12:00 p.m. to 2:00 p.m.	GH	Seguin	R
Superalloys 2016 Programming Committee	12:00 p.m. to 2:00 p.m.	GH	San Jacinto	R
EMPMD Council	12:30 p.m. to 2:00 p.m.	GH	Crockett CD	R
ICME Committee	12:30 p.m. to 2:00 p.m.	GH	Travis CD	O
Powder Materials Committee	12:30 p.m. to 2:00 p.m.	GH	Presidio A	O
TMS-ABM Leadership Meeting	1:00 p.m. to 2:00 p.m.	GH	Goliad	R
TMS-MetSoc-ABM Leadership Meeting	2:00 p.m. to 3:00 p.m.	GH	Goliad	R
Pan American Int. Materials Congress Organizing Committee	3:00 p.m. to 5:00 p.m.	GH	Goliad	R
Energy Conversion & Storage Committee	5:00 p.m. to 6:00 p.m.	GH	Presidio A	O
Superalloys 2016 Organizing Committee	5:00 p.m. to 7:00 p.m.	GH	Mission B	R
Chemistry & Physics of Materials Committee	5:30 p.m. to 6:30 p.m.	GH	Presidio C	O
IOMMMS Council Meeting	5:30 p.m. to 6:30 p.m.	GH	San Jacinto	O
Nuclear Materials Committee	5:30 p.m. to 7:00 p.m.	GH	Presidio B	O
Advanced Characterization Testing & Simulation Committee	5:45 p.m. to 6:45 p.m.	GH	Republic C	O
Composite Materials Committee	5:45 p.m. to 6:45 p.m.	GH	Republic A	O
Biomaterials Committee	6:00 p.m. to 7:00 p.m.	GH	Presidio A	O
Hydrometallurgy & Electrometallurgy Committee	6:00 p.m. to 7:00 p.m.	GH	Bonham C	O
Surface Engineering Committee	6:00 p.m. to 7:00 p.m.	GH	Bonham D	O
Materials & Society Committee	6:00 p.m. to 8:00 p.m.	GH	Bonham E	O
Technical Division Chairs	6:30 p.m. to 8:30 p.m.	GH	Seguin	R

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Schedule of Events

as of February 6, 2013

Venue Key: CC Henry B. Gonzalez Convention Center GH Grand Hyatt Hotel

Function	Time	Venue	Room	Access*
TUESDAY, MARCH 5				
All-Conference Events				
Registration	7:00 a.m. to 5:30 p.m.	CC	East Reg Lobby	O
Presenters' Coffee	7:00 a.m. to 8:00 a.m.	CC	Bridge Hall	R
Technical Programming Support Center	7:00 a.m. to 5:00 p.m.	CC	Bridge Hall	O
TMS Member Welcome Center	7:00 a.m. to 5:30 p.m.	CC	East Reg Lobby	O
TMS Foundation Center	7:00 a.m. to 5:30 p.m.	CC	East Reg Lobby	O
General Poster Session Gallery	7:00 a.m. to 5:30 p.m.	CC	Park & Towerview Lobbies	O
Young Leader Poster Session Gallery	7:00 a.m. to 5:30 p.m.	CC	Park & Towerview Lobbies	O
Technical Symposia	8:30 a.m. to 6:00 p.m.	See Technical Program for complete schedule and locations		
Morning Break	9:40 a.m. to 10:20 a.m.	CC & GH		O
Afternoon Break	3:20 p.m. to 4:00 p.m.	CC & GH		O
Happy Hour Reception	5:00 p.m. to 6:00 p.m.	CC	Exhibit Hall C	O
TMS 2013 Exhibition				
TMS 2013 Exhibition Hours	10:30 a.m. to 6:00 p.m.	CC	Exhibit Hall C	O
Lunch in Exhibit Hall (provided)	12:00 p.m. to 2:00 p.m.	CC	Exhibit Hall C	O
MI Learning Center	10:30 a.m. to 6:00 p.m.	CC	Exhibit Hall C	O
Special Presentations				
EPD/MPMD Luncheon	12:00 p.m. to 1:30 p.m.	GH	Texas BR C	T2
Young Leader Tutorial Luncheon & Lecture	12:00 p.m. to 2:00 p.m.	GH	Texas BR D	T2
Acta Materialia Materials and Society Award Special Symposium: Global R&D Trends – Implications for Material Sciences	2:00 p.m. to 5:30 p.m.	CC	Lila Cockrell Theatre	O
Student Events				
Technical Division Student Poster Contest	10:00 a.m. to 2:00 p.m.	CC	Park & Towerview Lobbies	O
Student Career Forum	3:00 p.m. to 5:00 p.m.	GH	Bonham B	O
Social Functions				
TMS-AIME Honors & Awards Reception	6:00 p.m. to 6:30 p.m.	CC	Lila Cockrell Theatre Lobby	T2
TMS-AIME Honors & Awards Presentation	6:30 p.m. to 7:45 p.m.	CC	Lila Cockrell Theatre	T2
TMS-AIME Honors & Awards Banquet	7:45 p.m. to 10:00 p.m.	GH	Texas BR AB	T2

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T2 - Ticketed Event
(T2 - Tickets may be purchased onsite 24 hours before event)

Schedule of Events

as of February 6, 2013

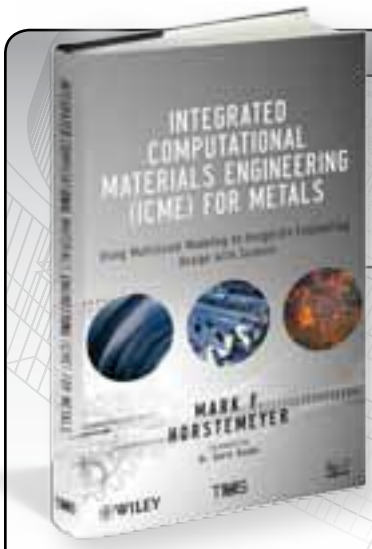
Venue Key: CC Henry B. Gonzalez Convention Center GH Grand Hyatt Hotel

Committee Meetings

Electronic Packaging & Interconnection Materials Committee	7:00 a.m. to 8:00 a.m.	GH	Presidio A	O
Metallurgical and Materials Transactions B Board of Review	7:00 a.m. to 8:00 a.m.	GH	Presidio C	R
MPMD Council	7:00 a.m. to 9:00 a.m.	GH	Crockett CD	R
Honors & Professional Recognition Committee	8:00 a.m. to 9:00 a.m.	GH	San Jacinto	R
Young Leader Committee	8:30 a.m. to 10:00 a.m.	GH	Seguin	R
TMS-CSM Leadership Meeting	9:30 a.m. to 10:30 a.m.	GH	Goliad	R
SMD Council	12:00 p.m. to 2:00 p.m.	GH	Crockett CD	R
Education Committee	12:30 p.m. to 2:00 p.m.	GH	Republic A	R
Computational Materials Science & Engineering Committee	5:00 p.m. to 6:00 p.m.	GH	Presidio A	O
Corrosion & Environmental Effects Committee	5:00 p.m. to 6:00 p.m.	GH	Presidio C	O
Energy Committee	5:00 p.m. to 6:00 p.m.	GH	Republic A	O
Refractory Metals Committee	5:00 p.m. to 6:00 p.m.	GH	Mission B	O
Solidification Committee	5:00 p.m. to 6:00 p.m.	GH	Republic C	O
Titanium Committee	5:00 p.m. to 6:00 p.m.	GH	Bonham C	O
High Temperature Alloys Committee	5:00 p.m. to 6:30 p.m.	GH	Bonham D	O
Shaping & Forming Committee	5:00 p.m. to 6:30 p.m.	GH	Bonham E	O

* O - Open to all attendees
R - Restrictions Apply

T - Ticketed Event, Pre-registration required
T2 - Ticketed Event
(T2 - Tickets may be purchased onsite 24 hours before event)



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

Meet the Author Mark F. Horstemeyer

Tuesday, March 5 • 10:30 a.m.
Wiley Booth, Henry B. Gonzalez Convention Center, Second Floor

Stop by the Wiley Booth on Tuesday morning to meet Mark F. Horstemeyer, the author of *Integrated Computational Materials Engineering (ICME) for Metals: Introducing Multiscale Modeling to Invigorate Engineering Design with Science.* This volume provides a comprehensive, practical introduction to the field, guiding readers through multiscale materials processing modeling and simulation with easy-to-follow explanations and examples. In the book, Horstemeyer, Center for Advanced Vehicular Systems (CAVS) Chair Professor in Mechanical Engineering and CAVS chief technical officer, Mississippi State University, shares valuable insights gained from years on the front lines of ICME implementation.

Purchase copies of *Integrated Computational Materials Engineering (ICME) for Metals: Introducing Multiscale Modeling to Invigorate Engineering Design with Science* and other books published through TMS and Wiley at the Wiley booth, located on the second level of the Convention Center. Print proceedings from TMS2013 are also available for purchase at the Wiley booth.

Schedule of Events

as of February 6, 2013

Venue Key: CC Henry B. Gonzalez Convention Center GH Grand Hyatt Hotel

Function	Time	Venue	Room	Access*
WEDNESDAY, MARCH 6				
All-Conference Events				
Registration	7:00 a.m. to 5:00 p.m.	CC	East Reg Lobby	O
Presenters' Coffee	7:00 a.m. to 8:00 a.m.	CC	Bridge Hall	R
Technical Programming Support Center	7:00 a.m. to 5:00 p.m.	CC	Bridge Hall	O
TMS Member Welcome Center	7:00 a.m. to 5:00 p.m.	CC	East Reg Lobby	O
TMS Foundation Center	7:00 a.m. to 5:00 p.m.	CC	East Reg Lobby	O
General Poster Session Gallery	7:00 a.m. to 3:00 p.m.	CC	Park & Towerview Lobbies	O
Young Professional Poster Gallery	7:00 a.m. to 3:00 p.m.	CC	Park & Towerview Lobbies	O
Technical Symposia	8:30 a.m. to 6:00 p.m.	See Technical Program for complete schedule and locations		

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Schedule of Events

as of February 6, 2013

Venue Key: CC Henry B. Gonzalez Convention Center GH Grand Hyatt Hotel

Morning Break	9:40 a.m. to 10:20 a.m.	CC & GH		O
Poster Session - Tear-Down	3:00 p.m. to 5:00 p.m.	CC	Park & Towerview Lobbies	O
Afternoon Break	3:20 p.m. to 4:00 p.m.	CC & GH		O
TMS 2013 Exhibition				
TMS 2013 Exhibition	10:30 a.m. to 3:00 p.m.	CC	Exhibit Hall C	O
Lunch Concessions	12:00 p.m. to 2:00 p.m.	CC	Exhibit Hall C	O
MI Learning Center	10:30 a.m. to 3:00 p.m.	CC	Exhibit Hall C	O
Exhibit Move out	3:00 p.m. to 7:00 p.m.	CC	Exhibit Hall C	O
Special Presentations				
LMD Luncheon	12:00 p.m. to 1:30 p.m.	GH	Texas BR C	T2
2013 Materials Innovation Plenary: Innovation in Materials & Manufacturing	2:00 p.m. to 6:00 p.m.	CC	Lila Cockrell Theatre	O
Social Functions				
Young Professional Reception	6:00 p.m. to 7:00 p.m.	GH	Presidio B	R
Committee Meetings				
Board of Directors Meeting	7:30 a.m. to 11:30 a.m.	GH	Presidio AB	R
Graduate Student Advisory Council	9:00 a.m. to 10:00 a.m.	GH	Mission A	R
TMS Foundation Revitalization Committee Meeting	2:30 p.m. to 5:30 p.m.	GH	Goliad	R
2014 Program Organizer Meeting	3:00 p.m. to 5:00 p.m.	GH	Travis CD	R
Women In Materials Science & Engineering Committee Meeting	4:00 p.m. to 5:00 p.m.	GH	Texas BR D	R
Magnetic Materials Committee	5:30 p.m. to 6:30 p.m.	GH	Presidio A	O
REWAS 2013 Organizing Committee Meeting	5:30 p.m. to 6:30 p.m.	GH	Presidio C	R
TMS Foundation Revitalization Committee Dinner	6:30 p.m. to 9:00 p.m.	Offsite	Citrus Restaurant	R

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Get Involved, Volunteer Today!

Learn how to become more involved in TMS by becoming a volunteer, contributing to the TMS Foundation, and accessing your full range of member benefits. Stop by the TMS Member Welcome Center or the TMS Foundation Center in the East Registration Lobby to speak with a TMS staff member about available opportunities.

Schedule of Events

as of February 6, 2013

Venue Key: CC Henry B. Gonzalez Convention Center GH Grand Hyatt Hotel

Function	Time	Venue	Room	Access*
THURSDAY, MARCH 7				
All-Conference Events				
Registration	7:00 a.m. to 5:00 p.m.	CC	East Reg Lobby	R
Presenters' Coffee	7:00 a.m. to 8:00 a.m.	CC	Bridge Hall	O
Technical Programming Support Center	7:00 a.m. to 5:00 p.m.	CC	Bridge Hall	O
TMS Member Welcome Center	7:00 a.m. to 5:00 p.m.	CC	East Reg Lobby	O
TMS Foundation Center	7:00 a.m. to 5:00 p.m.	CC	East Reg Lobby	O
Technical Symposia	8:30 a.m. to 6:00 p.m.	See Technical Program for complete schedule and locations		
Morning Break	9:40 a.m. to 10:20 a.m.	CC & GH		O
Afternoon Break	3:20 p.m. to 4:00 p.m.	CC		O
Committee Meetings				
Young Professionals Program Development Group	7:30 a.m. to 2:30 p.m.	GH	Travis CD	R
TMS Foundation Revitalization Committee Meeting	8:30 a.m. to 12:00 p.m.	GH	Bonham B	R

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ELSEVIER

WE ARE PROUD TO WORK WITH YOU

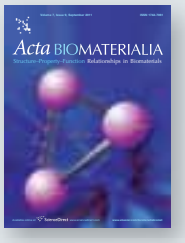
OUR JOURNALS REFLECT THE HIGH QUALITY AND TALENT REPRESENTED BY OUR EDITORS AT TMS

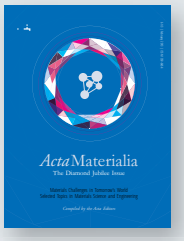
Keynote Speaker

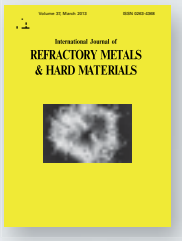
Eduard Arzt	Tuesday	2:00 PM	214C	Convention Center

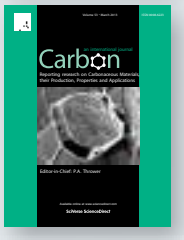
Invited Speakers

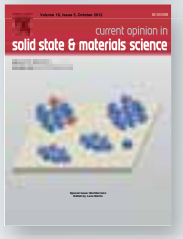
Jeff de Hosson	Tuesday	2:00 PM	Bowie B	Grand Hyatt
Yury Gogotsi	Tuesday	8:30 AM	007B	Convention Center
Nikhil Koratkar	Monday	2:20 PM	007B	Convention Center
Prashant Kumta	Monday	9:10 AM	007B	Convention Center
Zi-Kui Liu	Wednesday	10:50 AM	205	Convention Center
Roger Narayan	Tuesday	11:10 AM	201	Convention Center
Taigang Nieh	Tuesday	9:50 AM	Lone Star Salon D	Grand Hyatt
Ian Robertson	Tuesday	10:45 AM	207B	Convention Center



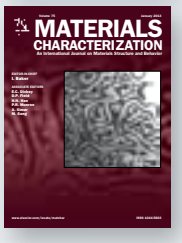


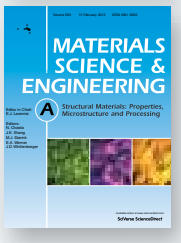






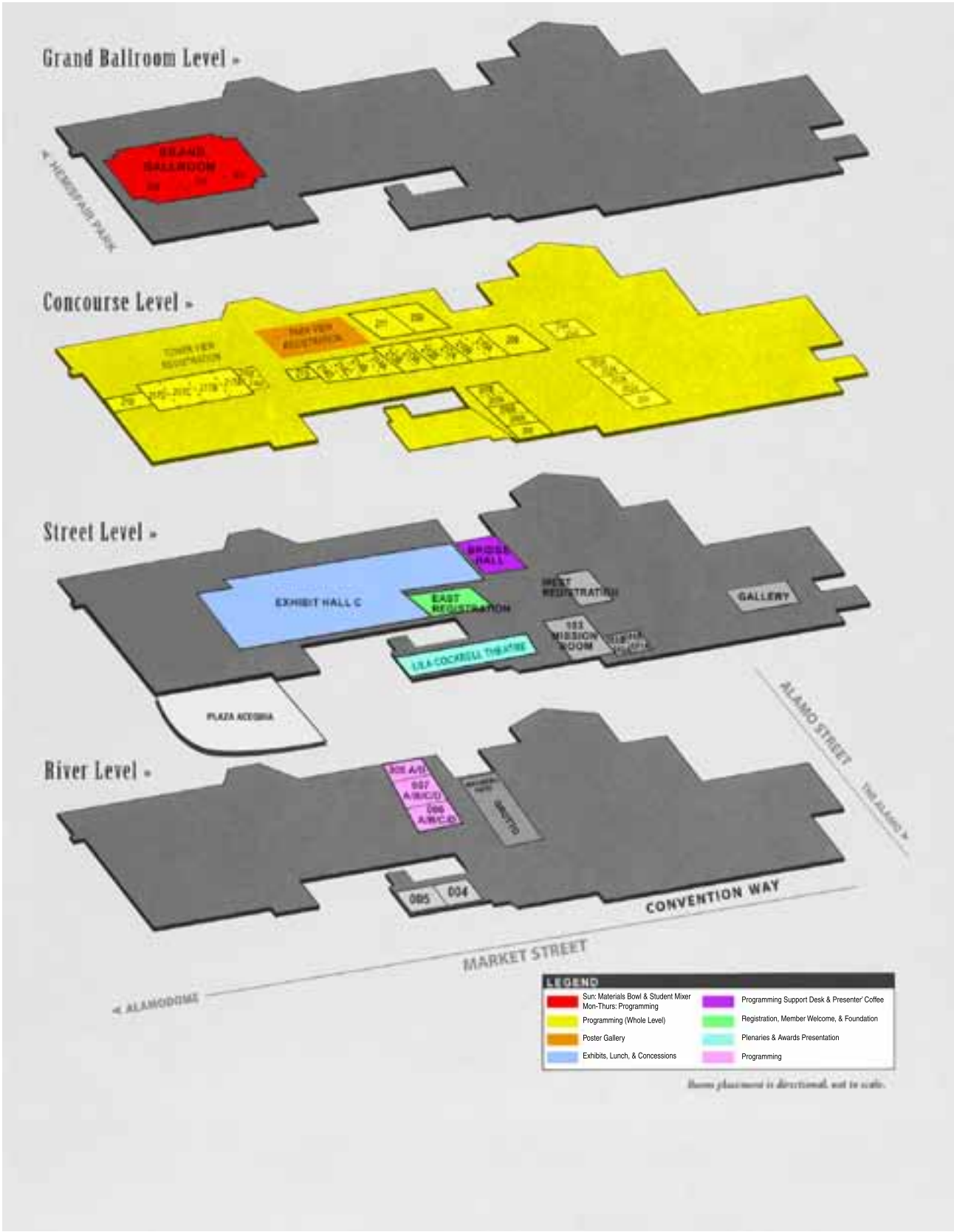
These are some of the journals represented by their editors at this conference





Materials Science

Henry B. Gonzalez Convention Center Map



San Antonio City Map

The San Antonio Convention & Visitors Bureau has two mobile applications to make your trip to San Antonio more enjoyable and to provide deals and discounts:

1. **San Antonio Official Travel Guide**: Discover the best places to stay, visit, and eat through the official San Antonio iTravel Guide. Get up-to-date information and explore the destinations as only an insider can. Features include a list of all area restaurants with guide maps, area events and activities, getting around the area, tours, and more.
2. **SAVE in San Antonio**: San Antonio Vacation Experience (SAVE) provides discounts for some of the most popular attractions in San Antonio. Use this app to get discounts at top attractions, including museums, shopping, sight seeing, and theme parks. This app includes links to exclusive offers for downtown, River Walk, airport, and Hill Country areas. Just show the coupons on your phone upon purchase to redeem.

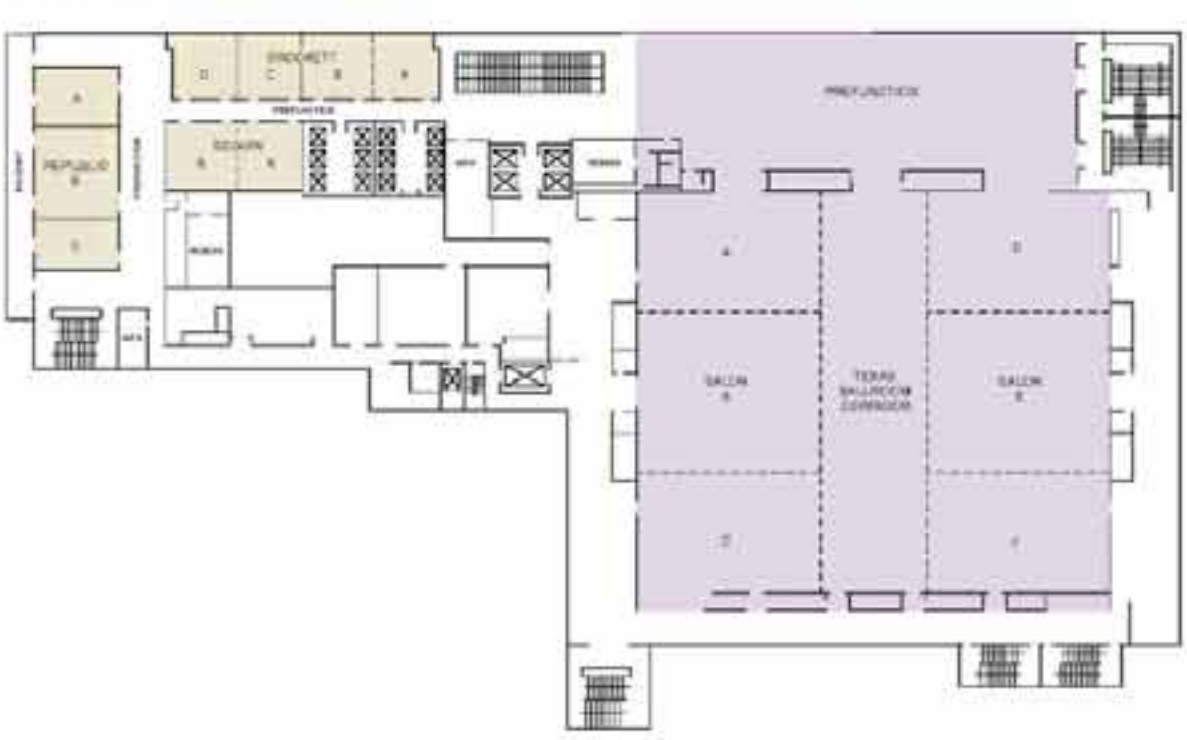
Applications are available on both Apple and Android operating devices and can be found in the **iTunes Store** and **Android Marketplace**. For those without a smart phone, go to www.visitsanantonio.com to plan your visit.

Follow **@SaveinSA** on Twitter for the latest information and deals. In addition, a number of San Antonio area restaurants will be offering deals and discounts to TMS2013 attendees. **Just wear or present your conference name badge to take advantage.**

Grand Hyatt Hotel Map

Second Level

Fourth Level



Grand Hyatt Hotel Map

Third Level

Legend

- Second Floor: Committee Meetings
- Second Floor: Programming
- Third Floor: Council/Committee Meetings & Non-Programming Functions
- Fourth Floor:Committee Meetings & Non-Programming Functions
- Fourth Floor: Luncheons, Awards Banquet Dinner, & Speed Networking

TMS2013 Aluminum Keynote Session:

Impurities in the Aluminum Supply Chain

Monday, March 4 • 8:30 a.m. to 12:20 a.m.

Lila Cockrell Theatre, Henry B. Gonzalez Convention Center

The rapid growth in aluminum production over the last ten years has placed additional demands on the raw material supply chain including bauxite, alumina, petroleum coke, and coal tar pitch. Rising impurity levels in petroleum coke, for example, are causing smelters and aluminum end users to look more closely at impurity level specifications. This keynote session will include invited presentations from leading industry experts that examine the role and outlook for impurities across the aluminum supply chain.

Chair: Les Edwards, Rain CII Carbon

SPEAKERS AND TOPICS

"Raw Material Impurities and the Challenge Ahead"

Stephen Lindsay, Alcoa Inc.

The impurities contained in the raw materials that are used by the aluminum industry pose challenges that must be managed from various perspectives. These include: product qualities, costs, and impact upon the work environment and that of the surrounding area. As the industry continues to change, changes in impurities will take on greater meaning for process control, metal products, and environmental, health and safety. The author provides his insights to these emerging issues.

"Impacts of Impurities Introduced into the Aluminium Reduction Cell"

James Metson, University of Auckland

Impurities enter the aluminium reduction process through raw materials and operational practices. The declining quality of petroleum cokes, and the steadily increasing efficiency in the capture and recycle of pot fumes, increase impurities, impacting both cell performance and metal quality. Aluminas are also a key and variable impurity source, with little incentive for producers to drive purity improvements. Beyond metal quality, the critical impacts lie in pot operations where control, or even analysis, of bath chemistry becomes increasingly problematic. Impurities have measureable impacts on current efficiency, and on anode effects, driven by inability to efficiently dissolve alumina. Impurity reduction strategies have been driven by perceived problem elements, for example phosphorus; however, these processes generally entail an unacceptable level of collateral alumina loss. It may well be time to revisit the potential to lower impurity inputs, for example in alumina and in operations, and to look again at potential stripping techniques.

"Changes in Global Oil Refining and Its Impact on Anode Quality Petroleum Coke"

Karl Bartholomew, KBC Advanced Technologies, Inc.

The global refining industry has undergone a dramatic upheaval over the past decade. From the mid-2000s when a "Golden Age" was underway, through two years of losses and concerns about 'peak oil,' to today's unique crude supply situation in the mid-Continent United States, refiners have never been more challenged in their feedstock supply strategy. This presentation will review the main economic drivers for refining, including the impact on petroleum coke production. How the markets (and decisions) have changed over the past decade will be examined, and scenarios of what's ahead will be covered. Arguably the biggest change affecting the U.S. downstream energy market is the rapid development of shale oil supply. Shale oil production, along with changes in global refining capacity (and coking capacity)—additions and closures—could soon have profound implications for the quality and quantity of calcinable anode grade petroleum coke.

"Impact of Higher Vanadium Levels on Smelter Operations"

Andrea Weber, Rio Tinto – Sebree Works

In early 2011, the RTA Sebree smelter experienced a significant increase (~100ppm) in calcined coke vanadium levels to levels around 410-440ppm. This was driven by crude oil changes at a refinery supplying one of the primary cokes used in the coke blend supplied to the smelter. The paper discusses the impact of the change on carbon consumption and some of the actions taken by the smelter to respond to the change. Data is presented showing the impact on process metrics such as anode consumption, unscheduled anode changes, current efficiency, power consumption, and primary metal quality. The presentation will show that changes of this magnitude can be managed with an appropriate understanding of key performance drivers and a focused technical improvement plan.

"Impact on Smelter Operations of Operating High Purity Reduction Cells"

Stewart Hamilton, New Zealand Aluminium Smelters

Over the last 15 years New Zealand Aluminium Smelters Limited (NZAS) has developed and implemented technology and operating practices to produce High Purity (Al 99.90+) and ultra High Purity (Al 99.97+) ingot. In the challenging macro-economic climate of falling LME, weakening exchange rates, and increasing power prices, the High Purity strategy has enabled NZAS to maximize value and maintain global leadership in High Purity smelter grade aluminium production. The NZAS journey to High Purity production and the impact that this strategy has had on the complexity of smelter operations are outlined. The operational focus necessary to successfully implement the High Purity strategy is also required to improve all facets of smelter operations. Data will be presented to show the impact recent challenges, such as reducing quality of raw materials, are having on Smelter operation and how these are being managed to maintain High and Ultra High purity production economically.

"Management of Impurities in the Aluminium Cast House"

Muhammad Akbar Rhamdhani, Swinburne University of Technology

The concentration of impurities in raw materials (particularly petroleum coke) is increasing and testing the ability of cast houses to meet customer chemical specifications. Much of the metal content (Ni, V) of the coke and impurities in alumina (Fe, Si, Ga, Zn) reports to the aluminium in the reduction cells. These impurities can have detrimental effects in certain alloys. This presentation will review options for removing impurities in the cast shop. Classical melt treatment processes of salt fluxing, degassing and filtration used to remove alkali metals and solid particles are reviewed. Aluminium boride treatment can be used to remove titanium, chromium, and vanadium. Current work on the mechanisms of this process is examined. An investigation into potential for a melt nickel removal process is recapped. Past work on iron removal is reviewed and those processes used for producing super purity aluminium are also listed and discussed.

"An Initial Assessment of the Effects of Increased Ni and V Content in AA6063 and A356 Alloys"

John Grandfield, Grandfield Technology

Changes in calcined coke composition associated with different crude oil sources have caused nickel and vanadium levels in aluminum to rise. To ensure cast product quality is not compromised, an understanding of the effects of these changes is needed. An initial investigation has been conducted for two commonly used alloys, AA6060/6063 and A356. Castings were produced with low typical levels of NiV and with high NiV levels approaching the maximum P1020 specification of 300ppm each. Microstructural changes were assessed using optical and scanning electron microscopy, and tensile properties and corrosion resistance were measured. For AA6060/6063 alloy, there was no significant difference in the tensile properties of extrusions with low and high NiV levels, but a small drop in corrosion performance was measured at high NiV levels. For as-cast A356 alloy, there was no significant difference in corrosion performance, but adding Ni and V had a small effect on tensile properties.

More from the TMS Light Metals Division:

Magnesium Technology 2013 Plenary

Monday, March 4, 8:30 a.m. to Noon

Henry B. Gonzalez Convention Center, Room 214A

Magnesium Technology 2013—one of the largest symposia at TMS2013—will kick off its technical programming with a plenary session on Monday morning featuring the following presentations:

- "From Elektron to Bio Implants – Magnesium Alloys in the 21st Century" Karl Kainer, Helmholtz-Zentrum Geesthacht
- "A Brief History of the Development of Grain Refinement Technology for Cast Magnesium Alloys" David StJohn, The University of Queensland
- "The USAMP Magnesium Front End Research and Development Project – Results of the Magnesium 'Demonstration' Structure" Joy Forsmark, Ford Motor Company
- "The Use of AC-DC-AC Methods in Assessing Corrosion Resistance Performance of Coating Systems for Magnesium Alloys" Robert C. McCune, Robert C McCune & Associates LLC
- "Thermodynamics of Phase Formation in Mg-La-Ce-Nd Alloys" Rainer Schmid-Fetzer, Clausthal University of Technology
- "Non-Flammable Magnesium Alloys with High Strength" Yoshihito Kawamura, Kumamoto University

REWAS 2013

Enabling Materials Resource Sustainability

REWAS 2013 will provide an interdisciplinary and multi-disciplinary platform where the materials and metallurgical professional can interact and exchange with other stakeholders and research fields to facilitate the transition to a more sustainable industry and society. By taking a material-focused perspective as well as a product-focused perspective, bridges between the two can be forged.

This special, four-day symposium will be divided into sessions that address the topic of "Enabling Sustainability" through:

- Recycling and End-of-Pipe Solutions
- Metal Production
- Process Design, Modeling, and Simulation
- Life Cycle Management, LCA, and Industrial Ecology
- Physics of Metals & Materials Processing
- Systems Modeling and Design, Life Cycle Management, LCA and Industrial Ecology
- Education and Consumer Awareness
- Systems Modeling and Design

REWAS 2013 International Scientific Committee

Gerardo Alvear, Xstrata Technology Canada

Helmut Antrekowitsch, Montanuniversität Leoben Austria

Diran Apelian, Worcester Polytechnic Institute – USA

Bart Blanplain, KU Leuven – Belgium

Liyuan Chai, Central South University China

David DeYoung, Alcoa - USA

Matthew Eckelman, North Eastern University USA

Daniel Goldmann, Technische Universität Claustal - Germany

Daniel Mueller, Norwegian University of Science and Technology

Kazuki Morita, University of Tokyo - Japan

Shinichiro Nakamura, Waseda University - Japan

M. Cristina Negri, Argonne National Laboratory USA

John Rankin, CSIRO - Australia

Matthias Schluep, EMPA - Switzerland

Maurits Van Camp, Umicore Group R&D Belgium

Antoinette Van Schaik, MARAS - Netherlands

Kari Heiskanen, Aalto University

Yongxiang Yang, Delft University of Technology

REWAS 2013 Organizing Committee

Christina Meskers, Umicore

Anne Kvithyld, SINTEF

Markus Reuter, Outotec Oyj

Randolph Kirchain, Massachusetts Institute of Technology

Mark Schlesinger, Missouri University of Science and Technology

Gregory Krumdick, Argonne National Laboratory

Cong Wang, Saint-Gobain High Performance Materials

Gabrielle Gaustad, Rochester Institute of Technology

Diana A. Lados, Worcester Polytechnic Institute

Brajendra Mishra, Colorado School of Mines

Jeffrey S. Spangenberger, Argonne National Laboratory

Sustainability at TMS2013

TMS supports a focus on sustainability, both in the innovative developments presented at the Annual Meeting & Exhibition and also in the way the event is held. We encourage you to participate in the REWAS symposium to learn about materials resource sustainability and to act on these ideas by discarding badges, programs, and other paper products in the recycling bins located in the Registration area at the end of the meeting.

REWAS 2013 Plenary Session Realizing Sustainability

Monday, March 4 • 2:00 p.m. to 5:30 p.m.
Lila Cockrell Theatre, Henry B. Gonzalez Convention Center

Speakers and Topics

"Sustainable Transportation Challenges and Opportunities"

Lewis M. Fulton, Co-Director of the NextSTEPS Research Program, Institute of Transport Studies (ITS-Davis), University of California, Davis

The world is headed toward two billion vehicles. Is this sustainable? Not without transforming vehicles, fuels, and transportation generally—not only in the U.S., but virtually everywhere. Professor Fulton will examine the roots of the problem, and then propose strategies and policies to bring about low carbon fuels, electric-drive vehicles, and low-carbon cities.

JOIN REWAS FOR A SPECIAL RECEPTION MONDAY

Following the plenary, REWAS will host a reception for symposium attendees, starting at 5:30 p.m. in the Lila Cockrell Theatre Lobby. Join us for light refreshments and an opportunity to network with the plenary speakers and other REWAS participants interested in enabling materials resource sustainability.

"Saint-Gobain's Approach Towards Materials Development for Sustainability in Habitat"

Todd DiNoia, Technical Director, Habitat R&D, Saint-Gobain High Performance Materials Research and Development Center

Saint-Gobain, the world leader in the habitat and construction markets, designs, manufactures and distributes building materials, providing innovative solutions to meet growing demand in emerging economies, for energy efficiency and for environmental protection. Saint-Gobain's strategy is to be the reference in the sustainable habitat and construction markets. This means developing construction and renovation solutions to ensure that buildings are energy-efficient, comfortable, healthy and esthetically superior, while at the same time protecting natural resources. A core part of this strategy is a clear focus on innovation to develop materials and products based on sustainable principles that are central to core research platforms and embedded in the innovation process. This talk will highlight features of Saint-Gobain's R&D approach to the development of sustainable building material, product, and system solutions. Examples of new construction products and their impact on sustainability in the context of energy, environment, health, and comfort in buildings will be shown.

"iNEMI Environmental Thrust; History, Challenges, & Opportunities"

Bill Bader, Chief Executive Officer of the International Electronics Manufacturing Initiative (iNEMI)

iNEMI (International Electronics Manufacturing Initiative) consortium has been creating and exploiting technology roadmaps for the electronics industry for 20 years. It has become recognized as an important tool for defining the "state of the art" in the electronics industry. Additionally, INEMI puts significant focus on identifying key gaps and challenges in emerging and disruptive technologies. From this gap analysis and workshops in areas of focus we define and organize collaborative iNEMI R&D projects. Specific examples will be reviewed that demonstrate how roadmap findings are used to develop industry led programs to close identified technology gaps. One key area of focus for iNEMI for the past 12 years has been driving improvements in materials and products that leads to progress in sustainability. This presentation provides a brief history of iNEMI environmental improvements that have been driven to realization in the past, and a holistic assessment of the roadmap challenges and gaps in electronics sustainability looking to the future. The material will then provide a deeper dive into a set of per competitive collaboration opportunities in the areas of materials, eco- design and sustainability, and recycling and reuse. The presentation will also include a preview of the key findings of the 2013 roadmap including some of the electronics industry paradigm shifts and the key technology developments.

"Advanced Technology and the Scope of Large-Scale Sustainability"

S. Julio Friedmann, Chief Energy Technologist, Lawrence Livermore National Laboratory

The extraordinary scale and scope of sustainability, including challenges from climate change to soil and water sustainability, require a focus on solutions that can credibly tackle a major fraction of those challenges. While there are millions of potential technical solutions, including those enabled by advanced materials, only those that thrive within the bounds of industrial scaling, land-use limits, and other key concerns can materially improve sustainability. This is particularly true in the energy sector, where large capital requirements and long-lived infrastructure affect the success of commercial innovations. We will discuss a handful of approaches, technologies, and pathways including novel carbon capture materials and devices; advanced manufacturing materials; computationally assisted material discovery; and water treatment.

"Global Trends in Water Treatment Technology & Sustainability"

William A. Bonkoski, GE Water & Process Technologies

As the world's population increases with a fixed amount of water available, emphasis must be placed on developing advanced water treatment technologies, so that our precious water resources can be recovered for reuse. While we always will strive to minimize water consumption, we must also seek to extract valuable wastewater components that have sustainable value such as organic contents, which can be converted to recoverable energy. Further, phosphorus and nitrogen may be recovered for beneficial reuse as well. This presentation will speak to new ideas and trends that will impact how water resources will be shared by our ever-increasing population in the future.

"Value-in-Use and Beyond—Creating More Value from Scrap"

Helga Vanthournout, Expert Consultant, McKinsey & Company and the Ellen MacArthur Foundation

Scrap use is gaining importance across a number of industries. It is therefore critical to optimize the management of the full scrap value chain. We will review measures to optimize handling and logistics as well downstream scrap recovery and investigate the application of the value-in-use concept in scrap processing. Value-in-use measures the full economic value of a specific raw material/product relative to a known benchmark or next-best competitive offering—at a specific asset and under defined circumstances. We will discuss the factors that determine value-in-use and explore the four core elements—modeling, value selling, resourcing, and integrated processes—of a winning value-in-use setup.

Acta Materialia Materials and Society Award Special Symposium

"Global R&D Trends – Implications for Material Sciences"

Tuesday, March 5 • 2:00 p.m. to 5:00 p.m.
Lila Cockrell Theatre, Henry B. Gonzalez Convention Center

Investment in research and development (R&D) is a critical indicator of a nation's innovative capacity and a precursor to its future growth, productivity, and sustainability. As the global economy has grown and evolved, so has the conduct of R&D. This symposium will provide perspectives on how R&D is conducted at the national, industrial, and individual levels in different parts of the world. In addition, it will address the critical connections between fundamental R&D and development of new materials technologies. Implications for materials science will also be examined from different application perspectives, such as electronics, energy, transportation and health care. Understanding these trends and their impacts on the materials science and engineering enterprise are a must for 21st Century planning.

SPEAKERS AND TOPICS

Keynote Speaker:
Jeffrey Wadsworth,
President and Chief Executive Officer, Battelle Memorial Institute; Recipient of the 2013 *Acta Materialia* Materials and Society Award

"The Evolving R&D Model: International Trends and U.S. Competitiveness"

Since at least the 17th century, innovations in materials sciences have been critical to solving complex national security, health, and energy problems—including the nexus between these areas. During the next 50 years, there is compelling evidence that there will be unprecedented demographic and economic changes as the global population increases from 7 to 9 billion. The addition of these two billion people will strain an already tight supply of food, water, and energy and create new national security and health-related issues. There is no simple solution to these challenges, so countries around the world are aggressively investing in R&D, education, and infrastructure initiatives. Material sciences will play a leading role in overcoming these challenges, but in order to do so there needs to be a renewed emphasis on scientific discovery and leadership, global R&D collaboration, and the ability to adapt to an increasingly dynamic marketplace. Examples of potential approaches will be discussed.

Moderator and Symposium Organizer:
Kevin Hemker,
Alonzo G. Decker Chair of Mechanical Engineering;
Professor and Chair, Department of Mechanical Engineering, Johns Hopkins University;
Chair, TMS Public & Governmental Affairs Committee and TMS Materials Innovation Committee

Sponsoring TMS Committees:
Public & Governmental Affairs Committee, Materials Innovation Committee, and Materials and Society Committee

Funding Support Provided by:
Acta Materialia, Inc. and Elsevier

"Linking the Challenges of Materials Technology with Opportunities in Materials Research"

William D. Nix, Professor Emeritus, Lee Otterson Professor of Materials Science and Engineering
Stanford University

The story of how the field of thin film and small-scale mechanical behavior developed in response to problems being faced in microelectronics is recounted. More important than solving the particular problems being faced was the recognition that new tools and techniques would be needed to address challenges in that technology in the long run. Along the way, tools and methods were developed that are now used routinely to advance completely new materials technologies. This development involved not only the identification of critical problems, but also the recognition that existing or newly emerging capabilities could be used to address those problems.

Nanoindentation, substrate curvature stress measurements, and all sorts of thin film and small-scale mechanical testing methods were developed in response to these needs and have turned out to be useful in other materials developments. In addition, the application of elementary analysis methods has proven to be useful in understanding thin film mechanical behavior. Applying Ashby's geometrically necessary dislocation density concept to indentation, using van der Merwe's misfit dislocation analysis to describe plasticity of thin metal films, and applying Griffith's crack analysis to understand intrinsic tensile stresses in polycrystalline thin films, are all examples of applying existing knowledge to the solution of newly developing problems. An example of exploiting a new opportunity was Uchic's realization that the focused ion beam instrument could be used to develop a new method for studying the mechanical properties of materials at a small scale.

Finally, the emergence of lithium-ion batteries and the need for better electrodes have provided still another set of challenges that are motivating new research. Some of this ongoing research will surely contribute to the development of better and longer-lasting lithium-ion batteries to power our electronic devices and our vehicles.

"Research and Development: The Key to Competitiveness in the 21st Century"

Craig R. Barrett, Retired Chief Executive Officer/Chairman of the Board, Intel Corporation

The 21st Century has been appropriately labeled the knowledge and innovation century. The key factors that make it possible for a society to succeed in this century are smart people, smart ideas, and the right environment to let the first two come together and do something wonderful and exciting. This means that quality education and continued investment in basic research and development are key success factors. Combining this with environmental factors—such as protection of intellectual property, a vibrant venture capital industry, appropriate tax and regulatory laws, and a social consciousness where the fear of failure is absent—is key for economic growth and success.

Most countries around the world have recognized these success factors and are moving forward to compete. Key to these efforts is the recognition that the American research university, with its close association to industry, is at the center of innovation. Countries around the world are trying to copy this American gem, while also creating the right environment for innovation. The Irish and rest of the western Europeans are active in this area. The Russians, with their great historical emphasis on academics and research, but little experience in commercialization of research, are investing huge sums to try to recreate an MIT model in Moscow. The Chinese universities are all active in trying to remake themselves in the mode of American universities. And, throughout the rest of the world, we see more of the same.

The proven model of Silicon Valley, or Route 128, has captured the imagination of the world and all are attempting to copy this success. As a result, it is no surprise to see technology incubators everywhere in the world, whether you are in Lebanon, Chile, or the Netherlands. Success is not assured for any of these approaches, but it is clear that there will be more competition for the American model than ever before.

"Prospects and Challenges for a Global Expansion of Nuclear Energy"

Siegfried S. Hecker, Co-Director, Center for International Security and Cooperation;
Professor, Department of Management Science and Engineering, Stanford University;
Emeritus Director, Los Alamos National Laboratory

Nuclear energy holds the potential of a sustainable, affordable, and clean source of energy available on a scale that can help meet the world's growing need for energy and slow the pace of global climate change. However, the Fukushima accident was a grim reminder of the importance of nuclear safety. Nuclear energy must also be economically competitive, a great challenge in the United States where the cost of reactor construction has skyrocketed and gas and oil supplies are expanding rapidly because of hydraulic fracturing technologies. Small modular reactors may hold the best hope for the U.S. reactor industry and offer significant opportunities for materials industries and materials research and development. Finally, the nuclear industry must find a socially acceptable waste disposal option.

Most of the global nuclear reactor demand comes from developing countries. China and India have ambitious plans and programs underway. Several dozen additional countries have expressed interest in developing nuclear power, but most of them lack the technical and regulatory expertise for such an expansion. Providing safe and secure nuclear power in such countries will be challenging, as will be the additional strain that a global spread of nuclear power will put on the nuclear nonproliferation regime.

"Innovation in the New Era of Global Science and Engineering"

Subra Suresh, Director, U.S. National Science Foundation

This presentation will highlight major trends influencing the evolution of science and engineering research and education on the global stage. Challenges and opportunities faced by national funding agencies, academic institutions, research laboratories and industry will be examined. Discussion will also include issues of the borderless knowledge enterprise, shifting demographics and global challenges that require collective effort amid stiff competition, while responding to local and national needs, fiscal constraints, and regional regulations.

For additional information on these speakers,
please visit the Spotlight Sessions page of the TMS2013 website at **www.tms.org/tms2013**

Special Plenary: Innovation in Materials & Manufacturing

Program Organizers:
Ed Herderick, EWI, and **Jud Ready,** Georgia Institute of Technology

Sponsoring TMS Committee:
Materials Innovation Committee

Funding Support Provided by:
Georgia Institute of Technology

Wednesday, March 6 • 2:00 p.m. to 5:00 p.m.
Lila Cockrell Theatre, Henry B. Gonzalez Convention Center

This special plenary, sponsored by the TMS Materials Innovation Committee, will take a closer look at transformational materials and manufacturing processes that offer significant gains to more rapid commercialization. Advanced manufacturing case studies by leading manufacturers will be featured.

SPEAKERS AND TOPICS

"International Space Station as an Innovation Laboratory: Materials Research and Beyond"

Julie Robinson, Chief Scientist, International Space Station, National Aeronautics and Space Administration (NASA)

Over the past decades, orbiting research facilities have been available for occasional studies of materials processing and shown unique potential. With the International Space Station (ISS) designated as a National Laboratory, and completed in 2012, industry now has the ability to access this unique laboratory for improvements to materials processing, solidification, studies of complex matter and fluid processes, and control of physical properties. Early spaceflight results have led to such developments as LiquidMetal™ and new turbine blade production methods. These path finding results are only a small indicator of what is available to the community using the facilities now available on the International Space Station.

"The National Network for Manufacturing Innovation"

Frank W. Gayle, Deputy Director, Advanced Manufacturing National Program Office, National Institute of Standards and Technology (NIST)

The National Network for Manufacturing Innovation (NNMI) is an Administration Initiative to create an effective manufacturing research infrastructure for U.S. industry and academia to solve industry-relevant problems. The NNMI will consist of linked Institutes for Manufacturing Innovation (IMIs) with the common goal of enhancing the development of manufacturing processes for new innovations in the research lab. Each IMI will allow industry, academia, and government partners to leverage existing resources, collaborate, and co-invest to nurture manufacturing innovation and accelerate commercialization. As sustainable manufacturing innovation hubs, IMIs will create, showcase, and deploy new capabilities, new products, and new processes that can impact large-scale commercial production. They will build workforce skills at all levels and enhance manufacturing capabilities in companies large and small. Institutes will draw together the best talents and capabilities from all the partners to build the proving grounds where innovations flourish and to help advance American domestic manufacturing.

"New Approaches to Manufacturing Innovation in DOE"

Robert Ivester, Deputy Program Manager, Advanced Manufacturing Office, U.S. Department of Energy (DOE)

The Advanced Manufacturing Office at the U.S. Department of Energy invests in next generation materials, technologies, and manufacturing processes that are often revolutionary, rather than evolutionary, in terms of performance and life-cycle energy or economic impact. The investment portfolio includes current and planned investments in innovative projects and shared user facilities that bring together industry, small business, universities and other researchers and manufacturing stakeholders. The office focuses on high-impact, foundational technologies that will make the United States a leader in the global advanced manufacturing and clean energy technology markets.

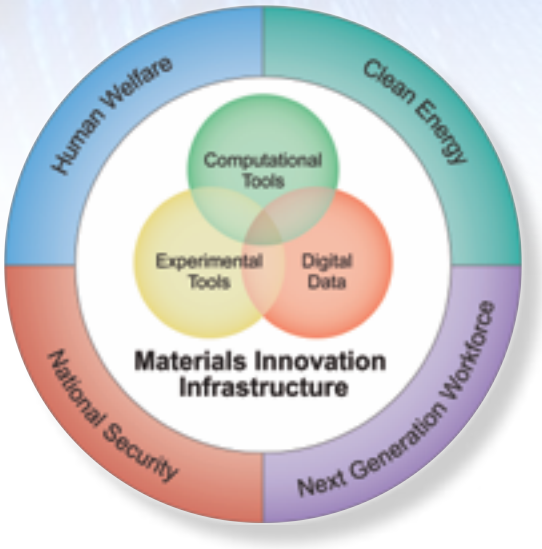
"Integrated Computational Materials Engineering (ICME): A Study on ICME Implementation in the Aerospace, Automotive, and Maritime Industries"

Tresa Pollock, Alcoa Professor of Materials and Chair, Materials Department, University of California at Santa Barbara

Now that ICME is recognized as a nascent discipline and awareness is growing worldwide, we are at a critical juncture. ICME implementation on a much wider scale is needed to accelerate (and significantly reduce costs of) the design and manufacturing of new materials systems. A focused effort has been undertaken to define the pathway(s) to rapid implementation of ICME for industrial problems. More specifically, TMS is leading this study to identify, prioritize, and make detailed recommendations of the frameworks and key steps needed for near-term implementation of ICME in three industrial sectors - the automotive, aerospace, and maritime industries. TMS is coordinating this study on behalf of the Department of Defense, the Department of Energy, and the National Science Foundation. This presentation will provide an overview of the status and planned final report of this study.

The MGI Digital Data Community

Developing the Materials Innovation Infrastructure to Support the Materials Genome Initiative



The **Materials Genome Initiative** (MGI), developed by the **White House Office of Science and Technology Policy** (OSTP), is a new effort to accelerate the discovery and deployment of advanced materials – from laboratory to commercial marketplace – resulting in new products and services that benefit society and improve economic growth.*

One of the principal goals of MGI is to build a **Materials Innovation infrastructure** that will:

- Integrate computational and experimental tools with digital data into the full product development cycle, with a goal to reduce new product development time and costs by almost half
- Support increased collaboration amongst researchers and other stakeholders

As part of the response to this challenge, **The National Institute of Standards and Technology** (NIST) and **The Minerals, Metals, and Materials Society** (TMS) have developed a new, online resource to support community building and interactions within the various sub-disciplines of the materials science and engineering field.

The **MGI Digital Data Community** allows users to build and join communities surrounding specific technical disciplines and topics, especially focused on the creation and sharing of data. These communities provide a forum for discussions; sharing documents, slide shows, and videos; notifying other members of upcoming events, and more.

To create your free user account and start joining or creating communities for discussion and collaboration today, visit **www.mgidata.org**.

From there, simply follow the prompts to create your user profile, and join or create communities that are of interest to you and others within your field. Also, invite colleagues and acquaintances to start taking advantage of this excellent resource for technical interactions and networking!

*For more information, refer to the **"Materials Genome Initiative for Global Competitiveness"** a white paper released by the OSTP in June 2011.

Special Lectures

MONDAY

Congressional Science and Engineering Fellowship Program

Monday, March 4 • 8:00 a.m. to 9:00 a.m.
Grand Hyatt Hotel, Presidio C

Have you ever considered being a Congressional Fellow? Attend this informational session to learn about The Minerals, Metals & Materials Society and Materials Research Society (TMS/MRS) Congressional Fellowship Program. TMS offers opportunities to learn about the field of science policy by spending a year as a special legislative assistant in the United States Congress in Washington, DC. Fellows serve at all stages of their careers, so make sure to attend and find out about life as a scientist in the U.S. Senate and House of Representatives.

Dr. Andrew "Drew" Steigerwald, the 2012-2013 TMS/MRS Congressional Science & Engineering Fellow, will talk about the many benefits of science fellowships and the importance of scientists' involvement in policy. Steigerwald's fellowship placement is in the office of Senator Sherrod Brown working directly with the legislative staff on energy, manufacturing, and tax policy, helping to develop ideas and strategies to implement different policies in Congress. There will be ample opportunity for questions and discussion.

2013 William Hume-Rothery Award Lecture

Monday, March 4 • 8:40 a.m.
Henry B. Gonzalez Convention Center, Room 205

Alex Zunger, Professor, University of Colorado, Boulder
Lecture Title: "First Principles Alloy Theory – A Retrospective"
About the Topic: Since Hume-Rothery, Pauling, and Friedel, Alloy Theory has been influenced by electronic structure theory. Whereas Density Functional theory has had, for a long time, a significant impact on our understanding of ordered solids, only in the past two decades has it been combined with statistical mechanics to produce a viable, electronic-structure-based theory of alloys. Zunger will describe his personal view of this development, including the development by his colleagues and collaborators of foundational tools of the trade (total-energy concept and first-principles pseudopotentials), through "first-principles thermodynamics" and computational discovery of new materials, in the areas of metal alloys, semiconductor alloys, and insulator alloys.

Extraction & Processing Division Distinguished Lecturer

Monday, March 4 • 9:00 a.m.
Henry B. Gonzalez Convention Center, Room 006D

Antoine Allanore, Thomas B. King Assistant Professor of Metallurgy, Massachusetts Institute of Technology, speaking on behalf of **Donald Sadoway**, John F. Elliott Professor of Materials Chemistry, Massachusetts Institute of Technology
Lecture Title: "Towards Sustainable Metal Production by Molten Oxide Electrolysis"

Antoine Allanore

Donald Sadoway

Federation of European Materials Societies Young Leader International Scholar

Monday, March 4 • 2:35 p.m.
Henry B. Gonzalez Convention Center, Room 201

Vincenzo Palermo, Institute for Organic Synthesis and Photoreactivity, CNR - National Research Council of Italy
Lecture Title: "Not a Molecule, Not a Polymer, Not a Substrate . . . the Many Faces of Graphene as Chemical Platform"
About the Topic: What is, exactly, graphene? While we often describe graphene with many superlative adjectives, it is difficult to force this (superlative) material within a single chemical class. Graphene typical size is atomistic in one dimension of space, and mesoscopic in the other two. This provides graphene with several, somehow contrasting properties. Graphene can be patterned, etched and coated as a substrate. Though, it can also be processed in solution and chemically functionalized, as a molecule. It could be considered a polymer, obtained by bottom-up assembly of carbon atoms, but it can be obtained from top-down exfoliation of graphite (a mineral) as well. It is not a nano-object, as fullerenes or nanotubes, because it does not have a well-defined shape; conversely, it is a large, highly anisotropic, very flexible object, which can have different shapes and be folded, rolled or bent to high extents. This presentation will discuss the state of the art and possible applications of graphene in its broader sense with a particular focus on how its "chemical" properties, rather than its well-known electrical ones, can be exploited to develop original science, innovative materials and new technological applications.

Special Lectures (cont.)

TUESDAY

Institute of Metals/Robert Franklin Mehl Lecture

Tuesday, March 5 • 9:05 a.m.
Henry B. Gonzalez Convention Center, Room 201

Horst Hahn, Karlsruhe Institute of Technology
Lecture Title: "Tunable Nanostructures and Printed Electronics"
About the Topic: The properties of materials are typically controlled by their microstructure. As a consequence, the properties cannot be altered reversibly. In contrast, gating using electrical charges allows for the reversible change of properties and has an enormous potential for applications. In general, charges can be applied at interfaces between an oxide (dielectric gating) or an electrolyte (electrochemical gating) and the material. This can be applied for the reversible change of mechanical, electrical and magnetic properties of nanostructures. In a similar way, electrochemical gating can be applied to printed field-effect transistors based on inorganic oxide nanoparticles. The basic principles of tunable nanostructures will be discussed, as well as the application of the electrochemical gating concept for printed electronics. The technical performance, such as field effect mobility, device speed, temperature range, etc. will be highlighted.

Extraction & Processing Division/Materials Processing & Manufacturing Division Joint Luncheon Lecture

Tuesday, March 5 • Noon
Grand Hyatt Hotel, Texas Ballroom C

Maurits Van Camp, Director of the Recycling & Extraction Technologies Platform at Umicore Group Research and Development
Lecture Title: "Sustainability: A Paradigm Shift for Metals?"
About the Topic: The global demand for technology metals has drastically increased. This will further accelerate as a result of the introduction of green and high-tech technologies. To secure a reliable and sustainable supply of these metals, innovative solutions need to be developed along the entire value chain. This requires a system-wide approach focusing on sustainable mining methods, substitution of critical metals, and recovery of metals from secondary sources. Even more than today, the walls between different research areas, metal and product sectors, industries, corporations and SMEs, industry and policy makers, countries etc. need to be removed.

Young Leader Tutorial Luncheon Lecture

Tuesday, March 5 • Noon
Grand Hyatt Hotel, Texas Ballroom D

Julia Greer, Assistant Professor of Materials Science and Mechanics, Caltech
Lecture Title: "A Scientist, a Parent, a Teacher, a Mentor . . . How to Balance it All?"
About the Topic: This talk, delivered from the perspective of a woman in academia, will focus on the issues of work/life balance and on how to balance professional and personal activities without feeling overwhelmed. Greer will discuss the issues associated with trying to survive in the world where career, family, and hobbies simultaneously require 100% of one's attention. She will provide examples of effective and ineffective situations, statistical data, and bring to light some of the perhaps surprising consequences of neglecting to find one's internal balance.

ALL TMS2013 ATTENDEES ARE WELCOME TO ATTEND THIS LECTURE, BUT BOXED LUNCHES WILL BE AVAILABLE ONLY TO THOSE WHO ORDERED THEM IN ADVANCE.

WEDNESDAY

Light Metals Division Luncheon Lecture

Wednesday, March 6 • Noon
Grand Hyatt Hotel, Texas Ballroom C

John Mitchell, President, North America, Rockwood Lithium
Lecture Title: "Lithium: Solving Global Energy Issues"
About the Topic: Lithium, the lightest metal in existence, has taken on a new importance in global energy markets. Lithium ion batteries provide a cost effective and reliable storage method for electrical energy today. While the battery industry and research institutions remain highly fragmented in approach, they all race to improve the same battery performance metrics. Solving some of these metrics could lead to the next global growth market. However, lithium's contribution toward solving energy needs does not begin and end with batteries. The growing use of aluminum lithium alloys in aerospace for weight reduction and the addition of lithium salts to save energy when operating melt furnaces are among other energy saving applications for lithium. While elemental lithium is found everywhere, factors like economics and geopolitical dynamics limit the focus of major lithium producers to source raw material from only a few places around the world. However, unlike other key global resources, lithium can be part of the energy solution for a much longer duration because it lends itself to recycling. This presenter will discuss the lithium industry, key growth markets, technology trends and other influences on the broader use of lithium.

Special Lectures (cont.)

2013 Shri Ram Arora Award Lecture

Wednesday, March 6 • 4:45 p.m.
Henry B. Gonzalez Convention Center, Room 214C

Sumit Goenka, Department of Materials Science & Engineering, Carnegie Mellon University, and Department of Metallurgy & Materials Engineering, Visvesvaraya National Institute of Technology
Lecture Title: "Antibacterial Nanosized Silver Substituted Hydroxyapatite with Enhanced Mechanical Properties"
About the Topic: Among the bioactive materials that have been used for orthopedic biomaterials design, hydroxyapatite [Ca10(PO4)6(OH)2] is a good candidate owing to its biocompatibility, osteoconductive properties and its presence in natural hard tissue. Poor mechanical properties such as brittleness, low tensile strength and poor machinability restrict their application. In this work we fabricated silver substituted hydroxyapatite [Ca10-xAgx(PO4)6(OH)2] with enhanced mechanical and antibacterial properties.

Vittorio de Nora Prize for Environmental Improvements in Metallurgical Industries Lecture

Wednesday, March 6 • 4:15 p.m.
Henry B. Gonzalez Convention Center, Room 006C

Leon Prentice, Senior Research Engineer, CSIRO Process Science and Engineering
Lecture Title: "It *Is* Rocket Science: The Engineering and Impact of Carbothermal Magnesium Technology"
About the Topic: Carbon is regularly used as a reductant for the production of many metals due to its simplicity, efficiency, and ease of use. For light metals, the thermodynamics – and engineering – are more complex. The production of magnesium by carbothermal reduction has been a goal for nearly a century, yet significant practical challenges have made its operation uneconomic. A multi-disciplinary team from Australia's national research organisation, CSIRO, has proven the technology at laboratory scale and demonstrated the operation of supersonic 'shock quenching.' This technology, called MagSonic™, is likely to be cost-competitive with existing processes while reducing energy consumption by up to 50% and environmental impact by up to 85%. Further advantages can be gained from renewable energy and carbon sources. This presentation will discuss the engineering challenges overcome in the development of MagSonic™ technology so far, and its potential to change the production and use of magnesium around the world.

Japan Institute of Metals Young Leader International Scholar

Wednesday, March 6 • 11:40 a.m.
Henry B. Gonzalez Convention Center, Room 201B

Yoji Miyajima, Interdisciplinary Graduate School of Science and Engineering, Tokyo Institute of Technology
Lecture Title: "Quantification of Lattice Defects in Severe-Plastic Deformed Metals"
About the Topic: It has been known that metals having ultra-fine grains (UFGs) produced by severe-plastic deformation processes exhibit unique mechanical properties such as hardening by annealing and softening by deformation in UFG-Al [1]. Although the unique phenomena are associated with the high dislocation density LV (m-2) and high density of grain boundary SV (m-1), there are few quantitative reports about those lattice defects. In the present study, an accumulative roll bonding (ARB) process was used to fabricate the UFG metals. The change in LV, depending on the number of the ARB cycle, was quantified using transmission electron microscopy/scanning transmission electron microscopy (TEM/STEM) and electrical resistivity measurements at 77 K. As a result, it was revealed that LV is almost constant for all ARB processed metals, with values of around 1.0×1014m-2 and 5.0×1014m-2 for UFG-Al and UFG-Cu, respectively.

Join TMS in Honoring a Distinguished Career

Materials Research Applied to National Needs (MARANN)
A Symposium in Honor of Professor Morris E. Fine

Monday, March 4
Henry B. Gonzalez Convention Center, Room 006A

This one-day symposium will honor Professor Morris E. Fine of Northwestern University on his 95th birthday for his outstanding contributions to the field of materials science and engineering.

It will also offer a mechanism for researchers, students, engineers, and administrators working in academia, industry, and national laboratories to promote idea exchanges and advance the fundamentals and applications of materials science and engineering. The process from materials research to successful applications will be examined by invited and contributed speakers from academia, industry, and U.S. government in areas of current interest in all classes of materials.

Prepare Future Generations of Minerals, Metals & Materials Professionals...

Support the TMS Foundation

Premium Item Donation Program

Help the TMS Foundation continue to support these society-building initiatives:

- Young Leaders Program
- TMS Scholarship Program
- Vittorio DeNora Prize for Environmental Improvements in Metallurgical Industries
- Emerging Leaders Alliance

Receive these items for donations of the following correlating amounts:

$10 Donation

TMS Pin

$25 Donation

Periodic Table Mug

$350 Donation

$550 Donation

$650 Donation

Visit the TMS Foundation booth in the East Registration Lobby to donate today! Or

Donate online

at www.tms.org/Foundation/tfhome.aspx

TMS FOUNDATION

Networking, Student, and Social Events

SUNDAY

TMS2013 Materials Bowl

Sunday, March 3
Elimination Rounds: Noon to 4:00 p.m.
Championship Round: 8:00 p.m.
Henry B. Gonzalez Convention Center, Grand Ballroom C3
Come and see this materials-themed, quiz-show-style competition, where student teams compete for cash prizes.

Networking Meeting of the Membership

Sunday, March 3 • 7:00 p.m. to 8:00 p.m.
Henry B. Gonzalez Convention Center, Room 217
All TMS2013 attendees are invited to an informal opening reception on Sunday evening. Join your TMS colleagues and the officers of the society for food, drinks, and the opportunity to learn about the progress the society has made in the past year, as well as to preview plans for the organization's future.

Meet the Candidate Employment Poster Session

Sunday, March 3 • 6:30 p.m.
Henry B. Gonzalez Convention Center, Room 213
Organized by the TMS Young Leaders Committee, this session allows young professionals to connect with potential employers for post-doctoral, full-time, or faculty positions. Candidates present posters on their qualifications and research interests to potential employers from universities, industries, and national labs.

Student Mixer

Sunday, March 3 • 8:30 p.m. to 10:30 p.m.
Henry B. Gonzalez Convention Center, Grand Ballroom C2
This informal social event allows students to interact with each other and with professional members in a relaxed—and fun—setting. Refreshments are provided. Dancing is optional.

MONDAY

Women in Science Breakfast

Monday, March 4 • 7:00 a.m. to 8:00 a.m.
Grand Hyatt Hotel, Texas Ballroom A
Organized by the TMS Women in Science Committee, this annual event offers an opportunity for TMS members to network and discuss issues specific to women in the science and engineering professions.

Peer-to-Peer Speed Networking Event

Monday, March 4
Buffet Lunch: 11:30 a.m. to 12:30 p.m. (PRE-REGISTRATION REQUIRED)
Networking Event: 12:30 p.m. to 1:30 p.m.
Grand Hyatt San Antonio Hotel, Texas Ballroom B
This special professional development event—open exclusively to TMS Volunteer Leaders—will provide a focused and efficient networking venue to build mutually beneficial and knowledge-building relationships among professionals. Due to the nature of this event, only those who have registered in advance can participate.

President's Welcoming Reception

Monday, March 4 • 5:00 p.m. to 6:30 p.m.
Henry B. Gonzalez Convention Center, Exhibit Hall C
All attendees are invited to meet in the exhibit hall for appetizers, beverages, and networking with exhibitors and colleagues.

Student Poster Contest Judging

Monday, March 4 • 3:30 p.m. to 5:30 p.m.
Henry B. Gonzalez Convention Center, Parkview and Towerview Lobbies
Browse the student poster displays and ask questions of the contest participants at the Student Poster Contest Judging Session.

Networking, Student, and Social Events (cont.)

TUESDAY

Exhibit Hall Luncheon

Tuesday, March 4 • Noon to 2:00 p.m.
Henry B. Gonzalez Convention Center, Exhibit Hall C
All full-conference registrants are invited to come to the exhibit hall to recharge between sessions and enjoy a complimentary light buffet lunch, courtesy of the TMS 2013 Exhibition.

Student Career Forum

Tuesday, March 5 • 3:00 p.m. to 5:00 p.m.
Grand Hyatt Hotel, Bonham B
Organized by the TMS Young Leader 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 materials.

Exhibit Hall Happy Hour

Tuesday, March 5 • 5:00 p.m. to 6:00 p.m.
Henry B. Gonzalez Convention Center, Exhibit Hall C
All attendees are invited to gather in the exhibit hall for appetizers, beverages, and networking with exhibitors and colleagues.

WEDNESDAY

Young Professional Happy Hour Reception

Wednesday, March 6 • 6:00 p.m. to 7:00 p.m.
Grand Hyatt Hotel, Presidio B
This reception provides young professionals the opportunity to network with more experienced TMS members in a relaxed, social atmosphere.

Technical Division Young Professional Poster Contest

Henry B. Gonzalez Convention Center, Parkview and Towerview Lobbies
View technical posters submitted by early-career professionals in each of the five TMS technical divisions: Electronic, Magnetic & Photonic Materials; Extraction & Processing; Light Metals; Materials Processing & Manufacturing; and Structural Materials. Posters will be judged, and the winner in each division will be awarded $500.

142nd TMS-AIME Annual Awards Banquet
including Dinner, Awards Presentation, and Installation of the 2013 President

Tuesday, March 5

Reception: 6:00 p.m.
Henry B. Gonzalez Convention Center, Lila Cockrell Theatre Lobby
Awards Ceremony Seating Begins: 6:30 p.m.
Henry B. Gonzalez Convention Center, Lila Cockrell Theatre
Dinner: 7:45 p.m.
Grand Hyatt San Antonio Hotel, Texas Ballroom AB

A Red-Carpet Event for the 'Stars' of Materials Science and Engineering

From a red carpet to a professional emcee, the 2013 TMS-AIME Awards Banquet will have all the elements of a Hollywood-style awards ceremony, shining a spotlight on the hard work and dedication of the 'stars' of the materials world. This memorable evening will honor TMS's award-winning materials scientists and engineers from all phases of their careers and working in all aspects of the field.

Participants will attend a cocktail reception before entering the Lila Cockrell Theatre for the grand awards ceremony, featuring a professional emcee and high-quality presentation. After award winners have been recognized for their accomplishments, attendees will proceed to the Grand Hyatt Hotel, where they may step out onto a red carpet for photographs if they wish. Walking into the grand ballroom, guests will be seated for an elegant, three-course dinner. Live entertainment will be provided by a local band, and the evening will conclude with an elaborate dessert bar and another chance to network and unwind. This gala event will provide all participants—both award winners and guests—with the 'star' treatment they deserve.

Attendees must present their tickets, purchased in advance, for admission to the event. Tickets will include admission to the cocktail reception, awards presentations, and three-course dinner with wine and dessert. Both the theater and hotel are fully accessible for handicapped guests.

The TMS-AIME Awards Banquet includes presentations of awards from both TMS and the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME). TMS is a member society of AIME.

Installation of the 2013 TMS President:
Elizabeth Holm

Elizabeth Holm, Professor of Materials Science and Engineering at Carnegie Mellon University (CMU) in Pittsburgh, Pennsylvania, will be installed as the 2013 TMS President during the TMS-AIME Annual Awards Banquet. Holm has noted the importance of the Society's strategic initiatives, including the initiative to sustain and grow the TMS "core," which is an exceptional strength for the organization. "The true core of TMS is its dedicated members," she said. "My goal is to refocus on sustaining members and activities, to ensure that the professional society that has served them so well since 1871 remains their destination of choice for the next 142 years."

Holm obtained her B.S.E in materials science and engineering from the University of Michigan, an S.M. in ceramics from the Massachusetts Institute of Technology, and a dual Ph.D. in materials science and engineering and scientific computing from the University of Michigan. Prior to joining CMU in 2012, Holm spent 20 years as a computational materials scientist at the U.S. Department of Energy's Sandia National Laboratories, working to bring materials modeling to industrial practice. Holm has been a TMS member for 20 years. In that time, she has served as chair of the Chemistry and Physics of Materials Committee and the Computer Simulation Committee; Director of the Structural Materials Division; and Director of Publications for the Society. She has received several professional honors and awards, is a Fellow of ASM International, and served two terms on the National Materials Advisory Board of the U.S. National Academies. Holm has authored or co-authored more than 120 scientific and research publications. Her research areas include the theory and modeling of microstructural evolution in complex polycrystals, the physical and mechanical response of microstructures, and the wetting and spreading of liquid metals.

She is a member of or has been active in a number of other societies, including ASM International, the Materials Research Society (MRS) and the American Ceramic Society (ACerS).

Society Awards Presented by 2012 TMS President Wolfgang Schneider

While Elizabeth Holm begins her term as TMS President during the awards banquet, 2012 TMS President Wolfgang Schneider ends his year of service to the society. Schneider is the head of the research and development center of Hydro Aluminum Rolled Products Business in Bonn, Germany, and is also a professor of metallurgy at the Technical University of Berlin. Schneider has been a member of TMS since 1996 and has served in many volunteer leadership roles, including as chair of the TMS Light Metals Division and on the TMS Board of Directors in the membership development area. In his final act as TMS president, Schneider will distribute many of the following awards at the banquet:

SOCIETY AWARDS

TMS Fellows Class of 2012

George "Rusty" Gray
Los Alamos National Laboratory
Robert Shull
National Institute of Standards & Technology
David Srolovitz
University of Pennsylvania
Peter Voorhees
Northwestern University

Alexander Scott Distinguished Service Award

Ray Peterson
Aleris International Inc

Application to Practice Award

Timothy Weihs
Johns Hopkins University

Brimacombe Medalist Class of 2013

Ellen Cerreta
Los Alamos National Laboratory
Nikhilesh Chawla
Arizona State University
Joy Forsmark
Ford Motor Co
Alan Luo
General Motors Co

Bruce Chalmers Award

Sindo Kou
University of Wisconsin

Cyril Stanley Smith Award

Leonid Bendersky
National Institute of Standards & Technology

Early Career Faculty Fellow Award

Julia Greer
California Institute of Technology

Educator Award

Marc Andre Meyers
University of California

Institute of Metals/Robert Franklin Mehl Award

Horst Hahn
Karlsruhe Institute of Technology

Leadership Award

Julie Christodoulou
Office of Naval Research

Morris Cohen Award

Gregory Olson
Northwestern University

William Hume-Rothery Award

Alex Zunger
University of Colorado

Shri Ram Arora Award

Sumit Goenka
Carnegie Mellon University

Vittorio de Nora Prize for Environmental Improvements in Metallurgical Industries

Leon Prentice
CSIRO Process Science and Engineering

DIVISION AWARDS

Presented at technical division-related events

Electronic, Magnetic & Photonic Materials Division

Distinguished Scientist/Engineer Award

Mark Asta
University of California

Distinguished Service Award

Jeff Hoyt
McMaster University

JEM Best Paper Award

Davood Shahrjerdi
Bahman Hekmatshoar
Stephen W. Bedell
Marco Hopstaken
Devendra Sadana
IBM T.J. Watson Research Center

John Bardeen Award

King Ning Tu
University of California

Extraction & Processing Division

Distinguished Lecturer Award

Donald Sadoway
Massachusetts Institute of Technology

Distinguished Service Award

Adam Powell
Metal Oxygen Separation Technologies

[Award Winners continued on Next Page]

142nd TMS-AIME Annual Awards Banquet
including Dinner, Awards Presentation, and Installation of the 2013 President

DIVISION AWARDS

Science Award

Peter Hayes
University of Queensland

Technology Award

Elizabeth Sterling
University of British Columbia
Jonathan Stolk
Olin College of Engineering
Lauren Hafford
Vestas
Michael Gross
Bucknell University

Materials Processing & Manufacturing Division

Distinguished Service Award and Distinguished Scientist/ Engineer Award

Thomas Bieler
Michigan State University

Structural Materials Division

Distinguished Scientist/ Engineer Award

Carlos Tome
Los Alamos National Laboratory

Distinguished Service Award

David Bahr
Purdue University

JOM Best Paper Award

Anna Tarakanova
Massachusetts Institute of Technology
Markus J. Buehler
Massachusetts Institute of Technology

Light Metals Division

Distinguished Service Award

Jomar Thonstad
Norwegian University of Science & Technology

Technology Award

Dmitry Eskin
Brunel University

Light Metals Award

Andrey Panov
Gennadiy Klimentenok
UC RUSAL Engineering and Technology Center
Gennady Podgorodetsky
Vladislav Gorbunov
National University of Science & Technology

Magnesium Technology Best Paper - Application Award

Fabrizio D'Errico
Politecnico Di Milano
Adamo Screnci
McPhy Energy SA

Magnesium Technology Best Paper - Fundamental Research Award

Taisuke Sasaki
Tadakatsu Ohkubo
Kazuhiro Hono
National Institute for Materials Science

Magnesium Technology Student Paper Award

Dinakar Sagapuram
Mert Efe
Srinivasan Chandrasekar
Kevin Trumble
Wilfredo Moscoso
Purdue University

Magnesium Technology Best Poster Award

Baolong Zheng
Troy Topping
Yizhang Zhou
Enrique Lavernia
University of California
Yuhong Xiong
Seagate Technology
Suveen Mathaudhu
U.S. Army Research Office

Aluminum Reduction Technology Award

Kristian Etienne Einarsrud
Stein Tore Johansen
SINTEF Materials and Chemistry
Ingo Eick
Hydro Aluminium Deutschland

Electrode Technology for Aluminum Production Award

Barry Sadler
Net Carbon Consulting Pty Ltd

Warren Peterson Cast Shop for Aluminum Production Award

Lisa Sweet
CAST Co-operative Research Ctr
John Taylor
University of Queensland
Mark Easton and
Malcolm Couper
Monash University
Nick Parson
Rio Tinto Alcan

Recycling Award

Tracey Brommer
PA Consulting
Britt Elin Gihleengen
Scandpower
Elsa Olivetti
Randolph Kirchain
Massachusetts Institute of Technology

JOM Best Paper Award

Murray D. Johnston
Leili Tafaghodi Khajavi
Mark Li
Samira Sokhanvaran
Mansoor Barati
University of Toronto

Energy Best Paper Award- Professional

Cynthia Belt
Consultant

Energy Best Paper Award- Student

Tao Wang
University of Alabama
Divakar Mantha
U.S. Air Force Academy
Ramana Reddy
University of Alabama

YOUNG LEADER AWARDS

Young Leader International Scholar Award

Sandip Harimkar
Oklahoma State University
Amy Clarke
Los Alamos National Laboratory

Electronic, Magnetic & Photonic Materials Division Young Leader Professional Development Award

Sarbajit Banerjee
State University of New York
David Mitlin
University of Alberta/NINT NRC
Yue Qi
General Motors Company
Guang Sheng
Scientific Forming Technology Corp

Extraction & Processing Division Young Leader Professional Development Award

Jan deBakker
BBA Inc
Hojong Kim
Massachusetts Institute of Technology
Jonghyun Lee
Tufts University
Thomas Wynn
Los Alamos National Laboratory

Light Metals Division Young Leader Professional Development Award

Shib Narayan Meher
National Aluminium Company Ltd
Leon Prentice
CSIRO Process Science and Engineering
James Saal
Northwestern University
Kiran Solanki
Arizona State University

Materials Processing & Manufacturing Division Young Leader Professional Development Award

Justin Crapps
ExxonMobil
Remi Dingreville
Sandia National Laboratories
Jun Lou
Rice University
Jian Wang
Los Alamos National Laboratory

Structural Materials Division Young Leader Professional Development Award

Nikhil Gupta
Polytechnic Institute of New York University
Po-Yu Chen
National Tsing Hua University
Michael Sangid
Purdue University
Alexis Lewis
U.S. Naval Research Laboratory

STUDENT AWARDS

J. Keith Brimacombe Presidential Scholarship

Bradley Potter
Case Western Reserve University

TMS Best Paper Contest Winner-Graduate

First Place: Cheng Sun
Texas A& M University
Second Place: Chih-Pin Chuang
University of Tennessee

OTHER AWARDS

J. Keith Brimacombe Prize

Jonathan Dantzig
University of Illinois

Acta Materialia Materials & Society Award

Jeffrey Wadsworth
Battelle Memorial Institute

AIME AWARDS

AIME Henry deWitt Smith Scholarship

Dmitri Nassyrov
McGill University
Niaz Abdolrahim
Washington State University

AIME Honorary Membership Award

Bhakta Rath
Naval Research Laboratory

AIME Champion H. Mathewson Award

Jung-Kuei "Brian" Chang
Chung Hsin Electric & Machinery MFG Corp
Eric M. Taleff
University of Texas
Paul Krajewski
General Motors Company

AIME Robert Lansing Hardy Award

Markus Buehler
Massachusetts Institute of Technology

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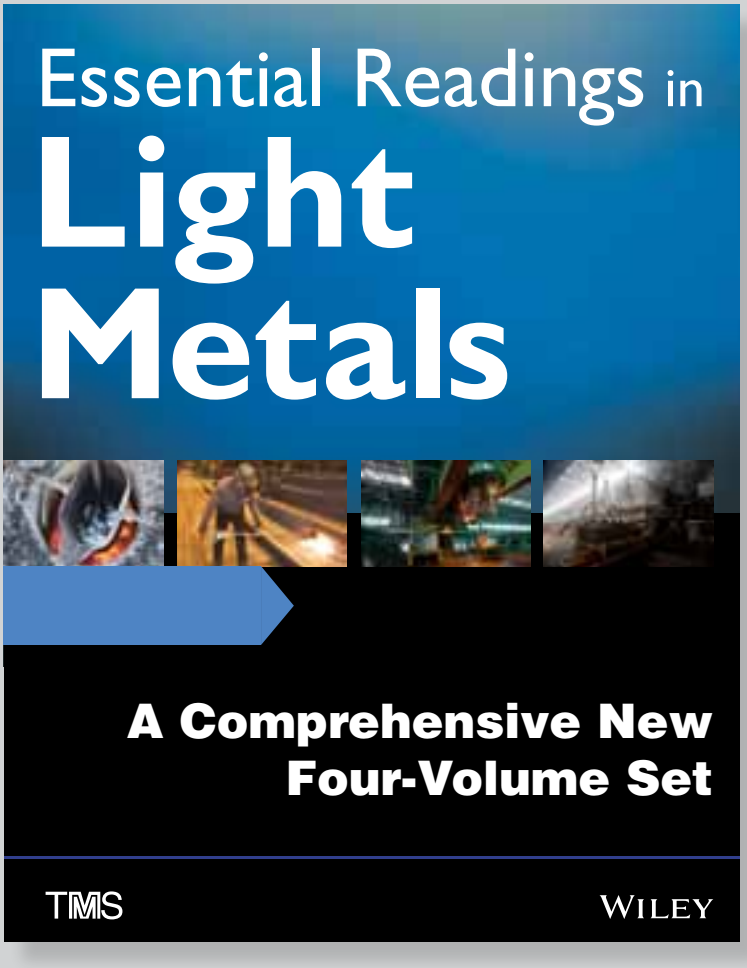

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