



Materials Theory ↔ Experiment

Processing ↔ Properties

Materials ↔ Applications

TMS 2005

134th Annual Meeting & Exhibition

February 13-17, 2005

Moscone West Convention Center • San Francisco, CA

Where The Connection Is Made

Featuring programming sponsored & co-sponsored by:

- TMS Education Committee
- TMS Electronic, Magnetic & Photonic Materials Division
- TMS Extraction & Processing Division
- TMS Light Metals Division
- TMS Materials Processing & Manufacturing Division
- TMS Public & Governmental Affairs Committee
- TMS Structural Materials Division
- TMS Young Leaders Committee
- Aluminum Association
- ASM International's Materials Science Critical Technologies Sector
- International Magnesium Association
- The Japan Institute of Metals
- National Science Foundation
- Society for Biomaterials
- Surfaces in Biomaterials Foundation



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Housing & Registration Forms Included

<http://www.tms.org/AnnualMeeting.html>

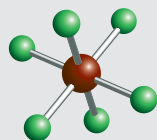


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Look for these new meeting features designated with this symbol.

Watch for *Featured Presentations!*

Eight outstanding presentations have been selected by the TMS Program Committee as Featured Presentations. They represent all areas of technology and will be presented throughout the three-and-a-half day program. In addition, all eight Featured Presentations will be presented a second time during a special session on Wednesday afternoon. Every attendee will have two opportunities to hear these noteworthy presentations.

During the TMS 2005 Annual Meeting & Exhibition

The Role of Technology in the Global Primary Aluminum Industry Today and in the Future

An interactive session and discussion sponsored by The Minerals, Metal & Materials Society (TMS) Light Metals Division, the TMS Aluminum Committee, and the Aluminum Association as a part of TMS 2005.



Traditionally, technology has been regarded as the way to streamline operations, create efficiencies, and raise profits. The requirements of improving productivity and cutting costs are now forcing the aluminum industry to press the limits of technology. Are we now seeing that the economic results of aluminum smelters will be more dependent on cost of raw materials, energy, and labor rather than on superior cell technology? Which technological requirements and achievements are needed to ensure that the Primary Aluminum Industry remains competitive in the coming years? The leaders of the Primary Metals Groups of the world's largest aluminum producers have been invited to discuss these and related challenges at TMS 2005.

Scheduled for **Tuesday, February 15, 2005**, the speaker presentations will be followed by a panel discussion with the opportunity for the audience to ask questions and provide their comments to the presenters.

This is an opportunity that anyone involved with the primary aluminum industry can't afford to miss.

Professor James W. Evans, University of California – Berkeley, will lead the discussion.

Scheduled Speakers



Cynthia Carroll
President and CEO of
Alcan Primary Metal
Group, Canada



Truls Gautesen
President of Hydro
Aluminium Primary
Metal, Norway



Wayne Hale
Senior Vice President
of Operations, SUAL
Holding, Russia



Bernt Reitan
Vice President of Alcoa,
Group President
Alcoa Primary Products,
Alcoa, USA

The Aluminium Corporation of China (Chalco) has also committed to sending a top-level executive to participate.

TECHNICAL PROGRAM GRID

	MONDAY		TUESDAY		WEDNESDAY		THURSDAY
	AM	PM	AM	PM	AM	PM	AM
2000	Industrial Energy Reduction: Materials Opportunity Analysis: Session I	Alumina and Bauxite: Bauxite and Bayer Process Red Side	The Role of Technology in the Global Primary Aluminum Industry Today and in the Future: Session I	Future of Primary Metals Production in the US	Products, Services, Suppliers Showcase		
2001	Cast Shop Technology: Cast Shop Safety	Cast Shop Technology: Aluminum Melting: Strategies and Sourcing	Cast Shop Technology: Aluminum Melting: Furnace Design and Refractories	Cast Shop Technology: Melt Treatment: Degassing and Filtration	Cast Shop Technology: DC Casting: Melt Flow and Cooling	Cast Shop Technology: DC Casting: Microstructure and Hot Tearing	Cast Shop Technology: Foundry
2002	Aluminum Alloys For Packaging: Session I	Cast Shop Technology: Melt Treatment: Fluxing, Alloying and Grain Refinement			Aluminum Reduction Technology: Pot Control	Aluminum Reduction Technology: Cell Stability	
2003	Aluminum Reduction Technology: Environmental and Modernization	Aluminum Reduction Technology: Cell Development & Operations - Part 1		Aluminum Reduction Technology: Cell Development & Operations - Part 2	Aluminum Reduction Technology: Emerging Technologies - Part 1	Aluminum Reduction Technology: Emerging Technologies - Part 2	Aluminum Reduction Technology: Fundamentals
2004	Magnesium Technology 2005: Magnesium, Primary Production and Environmental	Magnesium Technology 2005: Magnesium and Alloys - Refining, Recycling and Fundamentals	Magnesium Technology 2005: Thermodynamics (Magnesium Alloys)	Magnesium Technology 2005: Magnesium Alloy Development	Magnesium Technology 2005: Magnesium Alloy Processing	Magnesium Technology 2005: Creep Resistant Magnesium Alloys and Welding-Joining	Magnesium Technology 2005: Corrosion and Surface Finishing - Magnesium Alloys
2005	Alumina and Bauxite: Industry Trends and Developments	Alumina and Bauxite: Alumina Quality	6th Global Innovations Symposium: Trends in Materials and Manufacturing Technologies for Transportation Industries: Rapid Prototyping	Alumina and Bauxite: Influences of Alumina on Smelter Performance	Alumina and Bauxite: Bayer Process Chemistry	Alumina and Bauxite: Precipitation	Alumina and Bauxite: HES and Control & Modelling
2006	Magnesium Technology 2005: Wrought Magnesium Alloys I	Magnesium Technology 2005: Wrought Magnesium Alloys II	Magnesium Technology 2005: Wrought Magnesium Alloys III	Automotive Alloys 2005: Session I	Automotive Alloys 2005: Session II	Automotive Alloys 2005: Session III	General Abstracts: Quasi-Static Loading
2007	Carbon Technology: Anode Raw Materials	Carbon Technology: Green Anodes I	General Abstracts: Nanostructured and Lightweight Materials	Carbon Technology: Green Anodes II	Carbon Technology: Anode Baking	Carbon Technology: Cathode Materials and Corrosion I	Carbon Technology: Cathode Materials and Corrosion II
2008	John Campbell Honorary Symposium on Shaped Casting of Metals: Liquid Metal Quality	John Campbell Honorary Symposium on Shaped Casting of Metals: Filling and Feeding	John Campbell Honorary Symposium on Shaped Casting of Metals: Solidification	John Campbell Honorary Symposium on Shaped Casting of Metals: Structure and Properties	John Campbell Honorary Symposium on Shaped Casting of Metals: Modeling	John Campbell Honorary Symposium on Shaped Casting of Metals: Applications	
2009	Globalization of Materials R&D	6th Global Innovations Symposium: Trends in Materials and Manufacturing Technologies for Transportation Industries: Keynote Session	6th Global Innovations Symposium: Trends in Materials and Manufacturing Technologies for Transportation Industries: Sheet Metal Forming	6th Global Innovations Symposium: Trends in Materials and Manufacturing Technologies for Transportation Industries: Sheet Metal Processing	6th Global Innovations Symposium: Trends in Materials and Manufacturing Technologies for Transportation Industries: Novel Processes I	6th Global Innovations Symposium: Trends in Materials and Manufacturing Technologies for Transportation Industries: Novel Processes II	6th Global Innovations Symposium: Trends in Materials and Manufacturing Technologies for Transportation Industries: Bulk Metal Processing

MONDAY		TUESDAY		WEDNESDAY		THURSDAY	
PM	AM	PM	AM	AM	PM	AM	PM
Characterization of Minerals, Metals and Materials: Extraction and Processing Applications	Characterization of Minerals, Metals and Materials: Characterization of Structural Engineering Materials – I	Characterization of Minerals, Metals and Materials: Characterization of Structural Engineering Materials – II	Characterization of Minerals, Metals and Materials: Characterization of Light Weight Materials – II	Characterization of Minerals, Metals and Materials: Materials Testing and Evaluation	Characterization of Minerals, Metals and Materials: Property and Performance of Engineering Materials	Characterization of Minerals, Metals and Materials: General Characterization	2010
General Abstracts: Electronic Materials	General Abstracts: Composites and Coatings	General Abstracts: Advances in Steels	General Abstracts: Environmental Damage and Durability	Recycling - General Sessions: Aluminum and Consumer Goods Recycling	Recycling - General Sessions: Non-Ferrous Recycling	Recycling - General Sessions: Post-Consumer Recycling	2011
General Abstracts: Temperature Treatments and Casting	Characterization of Minerals, Metals and Materials: Characterization of Industrial Products	Characterization of Minerals, Metals and Materials: Characterization of Light Weight Materials – I	Metallurgical Technology for Waste Minimization: Session I	Metallurgical Technology for Waste Minimization: Session II	Metallurgical Technology for Waste Minimization: Session III		2012
Arsenic Metallurgy: Fundamentals & Applications: Plenary Session	Arsenic Metallurgy: Fundamentals & Applications: Removal of Arsenic and its Precipitation from Process Streams I	Arsenic Metallurgy: Fundamentals & Applications: Thermodynamics and Pyrometallurgy	Arsenic Metallurgy: Fundamentals & Applications: Removal of Arsenic and its Precipitation from Process Streams II	Arsenic Metallurgy: Fundamentals & Applications: Process Metallurgy	General Abstracts: Dynamic Loading		2014
Converter and Fire Refining Practices: Plenary	Converter and Fire Refining Practices: Operations and Modernization	Converter and Fire Refining Practices: Process Improvements and Anode Casting	Converter and Fire Refining Practices: Processing Fundamentals	Converter and Fire Refining Practices: Advanced Technologies	TMS Featured Presentations		2016
Extractive Metallurgy: Pyrometallurgy I	Extractive Metallurgy: Hydrometallurgy	Extractive Metallurgy: Recycling and Waste Minimization	Extractive Metallurgy: Copper	Extractive Metallurgy: Pyrometallurgy II	TMS Featured Presentations		2018
Frontiers in Solidification Science: Morphological Evolution and Mushy Zone Phenomena I	Frontiers in Solidification Science: Morphological Evolution and Mushy Zone Phenomena II	Frontiers in Solidification Science: Nucleation	Frontiers in Solidification Science: Crystal-Melt Interfaces: Fundamental Properties and Related Behavior – and – Poster Session	General Abstracts: Cyclic Loading			2020
Precious Metals: Au, Ag, Pt, Pd, Os, Rh, Ir, Ru: Session I	Surface Engineering in Materials Science III: Laser Processing for Surface Modification	Surface Engineering in Materials Science III: Nanocoatings	Surface Engineering in Materials Science III: Thin Films	Surface Engineering in Materials Science III: Characterization of Surfaces and Films/Coating	Surface Engineering in Materials Science III: Plasma Processing for Surface Modification	Surface Engineering in Materials Science III: Coating Properties and Processing Effects	2022
Mechanical Behavior of Thin Films and Small Structures: Strengthening Mechanisms at Small Length Scale	Mechanical Behavior of Thin Films and Small Structures: Plasticity and Deformation Mechanisms at Small Length Scale	Mechanical Behavior of Thin Films and Small Structures: Stability, Strain and Stress	Mechanical Behavior of Thin Films and Small Structures: Fatigue, Fracture, and Reliability of MEMs and Thin Structures I	Mechanical Behavior of Thin Films and Small Structures: Fatigue, Fracture, and Reliability of MEMs and Thin Structures II	Mechanical Behavior of Thin Films and Small Structures: Advanced Characterization Techniques		2024
Micromechanics of Advanced Materials II (Symposium in Honor of James C.M. Li's 80th Birthday: Dislocation Mechanics of Plasticity	Micromechanics of Advanced Materials II (Symposium in Honor of James C.M. Li's 80th Birthday: Impression and Indentation Testing	Micromechanics of Advanced Materials II (Symposium in Honor of James C.M. Li's 80th Birthday: Diffusion and Atomistic Modeling	Micromechanics of Advanced Materials II (Symposium in Honor of James C.M. Li's 80th Birthday: Microstructure and System Stability	Micromechanics of Advanced Materials II (Symposium in Honor of James C.M. Li's 80th Birthday: Mechanics of Nanostructures	Micromechanics of Advanced Materials II (Symposium in Honor of James C.M. Li's 80th Birthday: Fatigue, Fracture and Failure	Micromechanics of Advanced Materials II (Symposium in Honor of James C.M. Li's 80th Birthday: Thin Films and Multilayers – and – Shock Compression	3000
Materials Processing Fundamentals: Solidification & Casting	Materials Processing Fundamentals: Liquid Metal Processing	Materials Processing Fundamentals: Smelting and Refining I	Materials Processing Fundamentals: Smelting and Refining II	Materials Processing Fundamentals: Powders, Composites & Coatings	Rare Earths, Science, Technology, and Applications V: Reactive Metal Processing	Rare Earths, Science, Technology, and Applications V: Rare Earths	3001

	MONDAY		TUESDAY		WEDNESDAY		THURSDAY
	AM	PM	AM	PM		AM	PM
3002	Phase Transformations Within Small-Size Systems: Thermodynamics, Phase Equilibria and Kinetics	Phase Transformations Within Small-Size Systems: Order-Disorder Transformations	Phase Transformations Within Small-Size Systems: Phase Separation, Precipitation and Displacive Transformations	Phase Transformations Within Small-Size Systems: Magnetic and Structural Transformations	Phase Transformations Within Small-Size Systems: Amorphous to Nanocrystal Transformations	Phase Transformations Within Small-Size Systems: Transformations in Thin/Thick Films and Multilayers	
3003	The Armen G. Khachaturyan Symposium on Phase Transformation and Microstructural Evolution in Crystalline Solids: Session I	The Armen G. Khachaturyan Symposium on Phase Transformation and Microstructural Evolution in Crystalline Solids: Session II	The Armen G. Khachaturyan Symposium on Phase Transformation and Microstructural Evolution in Crystalline Solids: Session III	The Armen G. Khachaturyan Symposium on Phase Transformation and Microstructural Evolution in Crystalline Solids: Session IV	The Armen G. Khachaturyan Symposium on Phase Transformation and Microstructural Evolution in Crystalline Solids: Session V	The Armen G. Khachaturyan Symposium on Phase Transformation and Microstructural Evolution in Crystalline Solids: Session VI	The Armen G. Khachaturyan Symposium on Phase Transformation and Microstructural Evolution in Crystalline Solids: Session VII
3004	Neutron Diffraction Characterization of Mechanical Behavior: Facilities, Techniques, and Capabilities	Neutron Diffraction Characterization of Mechanical Behavior: Deformation I	Neutron Diffraction Characterization of Mechanical Behavior: Deformation II	Neutron Diffraction Characterization of Mechanical Behavior: Deformation III	Neutron Diffraction Characterization of Mechanical Behavior: Residual Stress I	Neutron Diffraction Characterization of Mechanical Behavior: Residual Stress II	Neutron Diffraction Characterization of Mechanical Behavior: Phase Transformation
3005	Computational Thermodynamics and Phase Transformations: Grain Boundaries and Interfaces I	Computational Thermodynamics and Phase Transformations: Materials Design and Development	Computational Thermodynamics and Phase Transformations: Grain Boundaries and Interfaces II.	Computational Thermodynamics and Phase Transformations: Atomistic and Ab Initio Methods	Computational Thermodynamics and Phase Transformations: Theory and Simulation of Alloys.	Computational Thermodynamics and Phase Transformations: Thermodynamic Models and Databases	Computational Thermodynamics and Phase Transformations: Phase Field Models and Related Methods
3006	Bulk Metallic Glasses: Processing and Fabrication I	Bulk Metallic Glasses: Processing and Fabrication II	Bulk Metallic Glasses: Fatigue and Fracture	Bulk Metallic Glasses: Shear Banding and Deformation	Bulk Metallic Glasses: Corrosion, Oxidation and Phase Transformation	Bulk Metallic Glasses: Mechanical Behavior	Bulk Metallic Glasses: Mechanical Behavior and Phase Transformation
3007	Multicomponent Multiphase Diffusion Symposium in Honor of John E. Morral: Analysis of Interdiffusion Microstructures: Session I	Multicomponent Multiphase Diffusion Symposium in Honor of John E. Morral: Analysis of Interdiffusion Microstructures: Session II	Multicomponent Multiphase Diffusion Symposium in Honor of John E. Morral: Experimental Methods for Determining Diffusion Mechanisms	Multicomponent Multiphase Diffusion Symposium in Honor of John E. Morral: Diffusion in Oxide Systems	Multicomponent Multiphase Diffusion Symposium in Honor of John E. Morral: Computational Tools for Understanding Diffusion Mechanisms	Multicomponent Multiphase Diffusion Symposium in Honor of John E. Morral: Applications of Multicomponent Multiphase Diffusion	
3008	Hume Rothery Symposium: The Science of Complex Alloys	Hume Rothery Symposium: The Science of Complex Alloys	Hume Rothery Symposium: The Science of Complex Alloys	Hume Rothery Symposium: The Science of Complex Alloys	Powder Metallurgy Research and Development in the Transportation Industry: Titanium Alloys - P/M Developments	Powder Metallurgy Research and Development in the Transportation Industry: Sintering and Densification - P/M Processing	Powder Metallurgy Research and Development in the Transportation Industry: Nano-Materials, Intermetallics, Amorphous and Composites - P/M Developments
3009	Biological Materials Science and Engineering: Biological Materials I	Biological Materials Science and Engineering: Biological Materials II	Biological Materials Science and Engineering: Biological Materials/Bio-Medical Applications I	Biological Materials Science and Engineering: Biological Materials/Bio-Medical Applications II	Biological Materials Science and Engineering: Biological Materials Characterization and Biomimetics I	Biological Materials Science and Engineering: Biological Materials Characterization and Biomimetics II	
3010	Texture and Microstructure in Thin Films and Coatings: Copper Metallization	Texture and Microstructure in Thin Films and Coatings: Techniques and Coatings	Texture and Microstructure in Thin Films and Coatings: Coatings (Jt. With Refractory Metals in Electronic Applications)	Refractory Metals in Electronic Applications: Joint Session with Texture and Microstructure in Thin Films and Coatings: Texture and Thin Films	Refractory Metals in Electronic Applications: Applications	Refractory Metals in Electronic Applications: Processing and Properties	
3011	Microstructural Processes in Irradiated Materials: Point Defect Clusters	Microstructural Processes in Irradiated Materials: Modelling Defect Evolution	Microstructural Processes in Irradiated Materials: RPV Embrittlement	Microstructural Processes in Irradiated Materials: Microstructure Evolution and Segregation – and - Poster Session	Microstructural Processes in Irradiated Materials: He/H-Defect Interactions	Microstructural Processes in Irradiated Materials: Carbides, Nitrides and Oxides	Microstructural Processes in Irradiated Materials: Microstructural Observations of Deformation

MONDAY		TUESDAY		WEDNESDAY		THURSDAY	
AM	PM	AM	PM	AM	AM	PM	
Computational Aspects of Mechanical Properties of Materials: Atomistic Methods	Computational Aspects of Mechanical Properties of Materials: Atomistic Scale Modeling	Computational Aspects of Mechanical Properties of Materials: Nano-Scale and Meso-Scale Modeling	Computational Aspects of Mechanical Properties of Materials: Meso-Scale and Continuum Modeling	Materials Issues for Advanced Nuclear Systems: Materials for Gen IV and Space Nuclear Reactors	Materials Issues for Advanced Nuclear Systems: Materials for Nuclear Waste Storage	Materials Issues for Advanced Nuclear Systems: Materials Compatibility	3012
Lead Free Solder Implementation: Reliability, Alloy Development, New Technology: Interfacial Reactions and Phase Stability in Lead Free Solder Alloys	Lead Free Solder Implementation: Reliability, Alloy Development, New Technology: Intermetallic Growth in Lead-Free Solder Joints	Lead Free Solder Implementation: Reliability, Alloy Development, New Technology: Lead-Free Solder Alloy Development	Lead Free Solder Implementation: Reliability, Alloy Development, New Technology: Electromigration, and Electrical "Aging" of Lead-Free Solder Joints	Lead Free Solder Implementation: Reliability, Alloy Development, New Technology: Thermal Fatigue and Reliability of Lead-Free Solder Joints	Lead Free Solder Implementation: Reliability, Alloy Development, New Technology: Mechanical Properties of Lead-Free Solder Alloys and Solder Joints		3014
Phase Stability, Phase Transformation and Reactive Phase Formation in Electronic Materials IV: Magnetic and Semiconducting Materials	Phase Stability, Phase Transformation and Reactive Phase Formation in Electronic Materials IV: Thin Film Stability and Reactions, Electro- and Thermomigration Phenomena	Phase Stability, Phase Transformation and Reactive Phase Formation in Electronic Materials IV: Aging, Crystallographic Texturing and Characterization of Solder Joints	Phase Stability, Phase Transformation and Reactive Phase Formation in Electronic Materials IV: Phase Equilibria, Interfacial Energy and Wetting Phenomena in Solder Joints	Phase Stability, Phase Transformation and Reactive Phase Formation in Electronic Materials IV: Interfacial Reactions and IMC Formation in Solder Joints	Phase Stability, Phase Transformation and Reactive Phase Formation in Electronic Materials IV: Effects of Alloying Additions on the Microstructural Evolution of Solders and Solder Joints		3016
Corrosion Sensors and Monitoring	Applications and Fundamentals of High Aspect Ratio Nanomaterials: Simulation & Control of Carbon Nanotube Formation	Applications and Fundamentals of High Aspect Ratio Nanomaterials: Inorganic Nanostructures	Applications and Fundamentals of High Aspect Ratio Nanomaterials: Applications of Carbon-Based and Inorganic Nanostructures	Applications and Fundamentals of High Aspect Ratio Nanomaterials: Nanostructured Composites	Applications and Fundamentals of High Aspect Ratio Nanomaterials: Monitor and Control of Nanostructure Synthesis		3018
Frontiers in Thin Film Growth and Nanostructured Materials: A Symposium in Honor of Prof. Jagdish Narayan: Nanostructures and Nanocomposites I	Frontiers in Thin Film Growth and Nanostructured Materials: A Symposium in Honor of Prof. Jagdish Narayan: Nanostructures and Nanocomposites II	Frontiers in Thin Film Growth and Nanostructured Materials: A Symposium in Honor of Prof. Jagdish Narayan: Thin Films, Coatings and Nanostructures	Frontiers in Thin Film Growth and Nanostructured Materials: A Symposium in Honor of Prof. Jagdish Narayan: Semiconductors	Frontiers in Thin Film Growth and Nanostructured Materials: A Symposium in Honor of Prof. Jagdish Narayan: Advanced Technology and Applications I	Frontiers in Thin Film Growth and Nanostructured Materials: A Symposium in Honor of Prof. Jagdish Narayan: Advanced Technology and Applications II		3020
Functional Thin Films for Sensors: The Physics and Applications of Functional Thin Films in Sensors	Functional Thin Films for Sensors: Novel Synthesis Methods and Applications of Functional Thin Films	Neutron Scattering in Materials Research: Diffraction, Phases, and Micromechanics	Neutron Scattering in Materials Research: Diffraction: Instruments and Nanostructure	Neutron Scattering in Materials Research: Dynamics and Inelastic Scattering	Neutron Scattering in Materials Research: Diffusion and Other Processes		3022
The Langdon Symposium: Flow and Forming of Crystalline Materials: Creep	The Langdon Symposium: Flow and Forming of Crystalline Materials: High Temperature Deformation Including Superplasticity	The Langdon Symposium: Flow and Forming of Crystalline Materials: Grain Boundary Properties and Severe Plastic Deformation	The Langdon Symposium: Flow and Forming of Crystalline Materials: Equal Channel Angular Pressing – and – Poster Session	The Langdon Symposium: Flow and Forming of Crystalline Materials: Ultrafine-Grained Materials I	The Langdon Symposium: Flow and Forming of Crystalline Materials: Ultrafine-Grained Materials II		3024

↓ MARRIOTT HOTEL ↓

Superalloys and Coatings for High Temperature Applications: Bond-Coat Technologies – I	Superalloys and Coatings for High Temperature Applications: Bond-Coat Technologies – II	Superalloys and Coatings for High Temperature Applications: Oxidation Behavior – I	Superalloys and Coatings for High Temperature Applications: Ceramic Materials for TCBs	Superalloys and Coatings for High Temperature Applications: Superalloys – I	Superalloys and Coatings for High Temperature Applications: Superalloys – II	Superalloys and Coatings for High Temperature Applications: Superalloys - III	Nob Hill A/B
Friction Stir Welding and Processing III: Aluminum Alloys	Friction Stir Welding and Processing III: High-Temperature Materials	Friction Stir Welding and Processing III: Friction Stir Processing	Friction Stir Welding and Processing III: Process/Applications	Friction Stir Welding and Processing III: Modeling	Friction Stir Welding and Processing III: Microstructure and Texture		Nob Hill C/D
Beta Titanium Alloys of the 00's: Applications I	Beta Titanium Alloys of the 00's: Applications II	Beta Titanium Alloys of the 00's: Phase Equilibria	Beta Titanium Alloys of the 00's: Composites and Processing	Beta Titanium Alloys of the 00's: Corrosion and Biomedical	Beta Titanium Alloys of the 00's: Mechanical Response		Salon 10/11

SYMPOSIA HIGHLIGHTS AND AVAILABLE PROCEEDINGS

Globalization of Materials R&D

This symposium will discuss the findings of an ad hoc committee of the National Materials Advisory Board that conducted a study to assess the status and impacts of the globalization of materials research and development. The committee conducted a brief survey (based on earlier studies) of materials R&D being carried out around the world, and identified major trends, especially those that affect U.S. capabilities in this area. The group also assessed the forces that are driving these trends, assessed their impacts, and recommended actions to assure U.S. access to current materials R&D.

Materials Theory ↔ Experiment

Connecting theory and experiment is the way in which our materials science knowledge base continues to grow. The TMS Annual Meeting always provides the venue for presentation and healthy discussion of new advances in the field. The 2005 program will include three primary tracks:

- Phases and Phase Transformations
- Multi-scale Mechanical Behavior
- Materials Characterization and Properties

PHASES AND PHASE TRANSFORMATIONS

Hume-Rothery Symposium: The Science of Complex Alloys

This symposium, held in honor of the 2005 Hume-Rothery Award recipient, Uichiro Mizutani, will emphasize both theoretical and experimental aspects of electronic, structural, and thermodynamic properties of complex alloy phases. The invited speakers will provide an assessment of our current understanding of the structural properties of complex materials, including quasicrystalline and amorphous alloys. Special emphasis will be put on our understanding of why Nature is able to stabilize such complex atomic arrangements. Most of these structures have been synthesized by using the Hume-Rothery rule that relates fundamental aspects of electronic structure to stability. In recent years, bulk metallic glasses have been synthesized in many multi-component systems. Here again there is a need to understand better why metallic glasses can be stabilized in bulk form within a specific range of alloy compositions. The above features and more recent results related to structurally complex alloy phases will constitute the main theme of this symposium.

The Armen G. Khachaturyan Symposium on Phase Transformation and Microstructural Evolution in Crystalline Solids

This symposium will honor the remarkable contributions of Armen G. Khachaturyan to many fields in materials science in the last 40 years. In particular, his concentration wave theory of ordering in alloys and ceramic compounds has provided a bridge between statistical mechanics of alloys, their symmetry, macroscopic thermodynamics, and diffraction. This symposium intends to bring together theoretical, computational and experimental materials scientists to address current issues in microstructural evolution during solid-state reactions and effects of defects (dislocations, surfaces, interfaces, grain boundaries, et. al.) and external stress/electrical/magnetic fields. Six sessions are anticipated including both invited and contributed talks in each session. Joint sessions are planned with the symposium on Computational Thermodynamics and Phase Transformations.

Phase Stability, Phase Transformation and Reactive Phase Formation in Electronic Materials IV

This is the fourth in a series of TMS symposia addressing the stability, transformation, and formation of phases during the fabrication, processing, and utilization of electronic materials and devices. Topics of interest include: phase stability issues surrounding microelectronics packaging technology (e.g., stability of under bump metallizations, interfacial reactions at solder joints, phase transformations in lead-free solders during reflow and thermal cycling); phase formation and integrated circuit technology (e.g., phase transformations in metal silicide gate materials, phase stability of contacts and interconnects, and diffusion barrier materials); and the phase stability and morphological evolution of novel electronic materials (such as multicomponent III-V semiconductors, electroceramic materials, strained layers and superlattices, and self-assembled structures).

The proceedings from this symposium are planned for publication in *The Journal of Electronic Materials*.



Phase Transformations Within Small-Size Systems

The emphasis of this symposium is on solid-solid phase transformations that occur within small particles or matrix grains (as opposed for instance to nano-sized precipitates forming within matrix grains of conventional or large size). Examples of such size effects on phase transformations include the size-dependent extension of solid solubility, alteration of phase boundaries and phase equilibria, and suppression of spinodal decomposition and long range ordering. Further examples include significant changes in the morphology, nucleation, and growth of diffusional precipitates and/or martensitic crystals that can occur as a result of the reduced dimensions of the matrix within which they form. These size-dependent changes often lead to novel properties (e.g., retention of ferromagnetism at the nanoscale). Achieving a fundamental understanding of matrix (or matrix grain) size effects on the thermodynamics, kinetics, and mechanisms of phase transformations is crucial, and significant progress is beginning to be made in recent years. Emphasis is on 3-dimensional, nano-size particles and matrix grains, with one or two sessions devoted to thin films (including electrodeposited materials). Topics to be covered include: thermodynamics and phase equilibria; spinodal decomposition; order-disorder transitions; precipitation, allotropic and displacive transformations; magnetic and ferromagnetic transitions; nanopowder metallurgy; devitrification of metallic glass; surface effects and characterization.

The proceedings from this symposium are planned for publication in *Metallurgical and Materials Transactions*



Multicomponent Multiphase Diffusion Symposium in Honor of John E. Morral

Throughout his career, John Morral has dedicated his work to the understanding and application of multicomponent diffusion. This symposium, in honor of John Morral's 65th birthday, will highlight both experimental and theoretical work in a variety of multicomponent multiphase diffusion problems. This work is increasingly important in improving industrial materials processing and development. Highlighted topics are to include diffusion kinetics of high temperature coatings and processing, zig-zag diffusion paths, internal oxidation, carburizing, nitriding, and alloy heat treatment.

Computational Thermodynamics and Phase Transformations

This symposium is the fourth in a series of annual TMS symposia focusing on computational thermodynamics and kinetics of phase transformations. The intent is to assemble materials scientists in both computational and experimental disciplines to assess the current status of computational models and simulation techniques at different time and length scales. Attention will be given to the mechanistic fundamentals and practical applications of phase and microstructure transformation in advanced materials including metals, ceramics, and semiconductors. Of particular interest are computational models that integrate two or more different approaches, analyses that compare the relative merits of various simulation techniques, and validation of simulation results from experimental data.

MULTISCALE MECHANICAL BEHAVIOR

Mechanical Behavior of Thin Films and Small Structures

This symposium will provide a forum for researchers involved in experimental or theoretical investigations into the mechanical behavior of thin films, MEMS and NEMS and other small structures. The symposium will focus on experimental, theoretical, and computational studies related to thin films, MEMS, NEMS and other small structures. These studies will include, but are not limited to, the following subject areas: Thin film mechanics, fatigue, fracture, delamination, deformation, plasticity, creep, electromigration and other mass transfer effects, stability, reliability, in situ techniques, advances in nanomechanical testing techniques, tribological properties including adhesion, friction, wear, and surface chemistry/topography, and theoretical, computational and analytical modeling of mechanical properties in small dimensions.

Computational Aspects of Mechanical Properties of Materials

The objectives of this symposium are to review recent advances in the applications of computational methods and materials sciences principles to simulating or predicting mechanical behavior of materials. Particular interests are on theoretical computation or simulation of mechanical properties of materials over multi-length or time scales and the comparison of theoretical results against experimental data or observations.

The proceedings from this symposium are planned for publication in *Metallurgical and Materials Transactions*



Micromechanics of Advanced Materials II (Symposium in Honor of James C.M. Li's 80th Birthday)

Since the micromechanics of materials controls the structural integrity and hence the reliability of all complex advanced structures and devices, it is both technologically and timely important to propose the second symposium on this topic in 2005 at the same time to celebrate Professor James C.M. Li's 80th birthday, who made significant contributions in all areas of micromechanics of materials. We hope to draw all Professor Li's long time colleagues, friends, and students in the fields of micromechanics and materials science to join this symposium. There will be many invited talks as in the first symposium. Some examples of what could be included in the proposed sessions are 1) mechanical

UPDATE:

Computational Thermodynamics and Phase Transformations Symposium to feature Plenary Presentation by the Director of the Princeton Materials Institute



Anisotropic Grain Boundary Properties



Speaker: Dr. David J. Srolovitz, Director – Princeton Materials Institute

Grain boundary structure and properties depend on five distinct crystallographic variables: three to describe the relative orientation of one grain with respect to the other and two to describe the boundary plane. The evolution of polycrystalline structures may depend upon the anisotropy in grain boundary mobility, grain boundary free energy/stiffness, efficiency with which the boundary absorbs defects. In this presentation, we focus upon grain boundary properties that are important for quantitative modeling of the evolution of polycrystalline microstructures as a function of these crystallographic parameters (i.e., grain boundary mobility and grain boundary stiffness). We discuss how to determine these properties using molecular dynamics simulations. Finally, we compare predicted grain boundary dynamical properties with experimental measurements to draw some conclusions on what controls the rate at which polycrystalline structures evolve.

properties of small dimensions; 2) experimental methods and studies of micromechanics of localized deformation; 3) thermodynamics and rate theory of micromechanical processes; 4) micromechanics of fracture and fatigues; 5) contact adhesion of smooth and rough surfaces; 6) micro-cutting and machining; 7) residual stresses in micro-systems and 8) Micro-mechanical packaging.

MATERIALS CHARACTERIZATION AND PROPERTIES

Characterization of Minerals, Metals, and Materials

The symposium will provide an update to the current progress in characterization studies in minerals, metals, and materials industry. The scope includes current industrial applications, research and developments, and innovative fundamental researches.

Proceedings from this symposium will be published in *EPD Congress 2005*.

EPD Congress 2005

M. Schlesinger, editor

ISBN: 0-87339-581-6

Approx. 1,600 pages, illustrated, CD-ROM format

Order number: 05-5816-CD

Shipping weight: 11b

Member price: \$156

Nonmember price: \$222

Use the advance registration form to order at the special at-meeting price, \$156.



Neutron Scattering in Materials Research

This symposium will cover neutron scattering methods of materials research including: powder neutron diffraction and single crystal diffraction, engineering neutron diffraction, small-angle neutron scattering, neutron reflectometry, and inelastic scattering. Invited talks will emphasize the new and future capabilities of these experimental methods for materials research. Contributed presentations are welcome in any of these fields.

Neutron Diffraction Characterization of Mechanical Behavior

Application of neutron diffraction in engineering materials characterization becomes increasingly prevalent due to its unique ability to provide microscopic insights to the mechanical behavior of advanced materials and components. The symposium will provide an international forum for the presentation and discussion of recent experimental results. Specific topics will include: (1) polycrystalline deformation mechanisms, (2) mechanical behavior of composites, (3) residual stress measurements, and (4) advances in instrumentation and data acquisition/analysis scheme.

Corrosion Sensors and Monitoring

Early warning of corrosion or coating degradation through the use of advanced sensors and monitoring techniques can make a substantial impact on the ability to preserve structural integrity. This approach can also lead to reductions in the risk of fatigue failure that is initiated by corrosion damage. Environmental information from monitoring systems also allows operators to optimize local maintenance schedules by focusing effort where it is most required. The purpose of this symposium is to bring engineers and scientists together to present and discuss new strategies and technologies for corrosion detection and monitoring. Topics will include but not be limited to electrochemical noise methods, sensor arrays, scanning electrode techniques, and optical methods.

Microstructural Processes in Irradiated Materials

Radiation can produce dramatic improvements or degradation in the properties of materials. An understanding of the microstructural changes occurring during irradiation is critical for the development of predictive models. The scope of this symposium will focus on the microstructural changes occurring in solids during ion, electron, neutron, gamma ray, or x-ray irradiation. This symposium, which is the sixth in a series of symposia held every two years, is intended to bring together researchers working on different materials systems so that similarities and differences in radiation effects can be compared. Materials of interest include metals, intermetallics, semiconductors, insulators, and superconductors.

Processing ↔ Properties

Understanding the connections between processing and properties is fundamental to the ability of materials engineers to develop and implement improved processes and products. A traditional strength of the TMS Annual Meeting is programming covering the full range of processing from basic extraction through end product manufacturing processes. The themes in this area for 2005 are:

- Aluminum Primary Processing
- Magnesium Technology
- Extractive Processing
- Downstream Metals Processing
- Surface Engineering

ALUMINUM

Alumina and Bauxite

The Alumina and Bauxite Symposium, along with cast shop technology, aluminum reduction technology, carbon technology, recycling technology, and reactive

metals, collectively form the Light Metals Symposium, where experts from the Light Metals Industry and academia from all over the world meet each other and share information. Papers are solicited from the following subject areas: Bayer process: fundamentals, chemistry, operational experiences; safety and environment with focus on residues; bauxite mining; process control; analytical methods; design of refineries.

Proceedings from this symposium will be published in *Light Metals 2005*

Light Metals 2005

H. Kvande, editor

ISBN: 0-87339-580-8

Approx. 1,450 pages, illustrated,
hardcover book and CD-ROM set

Order number: 05-5808-G

Shipping weight: 8 lbs

Member price: \$175

Nonmember price: \$249

Use the advance registration form to order at the special at-meeting price, \$175.



Aluminum Reduction Technology

The Aluminum Reduction Technology Symposium, along with alumina and bauxite, cast shop technology, carbon technology, recycling technology, reactive metals, and potroom operations - potroom improvements, collectively form the Light Metals Symposium, where experts from the Light Metals Industry and academia from all over the world meet each other and share information. Papers were solicited from the following subject areas: cell design; cell operation (performance and operating advances); new cell materials; cell modernization and productivity increase; process control; modeling of cell design; environmental aspects; fundamentals; and bath chemistry; Inert anodes.

Proceedings from this symposium will be published in *Light Metals 2005*

Light Metals 2005

Member price: \$175

Nonmember price: \$249

Use the advance registration form to order at the special at-meeting price, \$175.



Carbon Technology

The Carbon Technology Symposium, along with aluminum reduction technology, alumina, and bauxite, cast shop technology, recycling technology, and reactive metals, collectively form the Light Metals Symposium, where experts from the Light Metals Industry and academia from all over the world meet each other and share information. Papers were solicited from the following subject areas: anode raw materials and properties; paste plant design and operation; baking furnace design and operation; roasting room design and operation; anode quality and performance; carbon plant environmental and safety; carbon cathode materials and performance.

Proceedings from this symposium will be published in *Light Metals 2005*

Light Metals 2005

Member price: \$175

Nonmember price: \$249

Use the advance registration form to order at the special at-meeting price, \$175.



Cast Shop Technology

The Cast Shop Technology Symposium, along with carbon technology, aluminum reduction technology, alumina and bauxite, recycling technology, and reactive metals, collectively form the Light Metals Symposium, where experts from the Light Metals Industry and academia from all over the world meet each other and share information. Papers were solicited from the following subject areas: charge materials; melting; filtration; pre-furnace treatment; casting processes; fluxing; environmental issues; shape casting; grain refinement; modeling and control; automation; cast structures; safety.

Proceedings from this symposium will be published in *Light Metals 2005*

Light Metals 2005

Member price: \$175

Nonmember price: \$249

Use the advance registration form to order at the special at-meeting price, \$175.



Industrial Energy Reduction: Materials Opportunity Analyses

New and advanced materials and materials fabrication techniques can have a significant effect on energy efficiency in industrial processing through improved component performance and life extension. Although numerous opportunities exist for materials solutions to play a beneficial role in manufacturing, it is not always obvious in which applications advanced materials will have a key impact on energy efficiency. Analytical studies can be used to understand and identify the most promising materials related opportunities, and to quantify the potential benefits. They provide useful information for prioritization and planning for materials development.



MAGNESIUM TECHNOLOGY

Magnesium Technology 2005

This symposium, sponsored by the Magnesium Committee of the Light Metals Division of TMS and the International Magnesium Association will cover various topics of magnesium technology including Primary production and market; Recycling and environmental issues; Alloy development; Phase transformations; Manufacturing processes; Mechanical and physical properties; Cast and wrought alloys; Welding and joining; Corrosion and Surface Finishing; and Applications and research programs.

Proceedings from this symposium will be published in *Magnesium Technology 2005*

Magnesium Technology 2005

N. Neelameggham, editor

ISBN: 0-87339-582-4

Approx.: 700 pages, illustrated, hardcover book, and CD-ROM set

Order number: 05-5824-G

Shipping weight: 4 lbs

Member price: \$105

Nonmember price: \$150

Use the advance registration form to order at the special at-meeting price, \$105



EXTRACTIVE PROCESSING

Converter and Fire Refining Practices

Recent developments in continuous and batch converting practices. Influence on fire refining as a result of these updates are also to be discussed. Vessel design and control and optimization techniques can form part of this review.

Proceedings from this symposium will be available as a printed proceedings and on the *EPD Congress 2005 CD-ROM*

EPD Congress 2005

M. Schlesinger, editor

ISBN: 0-87339-581-6

Approx.: 1,600 pages, illustrated, CD-ROM format

Order number: 05-5816-CD

Shipping weight: 11b

Member price: \$156

Nonmember price: \$222

Use the advance registration form to order at the special at-meeting price, \$156.



Converter and Fire Refining Fundamentals
A.G. Ross, Editor
ISBN: 0-87339-586-7
Approx.: 448 pages, illustrated, softcover book
Order number: 05-5867
Shipping weight: 2
Member price: \$121
Nonmember price: \$173

Use the advance registration form to order at the special at-meeting price, \$121.

Extractive Metallurgy

This symposium will discuss general topics in Pyrometallurgy, Aqueous Processing, and Waste Treatment and Minimization. This includes the science, technology, and industrial practice of the processing of ores and the treatment and minimization of wastes.

Proceedings from this symposium will be published in *EPD Congress 2005*

EPD Congress 2005
Member price: \$156
Nonmember price: \$222

Use the advance registration form to order at the special at-meeting price, \$156.



Materials Processing Fundamentals

This symposium will cover all aspects of the fundamentals, synthesis, analysis, design, monitoring, and control of metals, materials, and metallurgical processes and phenomena. Topics include the experimental, analytical, and computer modeling aspects of the physical chemistry, thermodynamics, and transport phenomena in materials and metallurgical processes as well as monitoring and control methodologies involved in these processes. Research relating to processes involving iron and steel, nonferrous metals, or lightweight alloys and topics that relate to process monitoring and control involving laboratory or in-plant validation are especially encouraged.

Proceedings from this symposium will be published in *EPD Congress 2005*

EPD Congress 2005
Member price: \$156
Nonmember price: \$222

Use the advance registration form to order at the special at-meeting price, \$156.



Arsenic Metallurgy: Fundamentals & Applications

The International Symposium presents modern technologies/fundamentals available that are necessary for further advances in arsenic metallurgy. Arsenic has been a problem associated with the extraction of nonferrous metals since the Bronze Age. During the past decade a combination of both lower grade ores and environmental concerns has resulted in accelerated

technological developments to meet this arsenic challenge. Of particular interest has been the treatment of arsenical precious metals feed stocks.

Proceedings from this symposium will be available as a printed proceedings and on the *EPD Congress 2005 CD-ROM*

EPD Congress 2005
Member price: \$156
Nonmember price: \$222

Use the advance registration form to order at the special at-meeting price, \$156.



Arsenic Metallurgy: Fundamentals and Applications

R. Reddy, editor
ISBN: 0-87339-585-9
Approx.: 400 pages, illustrated, softcover book
Order number: 05-5859
Shipping weight: 2
Member price: \$104
Nonmember price: \$148

Use the advance registration form to order at the special at-meeting price, \$104.



Precious Metals: Au, Ag, Pt, Pd, Os, Rh, Ir, Ru

Primary and secondary production processing and recycling of the precious metals.

Proceedings from this symposium will be published in *EPD Congress 2005*

EPD Congress 2005
Member price: \$156
Nonmember price: \$222

Use the advance registration form to order at the special at-meeting price, \$156.



Reactive Metals

Papers are solicited on all aspects of the extraction, separation, purification, preparation, production and application of reactive metals (those that typically require molten salt processing), including but not limited to alkali metals (Li, Na, K), alkaline-earth metals (Be, Ca), groups 3-6 refractory metals (Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, W), rare earths, and actinides.

Proceedings from this symposium will be published in *Light Metals 2005*

Light Metals 2005
H. Kvande, editor
ISBN: 0-87339-580-8
Approx. 1,450 pages, illustrated, hardcover book and CD-ROM set
Order number: 05-5808-G
Shipping weight: 8 lbs
Member price: \$175
Nonmember price: \$249

Use the advance registration form to order at the special at-meeting price, \$175.



Metallurgical Technology for Waste Minimization

Many hydrometallurgical and pyrometallurgical technologies have been developed in the metal refining processes. On the other hand, various kinds of wastes are discharged from electric, electronic, and non-ferrous metal industries. These wastes contain metal values such as Cu, Zn, Ni and precious metals to be recovered by a suitable separation method. Best matching between wastes and metallurgical technologies is important to realize waste minimization. The session will cover various applications of metallurgical technologies to waste minimization and the related area.

Proceedings from this symposium will be published in EPD Congress 2005

EPD Congress 2005

Member price: \$156

Nonmember price: \$222

Use the advance registration form to order at the special at-meeting price, \$156.



DOWNSTREAM METALS PROCESSING

Friction Stir Welding and Processing III

This conference will highlight recent advances in friction stir welding and processing.

Frontiers in Solidification Science

This symposium will focus on emerging developments in solidification Science and the associated experimental, analytical, and computational techniques used for their investigation. The objective is to bring to the forefront those questions which are critical to the advancement of the field and to discuss the benefits and limitations of various new approaches. Topics of interest include novel experimental and theoretical approaches leading to the advancement of Solidification Science in the areas of morphological stability and selection, nucleation phenomena, chemical partitioning and segregation, microstructural evolution, multiple length-scale phenomena, intrinsic properties of crystal-melt interfaces, impurity effects at crystal-melt interfaces, growth mechanisms, and interface kinetics. Several contributed abstracts will be selected for oral presentation. Others will be selected for poster presentations. All posters will be presented at a formal poster session/reception, which will be held Monday evening before the Solidification Committee meeting.

Proceedings from this symposium will be published in a proceedings volume available at the meeting



Friction Stir Welding and Processing III

K. Jata, editor

ISBN: 0-87339-584-0

Approx.: 250 pages, illustrated, softcover book

Order number: 05-5840

Shipping weight: 3 lbs

Member price: \$112

Nonmember price: \$160

Use the advance registration form to order at the special at-meeting price, \$112.

Shape Casting — The John Campbell Symposium

An international three day symposium is being held to recognize Prof. John Campbell's many years of service to the field of shape castings. The symposium will celebrate his exceptionally productive career and contributions as a researcher, friend, and mentor. Highlights of the event will include:

- A comprehensive technical program, focusing on the contributions of Prof. Campbell, such as his 10-Rules for high quality castings, gating system design, process modeling, and structure-process-property relationships.
- An in-depth exploration of the latest casting innovations in quality, reliability, and process design - Presentations by researchers from around the world on leading-edge casting technologies.

Proceedings from this symposium will be published in a proceedings volume available at the meeting

Shaped Casting of Metals: Proceedings of the Symposium in Honor of John Campbell

M. Tiryakioglu and P. Crepeau, editors

ISBN: 0-87339-583-2

Approx. 250 pages, illustrated, hardcover book and CD-ROM set

Order number: 05-5832-G

Shipping weight: 3 lbs

Member price: \$107

Nonmember price: \$152

Use the advance registration form to order at the special at-meeting price, \$107.



The Langdon Symposium: Flow and Forming of Crystalline Materials

This symposium is designed to honor Prof. Terence G. Langdon on the occasion of his 65th birthday, by bringing together many of his former students, research colleagues, friends, and all interested in a symposium devoted to his research interests over the past 40 years. It will have three inter-related thrust areas associated with flow and forming: 1). Creep (including the creep behavior of metals, ceramics and composites; creep mechanisms; the role of grain boundary sliding; microstructures in creep). 2). Superplasticity (including mechanisms of flow; factors influencing ductility; the role of cavitation; superplastic forming; industrial applications). 3). Severe plastic deformation - SPD (including equal-channel angular pressing and other SPD techniques; microstructural development; mechanical properties and superplastic flow after SPD; mechanisms associated with SPD processing).

Recycling - General Sessions

Sessions will cover innovative research work, advances in ongoing research, and general industrial practices from recycling of materials. Reports of work in other fields, including optimization of physical, aqueous, and thermal processing of scraps and waste; environmental and economic impacts; material selection and design based on recyclability; life-cycle analysis of materials; properties; and applications of recovered materials are welcomed.

Proceedings of the Light Metals Recycling session will be published in *Light Metals 2005*.

Light Metals 2005
H. Kvande, editor
ISBN: 0-87339-580-8
Approx. 1,450 pages, illustrated, hardcover book and CD-ROM set
Order number: 05-5808-G
Shipping weight: 8 lbs
Member price: \$175
Nonmember price: \$249

Use the advance registration form to order at the special at-meeting price, \$175.

Proceedings from the Heavy Metals Recycling session will be published in *EPD Congress 2005*.

EPD Congress 2005
M. Schlesinger, editor
ISBN: 0-87339-581-6
Approx.: 1,600 pages, illustrated, CD-ROM format
Order number: 05-5816-CD
Shipping weight: 11b
Member price: \$156
Nonmember price: \$222

Use the advance registration form to order at the special at-meeting price, \$156.

SURFACE ENGINEERING

Surface Engineering in Materials Science-III

The objective of this symposium is to provide a multidisciplinary discussion on surface related phenomena by which materials performance may be enhanced through engineered interface and surface modification technologies. Specific topics include, but are not limited to: PVD and CVD processes, nanostructured and nanoparticles synthesis, thermal barrier coatings, biomedical coatings, functional coatings for electronic, optical and magnetic applications, surface modification by plasma, ion and laser beam techniques, direct fabricated materials, coatings for space, automobile and environmental industries, corrosion and oxidation resistance coatings, modeling, mechanical and tribological properties, interface properties and adhesion, advanced surface investigation techniques, ultrahard coatings.

Proceedings from this symposium will be published in a proceedings volume available at the meeting.

Surface Engineering in Materials Science III
A. Agarwal, S. Seal, and N. Dahotre, editors
ISBN: 0-87339-590-5
Approx. 376 pages, illustrated, softcover book
Order number: 05-5905
Shipping weight: 2 lbs
Member price: \$150
Nonmember price: \$213

Use the advance registration form to order at the special at-meeting price, \$150.

Superalloys and Coatings for High Temperature Applications

This symposium will provide a forum for the discussion of: (i) the degradation mechanisms which occur in superalloys, including oxidation and corrosion, and their effect on mechanical properties (ii) coatings for the superalloys, including overlays and thermal barrier systems, and (iii) issues concerning the compatibility of superalloys with coatings, particularly bond coat technologies.

Texture and Microstructure in Thin Films and Coatings

This symposium aims to discuss specific issues of microstructure and crystallographic texture development and evolution in films and coatings. (Processing-structure and structure-properties relationships will be addressed in connection with structural evolution). The purpose of this symposium is to provide an opportunity for researchers in industry, laboratories, and academia to discuss relevant issues of processing of films and structural evolution in electronic and magnetic films.



The problems of design of structure and texture in films for optimum properties and performance will be discussed. The presentations on coatings and surface modification methods to improve the high temperature oxidation resistance, wear, hardness, corrosion, thermal conductivity, and friction are also planned. A joint session with the symposium on Refractory Metals for Electronic Applications is planned.



Proceedings from this symposium will be published in the *Journal of Electronic Materials*.

Functional Thin Films for Sensors

Functionalized thin films for various sensing applications are attracting growing interest due to their fascinating properties and unique behavior in various environments. The transduction schemes for these new materials often involve new chemical and physical phenomena associated with size confinement, microstructure, phase domain distribution, and etc. Some examples include quantized excitation or emission, metal-insulator transition, nonlinear optical properties, very high gas adsorption rates, chemical and physical selectivity. The ability to controllably synthesize these thin film structures is key to advancing sensor science and technology (e.g., gas sensors, chemical sensors, light detectors, non invasive sensors). Functional thin films are readily incorporated in prototypes and devices demonstrating performance far exceeding that of existing sensor products. Multi-parameter porous silicon sensors, metal ion sensors based on self-assembled monolayers and uncooled IR thin film detectors are noteworthy examples of such devices. The development of economically viable and practically useful functional thin films requires a great deal of inventiveness and creativity. This symposium aims to foster such activities by providing opportunities for intensive discussions and exchange of ideas. Multiple sessions, each having a specific topic, are planned. These topics will include:

- The physics and applications of sensor thin films (gas sensing, chemical sensing, optical sensors, magnetic sensors, etc.)
- Chemical methods for synthesizing functional thin films for sensors
- Self assembly
- New concepts for thin films electronic, photonic, and magnetic structures and devices

Proceedings from this symposium will be published in the *Journal of Electronic Materials*.



Photonic Processing, Process Monitoring, and Diagnostics

The purpose of the symposium is to provide a forum for the representation of current activities and new ideas in the general area of photonic processing of materials and process monitoring using photonic devices. Papers will address (a) the new application of conventional processes, (b) new, more efficient technologies (c) numerical methods for the design of these processes. Papers on experimental studies that can support the advancement of analytical methods are also planned. Typical topics may include laser surface processing, infrared processing, optoelectronic devices, ultrafast processing of thin films, infrared imaging, laser systems for process monitoring, and diagnostics based on photonic sensors. In addition to theoretical studies, experimental efforts that generate data to validate the models are encouraged; as are applications of these techniques to solve relevant problems, especially by industrial investigators.

Materials ↔ Applications

The connections between materials science and engineering often occur when materials are developed for specific applications. Exploring and understanding the diversity of materials development approaches and complexity in end use requirements provides TMS Annual Meeting attendees with useful knowledge that can be applied to their specific areas of responsibility. In 2005 a wide range of programming will be presented in this area with the themes of:

- Transportation
- Emerging Materials
- Electronic Materials
- Other Application Areas

TRANSPORTATION

6th Global Innovations Symposium: Trends in Materials and Manufacturing Technologies for Transportation Industries

The symposium will focus on the latest advances and developments in materials and manufacturing technologies used in the Transportation Industry. It is intended to provide the industrial and research communities a forum for the technical exchange of recent advances in all aspects of processing, fabrication, structure-property relations, evaluation, applications of advanced materials and manufacturing technologies as they relate to the Transportation Industries. Topics will include high performance materials and innovative manufacturing processes for a wide variety of applications in



the automotive, aerospace, aviation and ground transportation fields.

Topics include:

- Advanced materials (metals, polymers, compacted powders, composites and ceramics)
- Innovative manufacturing processes (warm forming, hydroforming, casting, superplastic forming, adhesive bonding, advanced welding, and joining)
- Microstructures, phase transformations (age hardening), and texture
- Thermo-mechanical processing (rolling, extrusion, forging)
- Shaping, forming, joining, welding, coating
- Modeling of constitutive relationships, simulation of plastic deformation
- Material consistency, mechanical properties, manufacturability
- Performance assessment, material qualification
- Powder metallurgy
- Nanomechanical behavior

The proceedings from this symposium are planned for concurrent publication.

6th Global Innovations Symposium on Materials Processing: Trends in Materials and Manufacturing Technology and Powder Metallurgy R&D in the Transportation Industry
T.R. Beiler, J.W. Sears, J.E. Carsley, H.L. Frasier and J.E. Smugeresky, editors
ISBN: 0-87339-591-3
Approx. 433 pp., illus., softcover
Order number: 05-5913
Shipping weight: 3 lbs
Member price: \$109
Nonmember price: \$155

Use the advance registration form to order at the special at-meeting price, \$109.

Automotive Alloys 2005

Automotive Alloys 2005 symposium is seeking papers to capture the ongoing research, development and testing activities for usage of aluminum and magnesium alloys in automotive applications.

Beta Titanium Alloys of the 00's

It will cover advances in the technology of beta alloys in the last decade - 3rd in a series on this subject. We'll be covering alloy development, physical metallurgy, heat treatment, fabrication and processing and applications of this alloy system - advances in the last decade. It will include beta-rich alpha-beta alloys.

The proceedings from this symposium are planned for publication after the meeting.

Powder Metallurgy Research and Development in the Transportation Industry

Powder Metallurgy Research and Development in the Transportation Industry for Current and Future Applications. Symposium will be in-conjunction with the 6th Global Innovations and cover topics relating to powder materials in aerospace, automotive, and other transportation industries.

The proceedings from this symposium are planned for concurrent publication.

6th Global Innovations Symposium on Materials Processing: Trends in Materials and Manufacturing Technology and Powder Metallurgy R&D in the Transportation Industry
T.R. Beiler, J.W. Sears, J.E. Carsley, H.L. Frasier and J.E. Smugeresky, editors
ISBN: 0-87339-591-3
Approx. 433 pp., illus., softcover
Order number: 05-5913
Shipping weight: 3 lbs
Member price: \$109
Nonmember price: \$155

Use the advance registration form to order at the special at-meeting price, \$109.

Materials for the Hydrogen Economy

U.S. energy dependence is driven by transportation, which accounts for two-thirds of the 20 million barrels of oil our nation uses each day. The U.S. imports 55% of its oil, and this is expected to grow to 68% by the year 2025 under the status quo. Nearly all of our cars and trucks currently run on either gasoline or diesel fuel. This situation requires that alternative fuels be developed to promote future U.S. energy security. Hydrogen is a very attractive alternative fuel. It is ubiquitous (hydrogen is a constituent of water), clean, efficient, and can be derived from diverse U.S. domestic resources. Both renewable (biomass, hydro, wind, solar, geothermal) and non-renewable (nuclear, coal, natural gas) energy sources can be employed to produce hydrogen. Hydrogen can then be employed in high-efficiency power generation systems, including fuel cells for both vehicular transportation and distributed electricity generation. At the present time, there are three primary technology barriers that must be overcome for a transition to a hydrogen economy in the next few decades. First, the cost of safe and efficient hydrogen production and delivery must be significantly lowered. Second, hydrogen storage systems for vehicular and stationary applications must be developed. Finally, the cost of fuel cell power systems must be reduced. Materials will play a crucial role in addressing all of these technology barriers. Papers are planned in the areas of materials for hydrogen production, delivery, storage, and fuel cells, as well as the area of hydrogen embrittlement.



The 6th Global Innovations Symposium

Trends in Materials and Manufacturing Technologies for Transportation Industries to feature plenary presentations by two General Motors Directors



Tuesday, February 15, 2005

Automotive Research: Technical Trends and Challenges

Speaker: Dr. Alan I. Taub, Executive Director – Research & Development, General Motors Corporation



Dr. Alan I. Taub

The population of the earth stands above 6.3 billion people today and in another 15 years will approach 7.5 billion. As world population rises, vehicle ownership is also expected to climb dramatically. In order to sustain increasing numbers of vehicles, the automotive industry must address important challenges in several key areas: energy, emissions, safety, congestion, and affordability. This talk will cover General Motors' current strategies on how to address these challenges, highlighting developments in advanced propulsion, vehicle electronics, lightweight and smart materials, and agile manufacturing. These technologies are key to enable the industry to extend the significant benefits of personal mobility to people around the globe.

Wednesday, February 16, 2005

The Hydrogen Economy – Materials Challenges and Opportunities

Speaker: Dr. James A. Spearot, Director – Chemical and Environmental Sciences Laboratory, General Motors Research and Development Center



Dr. James A. Spearot

Recent debate in both government and technical forums has focused on the value, the possibility, and the timing of meeting future transportation fuel demands by use of hydrogen generated from renewable sources of primary energy. The justifications for and the criticisms against development of renewable energy supplies and hydrogen-fueled propulsion systems are reviewed, and the technical hurdles to be overcome in creating such a future vision are identified. If the vision of a hydrogen-fueled transportation system is to become reality, significant material inventions and developments will be required. The opportunities for critical materials research programs in the areas of hydrogen generation, fuel cell development, and hydrogen storage are described. The status of General Motors' progress in development of hydrogen-fueled, fuel cell-powered vehicles is used to demonstrate the potential that a clean, renewable-hydrogen fuel-based transportation system can provide in meeting societal goals.

EMERGING MATERIALS

Applications and Fundamentals of High Aspect Ratio Nanomaterials

This symposium will address the applications and fundamental physics and chemistry of high aspect ratio nanomaterials. High aspect ratio nanomaterials include nanotubes, nanowires, nanobelts, nanorods, etc. These materials may be of any composition. The nanomaterials may be carbon-based, silicon-based or a variety of functional materials such as complex magnetic, ferroelectric, and piezoelectric oxides, functional intermetallics such as ferromagnetic shape memory alloys, or

complex magnetic materials for spintronics. Topics of interest related to high aspect ratio nanomaterials include, but are not limited to, controlled and directed growth; physics and chemistry or other fundamental properties; theoretical modeling studies; their use in sensing, electronic, magnetic, biologic, or other scientific applications; synergistic growth or use as building blocks for complex or hybrid systems.

Proceedings from this symposium are planned for publication in the *Journal of Electronic Materials*.



Bulk Metallic Glasses

In the last decade, new approaches to fabricating metallic glasses (i.e., by utilizing unique combinations of elements to form metallic-glass alloys) have resulted in the required cooling rate dropping from 10⁵°C/s to as low as 1°C/s, and the specimen size increasing from 0.05mm to as large as 80mm. Because of the large sizes possible with this exciting technology, the metallic glasses are called BMGs.

Mechanical behavior of BMGs is among the new, exciting fields of research that are fully illustrating their advantages over crystalline alloys. Generally, BMGs have higher fracture strengths, fracture toughnesses, and elasticities than their crystalline counterparts. There is great interest in BMGs for use in biomedical, structural, and mechanical applications.

Frontiers in Thin Film Growth and Nanostructured Materials: A Symposium in Honor of Prof. Jagdish Narayan

This symposium will honor Prof. Jay Narayan for his pioneering research contributions to materials research related to beam processing and characterization of semiconductors, superconductors, and nanostructured materials. This symposium will focus on applications of cutting edge materials processing techniques and characterization methods that facilitate the convergence of thin films and nano materials technology in data storage, computing, sensing, medicine, pharmaceuticals, biomedical devices, chemical and energy and other novel applications. We propose to schedule several plenary lectures in the development of next generation advanced materials structures and characterization techniques. Papers are planned in the following areas, but are not limited to:

- Nano and thin film Technology - Information Technology Convergence
 - Processes for magnetics, Photonics, electronics
 - Nanoscale Devices
- Nanotechnology - Medical Technology Based Convergence
 - Nanostructured Surfaces and Interfaces
 - Nanostructured Medical Devices
- Nanotechnology - Structural Materials Based Convergence
 - Metallic Nanoparticles
 - NanoComposites and Nanolaminates
- Nanotechnology - Chemical Based Materials Convergence
 - Energetic Materials Systems
 - Nanoslurries, Pastes, etc.
- Nanoscale Characterization Techniques
 - Interface and Surface Characterization in Nanostructured Materials
 - Nanomechanical Characterization Techniques

Biological Materials Science and Engineering

The Biology-Materials connection is a fertile field of research with limitless possibilities. The constituents of biological systems are biological materials whereas biomaterials are synthetic materials developed for and used in the body. The structures and properties of biological materials have an unmatched breadth and complexity. The structure-property relationships in these materials are only starting to be established at the present time. Present thrusts toward developing novel biomaterials with unique tailored properties and improved biocompatibility are yielding exciting concepts. Biomimetics is a newly emerging interdisciplinary field in which lessons learned from biology form the basis for novel material concepts. This new field of biomimetics investigates biological structures, establishing relationships between properties and structures in order to develop methods of processing and microstructural design for new materials. It is giving rise to new materials concepts, including multifunctional and hierarchically-structured materials, and new materials synthesis/processing approaches. Many properties of biological materials are far beyond those that can be achieved in synthetic materials with present technologies. Biological organisms produce complex composites that are hierarchically organized in terms of composition and microstructure, containing both inorganic and organic components in complicated mixtures. These totally organism-controlled materials are synthesized at ambient temperature and atmospheric conditions. The unique microstructures in biological composites and the resulting properties have been, until recently, unknown to Materials Scientists, but are now beginning to stimulate creativity in the development of future synthetic materials. The symposium will encompass the following themes: Biological materials, Biomaterials (Bioimplants), and Biomimetics.

Proceedings from this symposium are planned for publication in the *Metallurgical & Materials Transactions*.



Employment Referral Board

An employment referral board will be located at the TMS Member Services Desk. Attendees may leave their resumes and employers may post job openings. Information and resume forms will be available at the display.

Polymer Nanocomposites— Their Science, Technology, and Applications

This four-session symposium will focus on the science and technology of polymer-based nanocomposites. Both fully dense materials and nanocomposite foams are included. It is intended to present a cross-section of the state-of-the-art regarding production, properties and applications of these materials. Coverage includes: synthesis techniques; nanoparticle and nanofibre fillers; surface functionalization; matrix / filler optimization; properties (e.g. thermal, electrical, optical, diffusion; mechanical, chemical, etc); and characterization techniques. Secondary properties such as fatigue, service temperature range, flame retarding, density, and acoustic absorption are also important. Existing and potential applications for nanocomposites, in particular those which take advantage of the multifunctional properties which can be obtained with these materials are especially welcomed.

**RESERVE YOUR
PROCEEDINGS VOLUMES
ON THE ENCLOSED
TMS ANNUAL MEETING
AND EXHIBITION
REGISTRATION FORM.**

Books and CD-ROMs purchased via the TMS Annual Meeting & Exhibition Registration form must be obtained at the meeting. Those not obtaining their ordered books will be required to pay the shipping and handling fees for their order.

ELECTRONIC MATERIALS

Lead Free Solder Implementation: Reliability, Alloy Development, New Technology

This symposium will focus on the implementation of lead free solder alloys in the manufacture of electronic assemblies. Papers which address the long-term reliability of solder joints and electronic assemblies are especially welcome. Topics in this area could include: long term thermal cycling, damage accumulation, property deterioration, and statistical analysis techniques. Solder alloy development is also of interest. Topics in this area could include: modifications to Sn-Ag-X alloys, alternatives to Sn-Ag-X alloys, materials and manufacturing challenges in solder alloy design, structure-property-processing relationships of bulk solders and solder joints, alloy development for optical/Optoelectronic and MEMS packaging, influence of surface and underbump metallization on solderability and integrity of solder joints, microstructure modeling and control, and testing methodologies of various kinds of electronic packages. Presentations will also focus on new technologies and techniques. These could include: soldering processes, metallization (board and component finishes), alternative interconnect technologies for stress management at both the wafer level, and chip to package level, and the issues involved in the design and integration of conductive adhesives in electronic packaging.

Proceedings from this symposium are planned for publication in the *Journal of Electronic Materials*.



Refractory Metals in Electronic Applications

Refractory metals (Cr, Mo, W, Ta, Nb, Zr and Ti) have electrical, thermo-mechanical and chemical properties that are uniquely applied in electronic material applications as well as in production of electronic materials. This symposium will review the unique properties and applications of refractory metals including (1). Electronic packaging/heat sinks, (2). Thin films for integrated circuits, displays, and wiring, and (3). Electronic processing. The unique properties include low thermal expansion, high stiffness, electrical conductivity, and chemical stability. The purpose of this symposium is to provide a venue to expand industrial and research knowledge-base to improve the applications of refractory metals in electronic materials with their unique properties and characteristics.

Biological Materials Science and Engineering Symposium will include Notable Plenary Speakers



The organizers of this symposium, co-sponsored by the Society of Biomaterials and the Surfaces in Biomaterials Foundation, have received commitments from 3 of the world's most well-known and respected leaders in the field of biological materials. Their plenary presentations, described below, will represent the most advanced, cutting-edge progress that is being made in this exciting and important area of materials application.



Biological and Artificial Attachment Devices: Lessons for Materials Scientists from Flies and Geckos

Speaker: Dr. Eduard Arzt, Max-Planck-Institut für Metalle Research and

Institut für Metallkunde, University of Stuttgart, Germany

This talk will describe an interdisciplinary study involving materials scientists, biologists, and physicist aimed at elucidating the correlation between structure and performance of attachment devices in insects, spiders, and geckos. In all of these cases, adhesion is mediated by the interaction of finely-structured contact elements with the different substrates. Local mechanical properties and adhesion forces are measured by nanomechanical test methods and compared with predictions based on theoretical contact mechanics. For example, it has been possible for the first time to measure the adhesion of single gecko spatulae, with dimensions of 200 nm, to selected substrates by atomic force microscopy. Structure, size, and shape of the contact elements are found to play important roles; in particular the principle of “contact splitting” has been identified: finer contact elements (down to sub-micron level) produce larger contact forces in heavier animals. The actual dimensions of the contact elements follow exactly the theoretical predictions, a relationship that covers 6 orders of magnitude in animal mass from the fruit fly to the gecko! From our findings, important conclusions can be drawn on the optimal design of artificial contact elements. The talk will present first prototype adhesive surfaces produced with this insight and identify their technical limits by introducing “adhesion mechanism maps”. These developments have led to the design of artificial micro-attachment systems (“biomimicry”) which are potentially useful in micro-technology.



Single-cell Nanomechanics and Human Disease States

Speaker: Dr. Subra Suresh, Head of the Department of Materials Science and Engineering, Ford Professor of Engineering,

Massachusetts Institute of Technology

The mechanical response of living cells and subcellular cytoskeleton can undergo dramatic alterations due to biochemical changes introduced by the progression of human

diseases. In this presentation, we provide experimental results on systematic alterations to the elastic properties of human red blood cells parasitized in vitro by *Plasmodium falciparum* malaria. By recourse to optical tweezers experiments, we extract direct force versus displacement relationships for the cell and examine contributions to cell elasticity from specific proteins transported to the membrane from the parasite. Continuum and molecular-level computational simulations of the deformation of red blood cell are also performed to quantify the nanomechanics of cell response. The mechanical properties of changes to cell deformability from *P. falciparum* infestation are also compared and contrasted with similar results for the *P. vivax* parasite. Finally, the similarities and differences in cell elasticity and disease states between malaria and human pancreatic cancer are also examined.



Mechanical Properties of Biological Materials

Speaker: Dr. Julian Vincent, Chair of Biomimetics, Department of Mechanical Engineering, University of Bath, United Kingdom

It seems to me that the mechanical properties of biological materials are of interest to the engineer for 3 main reasons: What characteristics do they have? Why and how? How can we benefit from this information? The most versatile material is probably the cuticle of arthropods, which has to be skeleton, skin, and sensor, providing support, flexibility, sensitivity, protection, waterproofing, absorption, locomotion, etc. In providing this it is impossible to separate structure and material properties. The properties here have to be understood at the level of chemical bonding (epitaxy of chitin-protein interactions via silk-like conformations; incorporation of heavy metals), physical chemistry (control of stiffness achieved by control of water content), micro-morphology (fibre orientations; volume fractions), macromorphology (control of buckling by folding stiffeners), and function (wing foldings, mechanisms for drilling holes). The benefit comes from comparing the design philosophy of the arthropod with what we would do given our technical background and experience. These turn out to be very different (there's only a 10% overlap - by design or coincidence) suggesting that 90% of biological problem-solving remains to be explored and exploited. The last part of the talk will therefore be devoted to techniques of biomimetic data-mining and how to organize biological information in a way which will aid creativity and innovation.

OTHER APPLICATION AREAS

Aluminum Alloys For Packaging

Papers related to the science, engineering, technology, aluminum, and customer plant implementation of the production and applications of aluminum alloys for packaging and container applications.

Materials Issues for Advanced Nuclear Systems

This symposium encompasses materials development or characterization related to advanced nuclear systems. This includes, but is not limited to Generation IV reactors and space nuclear power and propulsion.

Rare Earths, Science, Technology, and Applications V

This 5th symposium on rare earths will highlight the advances since the 4th symposium held in 2000. The primary symposium topics include resources, separation and processing, melts and metal reduction, alloys, batteries and materials chemistry, magnets, and applications in pigments, catalysts, refrigeration, solid oxide fuels, hydrogen storage and hydrides, superconductors, thermoelectric and piezoelectric materials.

General Abstract Session

The TMS Annual Meeting Programming Committee invites you to make plans now to attend its extensive program of general abstract sessions. In an effort to present a more comprehensive view of current work being carried on in materials science research and industry, particularly new and emerging technologies and techniques, TMS is soliciting general abstract submissions for sessions related to the following areas: alloy phases, aluminum, chemistry and physics of materials, composite materials, corrosion and environmental effects, electronic packaging and inter-connection materials, polymers, powder metallurgy, precious metals, processing fundamentals, reactive metals, recycling, refractory metals, shaping and forming, solidification, superconducting materials, surface engineering, thin films and interfaces.

General Poster Session

The TMS Annual Meeting Programming Committee invites you to make plans now to attend its general poster session. In an effort to present a more comprehensive view of current work being carried on in materials science research and industry, particularly new and emerging technologies and techniques, TMS is soliciting poster submissions for sessions related to the following areas: alloy phases, aluminum, chemistry and physics of materials, composite materials, corrosion and environmental effects, electronic packaging and inter-connection materials, polymers, powder metallurgy, precious metals, processing fundamentals, reactive metals, recycling, refractory metals, shaping and forming, solidification, superconducting materials, surface engineering, thin films and interfaces.



SPECIAL LECTURES/LUNCHEONS/DINNERS

EXTRACTION & PROCESSING DIVISION LUNCHEON LECTURER

Tuesday, February 15, 2005 ● 12:00 pm-1:45 pm ● Marriott San Francisco

Nickel Laterite Technology – Finally a New Dawn?

Michael G. King, Noranda Inc./Falconbridge Ltd.

It is unanimously agreed that the future prospects for the global nickel industry are extremely good. This is because the main use of nickel is in stainless steel, the production of which is directly related to world industrial growth. Since the majority of the world's nickel resources now reside in nickel oxide laterite deposits, over the past few decades there has been steady growth in the development of technology to treat these ores. In 1998 it appeared that the nickel industry would enter a new era of low cost production from laterites with the start up of three entrepreneurial plants in Western Australia, all of which used High Pressure Acid Leach technology. In fact, the opening of these plants proved to be a false dawn since all three immediately ran into major operational and financial issues. Now in 2005 several of the major nickel producers have finally advanced technology to the point of announcing the start of large scale projects for the treatment of laterites based on sound engineering and realistic economics. This presentation reviews the technology options selected for the new plants and, in particular, outlines the strategy

which Noranda/Falconbridge is using for the development of its Koniambo deposit in New Caledonia.

About the presenter:

Michael G. King is Senior Director of Metallurgical Technology for Noranda Inc./Falconbridge Ltd. Dr. King is the author of some 20 technical publications and holds four patents. Currently, he supervises strategic technology development in nickel and copper for Noranda/Falconbridge, the largest Canadian non-ferrous mining company, at the Falconbridge Technology Centre in Sudbury. Dr. King is a Fellow of the Royal Society of Chemistry and a Chartered Chemist (UK). His main professional interests have been in the minor metals and he is a former president of the Selenium-Tellurium Development Association. He has been a member of TMS since 1987.



Luncheon tickets are \$45 and may be purchased via the TMS Annual Meeting & Exhibition Registration form.

In conjunction with the symposium

Frontiers in Thin Film Growth and Nanostructured Materials: A Symposium in Honor of Prof. Jagdish Narayan

Dr. Jagdish Narayan Honorary Dinner
Monday, February 14, 2005 • Marriott San Francisco
Symposium Sponsored by:
Electronic, Magnetic and Photonic Materials Division
EMPMD - Thin Films and Interfaces Committee
Dinner tickets are \$65 and may be purchased via the TMS Annual Meeting & Exhibition Registration form.

In conjunction with the symposium

The Langdon Symposium: Flow and Forming of Crystalline Materials

Prof. Terence Langdon Honorary Dinner
Monday, February 14, 2005 • Marriott San Francisco
Symposium Sponsored by:
Materials Processing & Manufacturing Division
Structural Materials Division
MPMD-Shaping and Forming Committee
SMD-Mechanical Behavior of Materials-(Jt. ASM-MSCTS)
Dinner tickets are \$55 and may be purchased via the TMS Annual Meeting & Exhibition Registration form.

LIGHT METALS DIVISION LUNCHEON LECTURER

Wednesday, February 16, 2005 ● 12:00 pm-2:00 pm ● Marriott San Francisco

Aluminum by Design: Jewelry to Jets

Sarah Nichols, Carnegie Museum of Art

From its first appearance in the mid-19th century, when its rarity made it as prized as gold, aluminum has inspired creativity and sparked innovation in the design of furniture, jewelry, architecture, fashion, and consumer and industrial products. The essential qualities of aluminum; brilliance, strength, light weight, ductility, corrosion resistance, and ease of recycling have inspired some of the world's greatest artists, designers, and engineers. This talk examines the creative use of aluminum from a variety of perspectives - the producer, the manufacturer, the designer, and the consumer and highlights aluminum's seminal role in our society and culture.



jointly with that of chief curator to which she was appointed in 1996. During her tenure at the museum, she has installed many distinguished exhibitions. The most recent major exhibition she curated, Aluminum by Design: Jewelry to Jets which also included a significant publication and website, has just completed its seven venue international tour.

Born in Manchester, England, Nichols studied at the University of East Anglia, Norwich, England where she received a First Class Honors B.A. degree in Art History. She was a Winterthur Program Fellow in Early American Culture at the University of Delaware, Newark, where she received her M.A. in Decorative Arts and Museum Studies.



Nichols has written and lectured extensively on a wide range of decorative arts topics from eighteenth-century furniture to contemporary ceramics and glass.

About the presenter:

Sarah Nichols became Carnegie Museum of Art's curator of decorative arts in 1992. She holds this position

Luncheon tickets are \$45 and may be purchased via the TMS Annual Meeting & Exhibition Registration Form. (Photo from Aluminum by Design: Jewelry to Jets exhibit provided by the Carnegie Museum of Arts)

In conjunction with the symposium

Micromechanics of Advanced Materials II (Symposium in Honor of James C.M. Li's 80th Birthday)

Dr. James Li Honorary Dinner

Monday, February 14, 2005 • Marriott San Francisco

Symposium Sponsored by:

Structural Materials Division

ASM International: Materials Science Critical

Technology Sector

SMD-Mechanical Behavior of Materials-(Jt. ASM-MSCTS)

Dinner tickets are \$55 and may be purchased via the TMS Annual Meeting & Exhibition Registration form.

In conjunction with the symposium

Multicomponent Multiphase Diffusion Symposium in Honor of John E. Morral

Dr. John E. Morral Honorary Dinner

Monday, February 14, 2005

Marriott San Francisco

Symposium Sponsored by:

Materials Processing & Manufacturing Division

Structural Materials Division

EMPMD/SMD - Alloy Phases Committee

MPMD - Solidification Committee

ASM/MSCTS - Atomic Transport Committee

Dinner tickets are \$65 and may be purchased via the TMS Annual Meeting & Exhibition Registration form.

In conjunction with the symposium

John Campbell Honorary Symposium on Shaped Casting of Metals

Prof. John Campbell Honorary Dinner

Monday, February 14, 2005

Marriott San Francisco

Symposium Sponsored by:

Light Metals Division

LMD-Aluminum Committee

MPMD-Solidification Committee

Dinner tickets are \$65 and may be purchased via the TMS Annual Meeting & Exhibition Registration form.

University Alumni Receptions

Alumni receptions for various universities will be scheduled at the Marriott San Francisco Hotel. Please refer to the final program (available on-site) for a detailed listing.

Luncheon tickets are \$45 and may be purchased via the TMS Annual Meeting & Exhibition Registration form.

134th TMS-AIME Dinner and Awards Presentation

**With Installation of 2005 TMS President
Tuesday, February 15, 2005**



Gregory J. Hildeman
2004 TMS President



Tresa M. Pollock
2005 TMS President

The Annual TMS-AIME Dinner and Awards Presentations will be held at 7:00 pm, Tuesday, February 15, 2005 at the Marriott San Francisco. The highlight of the TMS Annual Meeting will begin with a cash bar reception at 6:00 pm and dinner at 7:00 pm. A presentation and recognition of the Society and Technical Division award recipients will be followed by the annual address to the Society by 2004 President Gregory J. Hildeman, who will then introduce Tresa M. Pollock the 2005 President.

Tresa M. Pollock is professor of Materials Science and Engineering at the University of Michigan in Ann Arbor, Michigan. She graduated with a B.S. in Metallurgical Engineering from Purdue University in 1984 and a Ph.D. in Materials Science and Engineering from the Massachusetts Institute of Technology in 1989. She was employed at General Electric Aircraft Engines from 1989 to 1991, where she conducted research and development on high-temperature al-

loys for aircraft turbine engines. Dr. Pollock was a professor in the Department of Materials Science and Engineering at Carnegie Mellon University from 1991 to 1999. She is a fellow of ASM International and has received the ASM International Research Silver Medal Award, the Purdue University Outstanding Alumni Award, the Bradley Stoughton Award, the Carnegie Mellon Ladd Research Award, a National Science Foundation Young Investigator Award, and the CMU Alcoa Professorship.

Dr. Pollock has been a member of TMS since 1989 and has served on the Board of Directors as the Director of Student Affairs and the Chair of the Structural Materials Division. Dr. Pollock has also served on numerous technical and administrative committees including the Titanium Committee, the High Temperature Alloys Committee, the Public & Governmental Affairs Committee, and the Nominating Committee.

Banquet tickets are \$65 and may be purchased via the TMS Annual Meeting & Exhibition Registration form.

YOUNG LEADER LUNCHEON

Date: Monday, February 14, 2005

Time: 12:00 pm-2:00 pm

Location: Marriott San Francisco

The Young Leaders of TMS have coordinated a series of presenters to discuss current trends in research funding. The featured presenters are active in the materials research field and will provide valuable expertise.

Tentative presenters include:

Professor Jian Cao, Northwestern University

Dr. James Rudd, National Science Foundation

Optional box lunch for \$35 may be purchased via the TMS 2005 Annual Meeting & Exhibition Registration form.



HONORS & AWARDS

CONGRATULATIONS TO THE 2005 TMS AWARD WINNERS:

TMS FELLOW CLASS OF 2005

Hamish Fraser, *The Ohio State University*
Terence G. Langdon, *University of Southern California*
Alton D. Romig, Jr., *Sandia National Laboratories*

JOHN BARDEEN AWARD

Arthur C. Gossard, *University of California, Santa Barbara*

BRUCE CHALMERS AWARD

Jonathan A. Dantzig, *University of Illinois*

DISTINGUISHED SERVICE AWARD

John P. Hager, *Colorado School of Mines*

EDUCATOR AWARD

Robert T. Dehoff, *University of Florida*

ROBERT LANSING HARDY AWARD

Ibrahim Karaman, *Texas A&M University*

WILLIAM HUME-ROTHERY AWARD

Uichiro Mizutani, *Nagoya University*

INSTITUTE OF METALS/ ROBERT FRANKLIN MEHL AWARD

John F. Knott, *The University of Birmingham*

CHAMPION H. MATHEWSON AWARD

James M. Howe, *University of Virginia*
William T. Reynolds Jr, *University of Virginia*
Vijay K. Vasudevan, *University of Cincinnati*

SHRI RAM ARORA AWARD

Ashish Garg, *Indian Institute of Technology*



TECHNICAL DIVISION AWARD WINNERS

ALUMINUM DISTINGUISHED SERVICE AWARD

Chris M. Bickert, *Pechiney Group*

EXTRACTION & PROCESSING DISTINGUISHED CO-LECTURERS

Christopher W. Bale, *Ecole Polytechnique, University of Montreal*
Arthur D. Pelton, *Ecole Polytechnique, University of Montreal*

EXTRACTION & PROCESSING SCIENCE AWARD

D. Richard Shaw, *FENIX Hydromet*
David B. Dreisinger, *University of British Columbia*
Thomas Lancaster, *Straits Whim Creek Pty, Ltd*
Geoffrey D. Richmond, *Amtec Limited*
Marcus Tomlinson, *AMEC Americas*

EXTRACTION & PROCESSING TECHNOLOGY AWARD

Frank A. Stober, *Hatch Associates*
Terry Gerritsen, *Hatch Associates*
Jakob Janzen, *Hatch Associates*
Andrei Kepes, *Hatch Associates*
Nils Voermann, *Hatch Associates*
Ian Candy, *Hatch Associates*
A. Matyas, *Hatch Associates*

LIGHT METALS TECHNICAL SERVICE AWARD

Diran Apelian, *Worcester Polytechnic Institute*

LIGHT METALS AWARD

Margaret M. Hyland, *The University of Auckland*
Edwin Patterson, *The University of Auckland*
Barry Welch, *Welbank Consulting Ltd.*

STRUCTURAL MATERIALS DISTINGUISHED SERVICE AWARD

George T. "Rusty" Gray, III, *Los Alamos National Laboratory*

STRUCTURAL MATERIALS DISTINGUISHED SCIENTIST/ENGINEER AWARD

Terence G. Langdon, *University of Southern California*

UNIVERSITY OF BRITISH COLUMBIA

J. KEITH BRIMACOMBE PRIZE

James W. Evans, *University of California, Berkeley*

INSTITUTE OF METALS LECTURE & ROBERT F. MEHL MEDALIST

Monday, February 14, 2005 ● 12:30 pm-1:30 pm ● Marriott San Francisco Hotel

“Power in Trust” - How Materials and Fracture Mechanics Deliver Safety and Reliability

John F. Knott, The University of Birmingham

Modern Society needs power: propulsive power, electrical power. Delivery of this power must be “trust-worthy”: safe, reliable, sustainable. The lecture reviews not only materials developed over the last fifty years to meet this need, but also the quantitative assessment methods that have been developed in parallel to ensure safe and reliable operation. Detailed attention is paid to two systems which produce both propulsive power and electrical power: the pressurized water reactor and the gas-turbine. For each system, discussion focuses on the demands of service duty, the materials used, the role of non-destructive inspection or quality-control and the main threats to integrity. Fracture Mechanics methodologies provide the means to quantify threats and to assess material response in terms of the risk of loss of function or catastrophic failure. The guarantees of safety and reliability rest on maintaining such risks at acceptably low levels.

About the Presenter:

Professor Knott's personal research has been in the fields of fracture, fracture mechanics, and mechanisms of sub-critical crack growth in a range of engineering alloys. For many years, he has acted as a consultant for both the UK nuclear industry and the aero-engine industry. He has, therefore, been personally involved in many of the issues raised in his lecture.

He was awarded an OBE (Officer of the Order of the British Empire) in the Queen's Birthday Honours List on June 12, 2004. The citation was “For services to nuclear safety” which is relevant to the topic of his lecture.



HUME-ROTHERY AWARD LECTURE

Monday, February 14, 2005 ● 8:40 am ● Moscone West Convention Center

Hume-Rothery Rule in Structurally Complex Alloy Phases

Uichiro Mizutani, Nagoya University

Sponsored by: Electronic, Magnetic & Photonic Materials Division, Structural Materials Division, Jt. EMPMD/SMD – Alloy Phases Committee

Special emphasis will be put on our understanding of why nature is able to stabilize structurally complex alloy phases like quasicrystals and gamma-brasses, the latter of which has been known as one of the typical Hume-Rothery phases for many years. Most of these structures have been synthesized by using the Hume-Rothery rule that relates fundamental aspects of electronic structure to stability. The Hume-Rothery rule related electronic structure studies on structurally complex alloy phases will be reviewed, followed by its new interpretation based on the first-principle band calculations, which hopefully goes beyond the first naive free electron picture put forward by Mott and Jones in 1936.

About the Presenter:

Dr. Mizutani's interest in research on phase stability and the work and ideas of Professor Hume-Rothery developed during his stay in the USA, as a post-doctoral Fellow at Mellon Institute in Pittsburgh. Hume-Rothery's ideas needed further support and develop-

ment, particularly in the physics of basic property measures, and in the calculations of energy, starting from first principles. With several associates, he devoted a major part of his research at Nagoya University to this field. Particularly rewarding has been the possibility of linking more closely the observed occurrence and structural features of typical electron phases like the gamma-phase, and more recently the stability of quasicrystals, and approximants, to their electronic band structure and the concept of the Brillouin zone.

Dr. Mizutani received the Japan Society of Powder and Powder Metallurgy Award for Distinguished Achievement in Research in 1995. He has received many paper awards with the most recent in 2002 from the Japan Institute of Metals for “Development of the Fe₂VA1-based alloys as new thermoelectric materials.” Dr. Mizutani will be presenting some of his most recent research during this award lecture.



EXTRACTION & PROCESSING DIVISION DISTINGUISHED CO-LECTURERS

Tuesday, February 15, 2005 ● 1:45 pm-2:30 pm ● Marriott San Francisco

Applications of Computational Thermodynamics in the Real World

Christopher W. Bale and Arthur D. Pelton, University of Montreal

Due to the development of sophisticated software for calculating chemical equilibria and of large evaluated databases for compounds and solutions (alloys, slags, ceramics, mattes, salts, aqueous solutions, etc.), one need not be a specialist to apply state-of-the-art thermodynamic calculations to real-life applications in metallurgy and materials science. Applications in process modeling, simulation and control, alloy design, etc. will be presented using the Windows®-based FactSage software and databases of which the authors are co-developers.

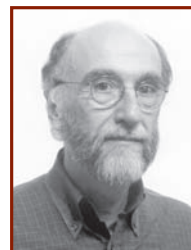
About the Presenters:

Dr. Bale and Dr. Pelton co-founded the Centre de Recherche en Calcul Thermo-chimique, University of Montreal in 1982 which they co-direct. Along with Prof. Bill Thompson they are co-developers of FACT, one of the largest thermodynamic database systems in the world, one of the very few specializing in metallurgical and materials applications, and the only one of its kind

in North America. The solution databases of FACT are unique in the world. The FACT system was awarded the Falconbridge Innovation Award in 1999; the first time this award has been given to an academic group.



Christopher
W. Bale



Arthur D. Pelton

Dr. Pelton is a Fellow of the Royal Society of Canada, an E.W.R. Steacie Memorial Fellow, a Fellow of ASM and CIM, and a recipient of the CODATA award, the Gibbs Triangle Award of Calphad, and the Hume-Rothery prize of the Institute of Materials, Minerals and Mining.

Dr. Bale was President of the Canadian Metallurgical Society in 1988, is a Fellow of the Canadian Institute of Mining Metallurgy and received the Canadian Metal Chemistry Award in 2000.

Are you a fan of The Learning Channel's Junkyard Wars TV Show?

Then you can't miss JOM's Rubbish Deconstruction League at TMS 2005!

TMS Exhibition, JOM Booth

February 15 & 16, 2005 • 12 Noon - 2:00 pm

The Rubbish Deconstruction League is a group challenge that entails constructing a solution to a real world problem, with limited time and resources (literally a pile of junk). Teams of 4-6 university students, faculty, or industry engineers will participate in 2 building challenges on Tuesday, February 15 and Wednesday, February 16 in the TMS 2005 Exhibit Hall.

This event will be supervised by Jeff Del Papa, founder of "The Nerds", the first American team to participate in the Emmy-nominated Junkyard Wars TV Show. It is an event where ingenuity, improvisation, and lateral thinking are rewarded. Each challenge will have multiple valid solutions that can be built within the time limit using the materials, "junk" at hand. Examples of past challenges include building a machine to play bocce, building a machine to play basketball, and a machine to transport a can of beans over water. Trophies will be presented to the winning teams.

The Rubbish Deconstruction League will be hosted by *JOM*, the official publication of the 2005 TMS Annual Meeting & Exhibition and the member journal of TMS. *JOM* is a unique hybrid of technical journal and magazine that balances in-depth coverage of technical topics with general-interest news and features to provide a balanced view of the entire materials science and engineering community.

While participating in or viewing the Rubbish Deconstruction League activities, be sure to visit with the *JOM* staff at the booth.

Participation in the event is free, but you must register your team in advance of the meeting. The number of teams is limited, so register today by contacting:

Diane Scheuring, TMS Member Services

Tel: (724) 776-9000, ext. 220

E-mail: dscheuring@tms.org



The TMS 2005 Exhibition

The TMS 2005 Exhibition will “bring it all together” by presenting the latest metals and materials innovations in an ideal face-to-face business environment. The TMS Exhibit is a primary source for practical, problem-solving solutions for today’s production, processing, and research challenges! Expanded technologies will be showcased in the 2005 exhibition.

Be sure to make plans to attend the following special events during the 2005 Exhibition:

Hosted Grand Opening Reception —

An opportunity to visit the booths while enjoying a hosted reception

Monday
5:00 pm-6:00 pm

Wednesday Snack —

Visit the booths and join us in the exhibit hall for an afternoon treat!

Wednesday
12:15 pm-2:00 pm

Junkyard Wars —

The popular television contest comes to life on the TMS Exhibition floor, see previous page for information.



The TMS 2005 Exhibition will feature over 20,000 square feet of exhibits and displays by more than 140 exhibiting companies. A sampling of the products, services, and technologies you’ll find at the TMS 2005 Exhibition include:

Air Pollution Control Equipment

Alloy, rare earth, precious metals, minerals & chemical producers and suppliers

Aluminum production technology and equipment

Automation

Carbon Technology and Supplies

Casting Technology

Clothing – Protective

Coatings, Thin Films Technology

Combustion/Furnace Technology

Engineering, Consulting, Contractors

Grain Refiners/ Hardeners

Industrial gases

Industrial Process Control

Instrumentation, Measurement, Microscopy Equipment

Modeling, Process Simulation, Design and Phase Diagram Software

Molten Metal Filtration, Pumps

National Laboratories

Publishers

Recycling/Scrap Processing

Refractory & Insulating Products

Research & Development

and much more!

**Location: Moscone Convention
Center West, First Level**

**To visit the exhibition, complete and
return the enclosed registration form
or contact TMS for an Expo Pass.**

Show Dates and Hours:

Monday, February 14, 2005 ... 12:00 Noon-6:00 pm

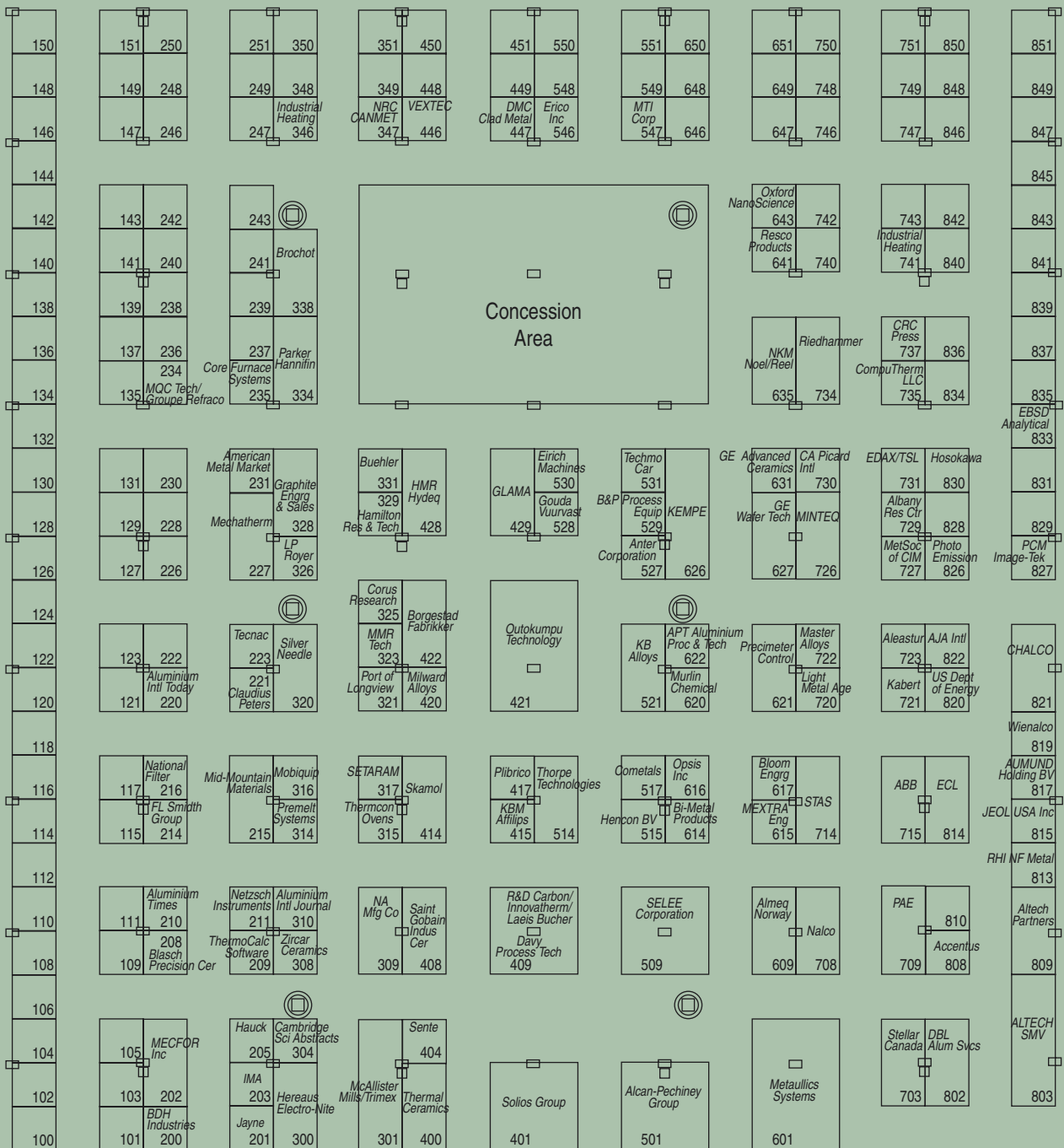
Tuesday, February 15, 20059:30 am-5:30 pm

Wednesday, February 16, 2005...9:30 am-3:00 pm





Exhibitor List: As of 10/18/04:

Company	Booth Number	Company	Booth Number	Company	Booth Number
ABB	715	GE Infrastructure--Water & Process Technologies.....	627	Nalco Company	708
Accentus plc	808	GLAMA Maschinenbau GmbH	429	National Filter Media.....	216
AJA International Inc.....	822	Gouda Vuurvast.....	528	Netzsch Instruments Inc.....	211
Albany Research Center	729	Graphite Engineering & Sales	328	NKM Noell/Reel Group	635
Alcan-Pechiney Group.....	501	Group Refraco	234	North American Mfg Co Ltd	309
Aleastur	723	Hamilton Research & Technology Ltd	329	NRCan CANMET Mats Tech Lab ...	347
Almeq Norway AS.....	609	Hauck Manufacturing Co	205	Opsis	616
ALTECH SMV Ltd.....	803	Hencon BV	515	Outokumpu Technology Ltd.....	421
Aluminium Corp. of China.....	821	Hereaus Electro-Nite Co.....	300	PAE.....	709
Aluminium International Today	220	HMR Hydeq	428	Parker Hannifin.....	334
Aluminium Intl Journal	310	Hosokawa Micron International Inc	830	PCM/ImageTek	827
Aluminium Times	210	Industrial Heating Magazine	741	Photo Emission Tech Inc	826
American Metal Market.....	231	innovatherm GmbH+Co.KG	409	Plibrico.....	417
Anter Corporation	527	International Magnesium Association	203	Port of Longview.....	321
APT Aluminium Proc & Tech.....	622	Jayne Industries	201	Precimeter Control AB	621
AUMUND Holding B.V.	817	JEOL USA Inc.....	815	Premelt Systems Inc.....	314
B&P Process Equipment	529	JMatPro	404	R&D Carbon	409
BDH Industries Inc.....	200	JOM	Concession Area	Resco Products Inc	641
Blasch Precision Ceramics Inc.....	208	Kabert Industries	721	RHI Non Ferrous Metals Engrg GmbH.....	813
Bloom Engineering	617	KB Alloys Inc.....	521	Riedhammer GmbH.....	734
BMP Bi-Metal Products	614	KBM Affilips BV.....	415	Saint Gobain Industrial Ceramics ...	408
Borgestad Fabrikker AS.....	422	KEMPE International	626	SELEE Corporation	509
Brochot	338	L P Royer Inc.....	326	SENTE Software/ThermoTech	404
Buehler Ltd	331	Laeis Bucher GmbH	409	SETARAM	317
C A Picard Intl.....	730	Light Metal Age.....	720	Silver Needle Inc	320
Cambridge Scientific Abstracts.....	304	Master Alloys Co.....	722	Skarveland AS	803
Claudius Peters	221	McAllister Mills/Trimex.....	301	Skamol A/S	414
Cometals	517	MECFOR Inc	202	SMV AS	803
CompuTherm LLC.....	735	Mechatherm International Ltd.....	227	Solios Group.....	401
Core Furnace Systems Corp.....	235	Metallurgical Society of CIM.....	727	STAS	714
Corus Ceramic Research Ctr	325	Metaullics Systems Co LP	601	Stellar Canada Inc.....	703
CRC Press.....	737	MEXTRA Eng, Extratativa de Metalls.....	615	Techmo Car s.p.a.	531
Davy Process Technology (Switzerland) AG.....	409	Mid-Mountain Materials	215	Tecnac do Brasil	223
DBL Aluminum Services	802	Milward Alloys Inc.....	420	Thermal Ceramics	400
DMC Clad Metal	447	MINTEQ International Inc.....	726	Thermcon Ovens BV	315
EBSD Analytical Inc.....	833	MMR Technologies Inc	323	ThermoCalc Software.....	209
ECL.....	814	Mobiquip Industries Ltd	316	Thorpe Technologies Inc	514
EDAX Inc/TSL	731	MQC Technologies Inc/Groupe Refraco Inc	234	TSL.....	731
Eirich Machines Inc	530	MTI Corporation.....	547	US Department of Energy	820
Erico Inc.....	546	Murlin Chemical Inc.....	620	VEXTEC Corporation	446
F.L. Smidth Group.....	214			Wienalco.....	819
GE Advanced Ceramics	631			Zircar Ceramics Inc	308

To obtain an Exhibit Prospectus or inquire about space reservation, please contact Cindy A. Wilson, TMS Exhibits Coordinator; telephone (724) 776-9000, ext. 231; fax (724) 776-3770; e-mail wilson@tms.org.



Building Legend

-  - Column 6'-4"
-  - Column 6'-4"
-  - Building Plumbing Drain
-  - Building Electric Port

Aisles are 10' wide (unless noted)
 Booths are 10' x 10' (unless noted)
 Ceiling Height 27'

MAIN ENTRANCE

SHORT COURSES

On pages 30-36, TMS offers a selection of learning intensive courses designed to enhance your technical and professional expertise. Programmed in conjunction with the 134th TMS Annual Meeting & Exhibition, these courses were developed in response to the training and information needs of today's engineering professionals.

With such diverse and carefully selected topics, we invite you to consider the merits of each course, as well as the qualification of the respective presenters, and join us in one of the following courses.

REGISTRATION

To register for a course, please use the 2005 TMS Annual Meeting Registration form in this brochure. All courses will be held at the Marriott San Francisco the weekend prior to the meeting, Saturday and Sunday, February 12-13, 2005.

You may register any time prior to the Annual Meeting and on site, but if you register by the advanced registration deadline of January 17, 2005 you will save an additional \$50 late registration penalty. Course size is limited and a sufficient number of pre-registered attendees are necessary to offer each course, so please register early!

CANCELLATION POLICY

TMS reserves the right to cancel any courses due to low pre-registration. All pre-registered attendees will be notified of the cancellation and offered either a transfer or a full refund.

REFUND POLICY

Written requests must be sent to TMS Headquarters, 184 Thorn Hill Road, Warrendale, PA 15086, and postmarked no later than January 17, 2005. A \$75 processing fee will be charged for all cancellations; this processing fee is separate from and in addition to the fee charged for cancellation of meeting registrations. Absolutely no refunds will be issued after the January 17, 2005 deadline.

Note to US residents: A tax deduction may be taken for expenses of continuing education (including registration fees, travel, meals, and lodging) undertaken to maintain and improve professional skills. For more information concerning applicability, contact your local Internal Revenue Service office.

If you need additional information on a particular course, please contact:

Christina Raabe
TMS, Manager of Continuing Ed and Information
184 Thorn Hill Road
Warrendale PA 15086 USA
Tel (724) 776-9000 ext. 212
Fax (724) 776-3770
E-mail raabe@tms.org

ARSENIC-ITS PROCESSING, REMOVAL AND STABILIZATION IN NON-FERROUS METAL INDUSTRY

Sponsored by: TMS Extractive and Processing Division.

Date and Time:

Sunday, February 13, 2005 ~ 8.30 am-5.00 pm

Presented by:

Dr. V. "Ram" Ramachandran, Consulting Engineer
Dr. George. P. Demopoulos, McGill University

Advance Registration Fees:

Members \$475; Non-Members \$560

Who Should Attend:

This one day course is intended for scientists, engineers, plant operating engineers, environmental engineers, and managers who are involved in the processing of arsenic bearing materials and its disposal in the non-ferrous metal industry. It is highly recommended not only for environmental professionals seeking a first introduction to arsenic metallurgy, but also those with prior but dated or limited experience.

Course Overview:

Arsenic has been a problem associated with the extraction of non-ferrous metals and precious metals. Until 20 years ago, arsenic tri oxide from the non-ferrous industry was used as chromated copper arsenate as protection for lumber. However, with the banning of its use for domestic lumber in USA, its usage has decreased considerably. This has raised environmental concern about its safe disposal during the processing of base and precious metals.

This one day interactive course will include:

- Role and distribution of arsenic during processing of base metals and precious metals.
- Treatment of As-containing byproduct streams for As removal.
- Fixing of arsenic in slags; Bevill Amendment.
- Treatment of aqueous effluents for heavy metals' removal including arsenic.
- Aqueous chemistry of Arsenic

- f) Chemistry of Waste Water Treatment with special reference to Arsenic Removal.
- g) Formation and Stability of Arsenic Compounds
 - Fe/As coprecipitates and Scorodite
- h) Concluding Remarks.

About the Presenters:

V. "Ram" Ramachandran is a Consulting Engineer to the Non-Ferrous Metal Industry. Ram has worked in the R and D department of ASARCO for about 26 years. Ram holds a Ph.D. in Extractive Metallurgy from the Colorado School of Mines. He is a Registered Professional Engineer in the State of Arizona and a Qualified Environmental Professional with Specialization in Water Quality. Ram has been very active in the Extractive and Processing Division of TMS. He has published extensively in the area of Extractive Metallurgy including a review paper on As removal from waste streams.

George P. Demopoulos is professor of Metals and Materials Engineering at McGill University, where he is teaching and conducting research in the area of hydro-metallurgy and environmental protection. One of his major research programs over the past 10 years has been the study and development of know-how and technology for the fixation of arsenic in the form of scorodite. He has to his credit some 150 refereed publications, over 40 graduate students and postdocs trained in his laboratory and is the co-inventor of 6 patents.

CARBON NANOTUBES

Sponsored by: TMS Electronic, Magnetic and Photonic Materials Division

Date and Time:

Sunday, February 13, 2005 ~ 8:30 am-5:00 pm

Presented by:

Mildred Dresselhaus, Massachusetts Institute of Technology
David Tománek, Michigan State University

Advance Registration Fees:

Members \$475; Non-Members \$560

Who Should Attend:

This one-day course is intended for engineers, scientists, designers, managers, and technical marketing personnel who are involved in the development, production, and application of carbon nanotubes and related nanostructures. This short course is highly recommended not only for those seeking a first introduction to nanotubes, but also those with prior but perhaps dated or limited experience.

Course Overview:

Carbon nanotubes are maybe the most significant spin-off product of fullerene research, which lead to the discovery of the C₆₀ "buckyball", rewarded by the 1996 Nobel Prize in Chemistry. Nanotubes based on carbon or other elements consist of graphitic layers seamlessly wrapped

to cylinders. With only a few nano-meters in diameter, yet (presently) up to milli-meters long, the length-to-width aspect ratio is extremely high. Nanotubes combine atomic-scale perfection with chemical inertness, high mechanical strength, excellent electrical, and thermal conductance. Accordingly, the number of both specialized and large-scale applications is growing constantly, ranging from additives in Li-ion batteries to conductive high-strength composites and flat-panel displays.

This course will review the morphology, synthesis, characterization, physical properties, and current applications of nanotubes.

About the Presenters:

Mildred Dresselhaus is an Institute Professor of Electrical Engineering and Physics at the Massachusetts Institute of Technology. She obtained her PhD in Physics at the University of Chicago in 1958. After a two year NSF postdoc at Cornell University, she became a staff member in the Solid State Division of the MIT Lincoln Laboratory in 1960 studying electronic energy band structure of materials at high magnetic fields using magneto-optical techniques. She remained at Lincoln Laboratory until joining the MIT faculty in the Electrical Engineering Department in 1967. In the 1960s and 1970s she did pioneering work on the electronic structure of graphite and the group V semimetals, and made major advances elucidating the intercalation physics of graphite intercalation compounds. Since then she has made major contributions to our understanding of carbon fibers, the science of novel carbon materials, the remarkable structure, and properties of fullerenes and of carbon nanotubes, and in advancing the field of nanoscience more generally. Her 4 books on carbon science and carbon nanotubes are widely used by students and workers in the field.



David Tománek is Professor of Physics at Michigan State University. After his Ph.D. at the Free University Berlin, he joined the AT&T Bell Laboratories for a short time. Taking a leave of absence from his Assistant Professor position in Berlin, he continued his carrier as a Research Fellow at the Physics Department of the University of California in Berkeley. At Michigan State University, he established a strong research program in Computational Nanotechnology. Focusing on low-dimensional systems including fullerenes, nanotubes, ferrofluids, metallic and magnetic clusters, he developed and applied a wide range of numerical techniques to study the structural, electronic, and optical properties of these systems. Maybe best known among his 170 scholarly publications are predictive calculations for the growth, mechanical strength, and thermal conductivity of carbon nanotubes, optical properties of carbon nanostructures, conductivity, and superconductivity of nanocarbons including fullerenes and nanotubes.



FACTSAGE: AN ADVANCED THERMODYNAMIC MODELING TOOL

Sponsored by: TMS Extraction & Processing Division

Date and Time:

Sunday, Feb. 13, 2005 ~ 8:30 am-5:00 pm

Presented by:

Prof. Arthur Pelton,
Prof. Christopher Bale

Advance Registration Fees:

Members \$475; Non-Members \$560

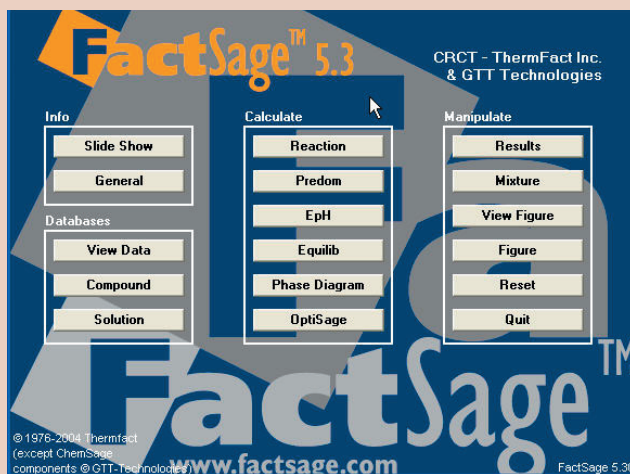
Who Should Attend:

- Engineers and scientists working in research and development in process metallurgy, materials science, alloy design, ceramics, glass technology and related fields. An understanding of fundamental thermodynamics is required, but participants need not be specialists in thermodynamics. FactSage allows non-experts to apply state-of-the-art thermodynamic calculations in their work.
- Professors and graduate students interested in thermodynamics in teaching and research.
- Engineers interested in metallurgical and chemical process simulation and control.

Course Overview:

FactSage[®] has been developed over the past 30 years at the CRCT (Centre for Research in Computational Thermochemistry), Ecole Polytechnique (University of Montreal) and currently has several hundred industrial, governmental, and academic users in materials science, metallurgy (pyro-, hydro-, electro-), corrosion, glass technology, combustion, ceramics, geology, etc. It is used internationally in graduate and undergraduate teaching and research. For calculating chemical equilibria, FactSage incorporates the powerful ChemSage Gibbs energy minimization algorithm of GTT Technologies of Aachen, Germany. Users have access to databases of thermodynamic data for thousands of compounds as well as to evaluated and optimized databases for hundreds of solutions of metals, liquid and solid oxide solutions, mattes, molten and solid salt solutions, aqueous solutions, etc. The FactSage software automatically accesses these databases in a friendly Windows[®] environment to permit the calculation of the conditions for multiphase, multicomponent equilibria, with a wide variety of tabular and graphical output modes, under a large range of constraints.

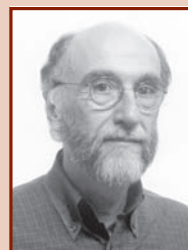
This Course will provide introductory training in the use of the software. The course will consist mainly of real-time demonstrations of examples taken from the extensive annotated course notes which will be provided.



Attendees who bring their own laptops (running Microsoft Windows[®] 98 or higher) will be able to follow along and gain hands-on experience, since the full-power version of FactSage will be installed temporarily on their PCs. All the main modules of FactSage will be covered and the extensive solution databases will be presented.

About the Presenters:

Arthur Pelton obtained his doctorate from the Department of Metallurgy and Materials Science of the University of Toronto in 1970. He has been a professor in the Materials Engineering program at Ecole Polytechnique (University of Montreal) since 1974 where he has devoted most of his career to the development of the FactSage system, particularly in the area of solution modeling and solution database development. He is the author of approximately 250 scientific articles and 11 book chapters; fellow of ASM and CIMM; fellow of the Royal Society of Canada; and recipient of the Hume-Rothery Prize of IMMM, the CODATA biennial award of the International Council for Science, the Gibbs Triangle Award of Calphad, and other prizes.



Christopher Bale has a Joint-Honors B.Sc in Chemistry & Metallurgy from the University of Manchester (1968), and a Ph.D. in Chemical Metallurgy from the University of Toronto (1973). He has been a professor in the Materials Engineering program at Ecole Polytechnique (University of Montreal) since 1977 where he has devoted most of his career to the development of the FactSage system particularly in the area of software development, and to the research and development of other interactive interfaces, especially internet-based programs.



Profs. Pelton and Bale are co-recipients of this year's Distinguished Lecturer Award of the Extraction and Processing Division of TMS.

The Materials Science and Engineering, Industrial Applications, and Processing of Magnesium Products

Sponsored by: TMS Light Metals Division

Dates and Times:

Saturday, February 12, 2005 ~ 8:30 am-5:00 pm

Sunday, February 13, 2005 ~ 8:30 am - 5:30 pm

Presented by:

Gerald Cole, Retired

David St. John, Cooperative Research Centre for Cast Metals Manufacturing

Advance Registration Fees:

Members \$645; Non-Members \$735

Who Should Attend:

This two-day course is intended for materials scientists, professors/students, engineers/technicians, managers and others who wish to gain an in-depth understanding on the materials science and engineering of magnesium, including the manufacturing, applications and issues with magnesium products. Attendees will get a full exposure to the valuable functional attributes of this lightest of industrial metals, including where magnesium is used and where it might be employed in future industrial applications. The course will conclude with a detailed analysis of global magnesium R&D efforts. Attendees will be encouraged to interact with the speakers in an open forum on issues which influence the "magnesium industry" including how magnesium technology could be a fruitful area for a future career.

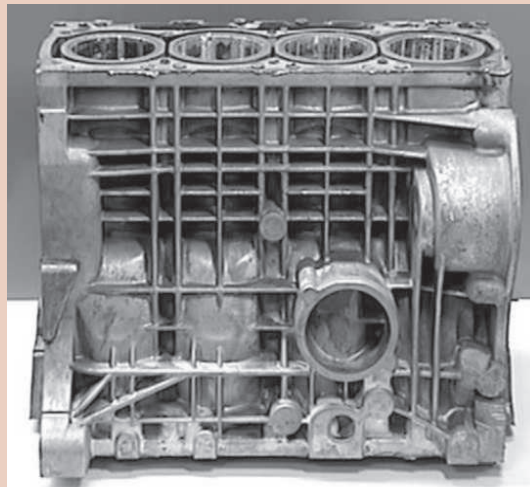


Course Overview:

Magnesium has recently emerged from obscurity as a reactive metal to become part of the suite of light material choices for modern industry. Currently, magnesium is used in automotive components (~ 5 kg/vehicle), IT products (1/3 of all laptops, many camera, cell phones and PDA bodies), and hand held home and industrial equipment. Magnesium science, engineering and processing technology have been extensively studied in Europe for over 10 years. But there is limited exposure in North American colleges and universities. The course will cover the basic elements of the science, engineering, and technology including the physical,



mechanical, chemical, and metallurgical properties of magnesium and its alloys and will conclude with a detailed analysis of current magnesium research activities in North America, Europe, Japan, Australia, and China. This analysis will include the major efforts to improve the high temperature mechanical properties of cast and worked magnesium alloys, and the extensive efforts to produce sheet, stampings, and extrusions.



About the Presenters:

Gerald Cole PhD, FASM received his PhD from the University of Toronto. He retired in 2001 after 35 years with Ford Motor Company supervising R&D in metallurgy, metal casting and NDT, working on vehicle weight reduction with cast magnesium and aluminum and consulting on quality, productivity, supply and product-process issues for automotive components' producers throughout Ford's supply chain. He has published over 130 papers, has patented 9 innovative solutions in producing and using light metal castings, has presented hundreds of seminars around the world, has taught graduate-level manufacturing and engineering science courses in US, France, Mexico, Australia, and Israel and has organized global training seminars and technical programs. Dr. Cole now manages his own consulting company, LightWeightStrategies LLC.

David St. John is currently CEO of one of the world's dominant light metal research and engineering centers, the Cooperative Research Centre for Cast Metals Manufacturing (CAST) located in Brisbane, Queensland, Australia. CAST has 18 industry and research provider participants and is focused on light metals research for companies that span metal producers, their equipment suppliers, die casters, Tier 1 suppliers and automotive companies. CAST also delivers education and training at high school, vocational, undergraduate, and post-graduate levels. David has published over 200 papers, is a co-inventor on three patents, and has a career covering academia and industry including managing industry research and development teams and teaching undergraduate and industry short courses. His work in solidification, and alloy design and heat treatment of aluminum and magnesium alloys is extensively cited. David can be contacted at cast@cast.crc.org.au.

Integrating Lean and Six Sigma in an Aluminum Smelter

Sponsored by: TMS Light Metals Division

Date and Time:

Sunday, February 13, 2005 ~ 8:30 am-5:00 pm

Presented by:

Keith Sinclair, Sinclair Associates Inc.
Rick Phelps, Sinclair Associates Inc.

Advance Registration Fees:

Members \$475; Non-Members \$560

Who Should Attend:

This one-day course is intended for managers, engineers, maintenance, and operations personnel who are accountable for daily operations and rapid process improvement. Those seeking an introduction or review of the principles, methods and tools of an integrated Lean and Six Sigma approach with a specific focus on smelter applications, will benefit from this hands-on workshop.

Course Overview: A Hands-On Simulation

In recent years, Lean Manufacturing and Six Sigma have come to the forefront as models for manufacturing excellence.

Six Sigma is driven by the fact that process and product variation is known to be a strong factor affecting manufacturing lead times, product and process costs, process yields, product quality, and ultimately business value. A crucial part of 6S work is to define and measure variation with the intent of discovering its causes and to develop efficient, operational means to control and reduce the variation. The expected outcomes of 6S efforts are faster flow, more efficient and capable manufacturing processes, and more consistent, predictable and capable overall business performance.

Lean Manufacturing (based on the Toyota Production System) is focused on the elimination of waste in all aspects of the process, leading to reduction in process variability, reduction in system cycle times, creating fast and flexible product flow and creating value in use of the product by the customer.

This hands-on aluminum smelter simulation enables participants to experience first hand the basic principles, methods and tools of both Six Sigma and Lean and how they apply, specifically in a continuous and batch processing environment.

- How to align process improvement efforts with business objectives and target the right critical processes through Process Mapping
- The need for integrating essential improvement strategies: Lean (time based) and Six Sigma (variation based)
- How this integrated approach will help you leverage efforts to eliminate waste and create the greatest value for you and your customers
- How to reduce process variation to increase throughput, reduce inventory and lower cost
- How to define and use appropriate data for both daily process management and rapid process improvement
- How to effectively involve people at all levels of the organization in fighting waste and moving toward Lean

Through running and analyzing the factory simulation, participants will learn how the tools of Lean and Six Sigma can be successfully integrated into a wider framework to deliver sustained business value through, increasing throughput, reducing inventory, improving product quality, reducing cost and improving reliability of supply.

The hands-on aluminum smelter simulation is complete with customer orders for varied products, bulk raw materials, "continuous" production lines, post-production processing and batch production centers and introduces the Integrated Lean and Six Sigma Methods and Tools::

- Basic statistical methods to analyze and improve the process
- Designed Experiments to study and test improvements
- Statistical Process Control and Response for daily control
- Stability in the value stream through Visual 5S and Standardized Work
- Flow and Pull in an Aluminum Smelter
- Accelerate Flow and increase throughput through variation reduction and process streamlining

Learn the power of integrating Lean and Six Sigma in an aluminum smelter through this hands-on factory simulation, illustrating the full benefits that can be delivered.



About the Presenters:

Keith Sinclair is a process improvement consultant with 18 years experience helping businesses achieve measurable improvement through the principles, methods and tools of what today is referred to as Six Sigma integrated with Lean Manufacturing. In addition to his consulting work, Keith's experience includes engineering, manufacturing management, and applied statistics. He founded Sinclair Associates, Inc. in 1986.

Keith has taught hundreds of process improvement practitioners and managers and lead programs and projects with demonstrated and significant ROI. His industrial experience includes industrial and process engineering as well as manufacturing management in a wide range of manufacturing and processing industries including mining, chemicals, steel, automotive supply, electronics, metal processing and assembly. In the past 12 years he has worked extensively in continuous and batch processing industries. His client list includes small, privately held companies to large international firms, with clients in the USA, Europe, Asia, Australia, South America, and Southern Africa.

Rick Phelps is an industrial engineer with 23 years of experience in applying the Theory of Constraints (TOC) to a wide range of industrial problems both as a practitioner and as a consultant. Trained and experienced in applied industrial statistics as well as the 'Lean' toolkit, Rick has helped numerous manufacturing enterprises focus their efforts and improve their critical processes and their bottom lines.

Interrupting his industrial career for three years, Rick served as a Habitat for Humanity International Partner in Uganda, where he found plenty of novel applications for his talents at process improvement. For this humanitarian outreach, Rick was honored in 1998 as an Outstanding Young Alumnus by The Georgia Institute of Technology.

ALUMINUM SMELTER CONTROL

Sponsored by: TMS Light Metals Division

Dates:

Sunday, February 13, 2005 • 8:30 am-5:00 pm

Presented by:

Mark Taylor, *University of Auckland*
James Metson, *University of Auckland*
John Chen *University of Auckland*
Margaret Hyland, *University of Auckland*

Registration Fees:

Members \$645, Non-members \$735

Who Should Attend:

As amperages have increased on existing plants and environmental and energy constraints have tightened on both new and existing ones, smelter control has become the biggest leverage area for not only cost reduction and product quality improvement, but also environmental compliance. The license to operate smelters now is becoming increasingly dependent on the reputation of companies for close control of their operations, and this is equally the case for companies building new smelters.

This short course is targeted at smelter operations practitioners, and smelter designers and engineers who have a need for hands-on knowledge of the drivers of smelter process variation and the levers to reduce it. The content in each area will start at a managerial level, and move to specific examples of control issues while providing a framework to build on the understanding gained.

Course Overview:

The course is designed to provide learning experiences based on real examples of smelter variation and control improvements and set backs over many years. These experiences are taken from a range of operations, and from different parts of the smelter flowsheet. Although it is not possible to cover every unit operation within and every input to a smelter in one day, the presenters will use these examples to build a framework of thinking about control which can be applied over the full range of plant operations and to other complex process industries as well.

An introductory discussion of Control Fundamentals will first highlight

- The origins of control in Smelters
- The three main phases of Control including the importance of observation
- The understanding of variation observed, and
- Risk management in control decision-making where automatic and manually performed control loops co-exist.

A more in depth presentation on variation then follows, with manufacturing analogies from other indus-

tries. This leads into a discussion of the linkages between the various parts of any smelter and the tendency for all variation to show up in a magnified way in the Reduction Lines.

Two specific case studies then bring the focus back to the inputs and outputs of a smelter – these case studies will discuss smelter experiences with controlling alumina variation, and with managing environmental regulation under varying input and process conditions. This is particularly topical at the moment because of recent experiences with hydrogen fluoride emissions at many different smelters.

After lunch the course turns to the manufacturing control necessary for consistent quality anodes, with another case study highlighting the leverage points for Carbon Plant control. This leads into the subject of Reduction Line process stability, and some examples of how reduction control loops have been destabilized through the underlying conditions, with event or process change triggers often involved as well. Consequences of Reduction Line instability will be discussed with substantial input from the participants on the course.

Next the latest developments in control are over-viewed in two presentations - one focusing on new data analysis and monitoring techniques which are now available for multivariate systems, and the other looking more broadly at trends in energy management in smelters in the future.

The crucial aspect of primary metal quality, purity drivers, and quality differentiation at the reduction lines is addressed last in a joint presentation on metal contamination control, and impurity control more generally.

About the Presenters:

Dr. Mark P. Taylor graduated from Auckland University in 1984 with a PhD in Chemical and Materials Engineering. His career with the Comalco organization spanned 18 years in a variety of research, technical and operational roles. He commenced at the Comalco Research Centre in Melbourne, before moving into technical management at New Zealand Aluminium Smelters, Tiwai, Invercargill. During this time, he was also the Implementation Manager for the \$450m smelter upgrade and then Potroom Manager. Following this he managed the smelter for a six month period before transferring to Brisbane. As General Manager Technical, M.P. Taylor directed Comalco's reduction research and development and provided technical support to Comalco's three operational smelters. He was appointed General Manager Operations in 2000 to Comalco's largest smelting operation, Boyne Smelters Ltd in Central Queensland. During his time with Comalco M.P. Taylor published over 50 papers, has been the recipient of two Best Paper Awards at TMS, and authored more than 100 technical reports within Comalco. M.P. Taylor joined the University of Auckland in January 2003 as the Director, Light Metals Research Centre and Honorary Professor in Chemical and Materials Engineering. He is engaged in light metals research and consulting globally and specializes in aluminium smelter improvement programs.

Prof. John JJ Chen is Professor of Chemical and Materials Engineering at the University of Auckland. After obtaining his BE degree from the University of Auckland, he worked for three years as a Potrooms Development Engineering at New Zealand Aluminium Smelters. He then returned to Auckland and completed a PhD in 1979. He has published over 170 papers in international journals and conference proceedings, one patent and over 60 proprietary research reports. He is on the Light Metals Division and the Aluminium Committee of TMS. He is a Fellow of the Royal Society of New Zealand, the Institution of Chemical Engineers (London), and the Institution of Professional Engineers New Zealand. He has received Merit Awards and Best Teachers Awards in the School of Engineering, and awards for best paper from TMS and IPENZ. Professor Chen's research interests include the modelling of the aluminium smelting process, the treatment of molten metal, and process control in the potrooms. He has been for many years at the forefront of multiphase flows and related transport processes. Professor Chen's research team was the first to quantify the impact of bubble driven flows on current efficiency in aluminium smelting cells and the first to identify and measure the increase in sidewall heat transfer coefficient opposite the bath/metal interface due to the waves in the metal layer impinging on the wall.

Associate Professor James Metson completed his PhD at Victoria University of Wellington in 1980. After a period as a staff Scientist at Surface Science Western, the University of Western Ontario, Canada, he moved to the University of Auckland late in 1985. In addition to his appointment in the Department of Chemistry he has since held positions as Director of the Research Centre for Surface and Materials Science, Acting Director of the Light Metals Research Centre during its formation. In addition he held the position of Associate Deputy Vice-Chancellor (Research) for the University between 2000 and 2002. His research work, largely based in surface and materials science, has involved extensive contact with the Aluminium industry, including involvement in the development of a new dry-scrubbing technology and studies of cell emissions, electrolyte chemistry, and elec-



trode reactivity. He has presented many papers at the TMS Light Metals Conference and was a Light Metals award winner in 1994. He was also winner of the New Zealand 1995 Shell Prize for Industrial Chemistry. He has presented more than 20 plenary or keynote lectures, has over 100 research publications and sixty technical reports, many dealing with applications in the aluminium industry.

Dr. Margaret Hyland graduated with a PhD in Chemistry from the University of Western Ontario, London, Canada in 1989, and is currently a Senior Lecturer in the Department of Chemical and Materials Engineering at the University of Auckland. She has carried out extensive research in aluminium smelting technology with primary interests in dry scrubbing and cell materials. She has presented a number of papers at the TMS Light Metals Conference and is the winner of 3 TMS Awards in Carbon and Reduction Technology in 1997 and 2000. Dr Hyland has published over 40 papers and over 60 technical reports, involving contracts with many of the major aluminium companies.

With contributions by:

Dr. Barry Sadler, Managing Director, Net Carbon Consulting Pty Ltd

Mr. Keith Sinclair, Sinclair Associates

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E. Buddy Damm
Timken Co

EPD Representatives
Adrian C. Denes
Praxair Inc

Joel Patrick Kapusta
Air Liquide Canada

EMPMD Representatives
Antonios Gonis
Lawrence Livermore
National Lab

C Robert Kao
National Central University

K. N. Subramanian
Michigan State University

LMD Representatives
John J. J. Chen
University of Auckland

Jim McNeil
Alcan Inc

MPMD Representatives
Thomas R. Bieler
Michigan State University

James C. Foley
Los Alamos National Lab

Fernand D. Marquis
South Dakota School of
Mines & Tech

SMD Representatives
Dennis M. Dimiduk
US Air Force

Eric M. Taleff
University of Texas

STUDENT INFORMATION

The TMS 2005 Annual Meeting & Exhibition offers students, interested in materials science and engineering, a variety of opportunities to gather technical information, explore career possibilities, and network with students and professionals in the field.

STUDENT SESSION MONITORS

Students will have the opportunity to partially defray their conference expenses by serving as session monitors. Monitors are responsible for assisting the session chair, recording session attendance, and assisting with audio/visual equipment. All monitors are required to report to Authors' Coffee each morning they are scheduled to monitor sessions. Monitor positions are limited and will be assigned on a first-come basis. To obtain work forms and a schedule, email mboots@tms.org.

The deadline to submit completed work forms is December 15, 2004.

STUDENT ATTENDEE ORIENTATION

Date: Sunday, February 13, 2005

Time: 2:00 pm-3:00 pm

Location: Marriott San Francisco

Interested in being in the right place at the right time? The Student Attendee Orientation is a great opportunity for students to get their questions answered about TMS and different activities taking place at the TMS 2005 Annual Meeting & Exhibition. This event is a great way to begin the week and meet other students with similar interests.

CAREER TIPS SESSION

Date: Sunday, February 13, 2005

Time: 3:30 pm-4:30 pm

Location: Marriott San Francisco

Would you like to know what Human Resource Representatives are looking for when reviewing resumes and during the interview? This session is designed to give you the tips you need to get your resume noticed, get your foot in the door and land that perfect job.

CAREER FORUM

Date: Sunday, February 13, 2005

Time: 5:00 pm-6:30pm

Location: Marriott San Francisco

Pursuing an appropriate career path is an important task of any metals and materials student. The Career Forum will address the many pertinent issues that face students today. Key industry figures will provide personal insight on preparation strategies, and tips on how to develop and foster a rewarding career. The speakers will also address questions from participating students during this interactive session.

TMS NETWORKING MIXER

Date: Sunday, February 13, 2005

Time: 8:00 pm-10:30 pm

Location: Marriott San Francisco

Sponsored by: TMS Student Affairs Committee

Attend an event that just might open the door to endless career possibilities. This networking mixer is intended to provide a relaxed, casual, and fun atmosphere for students, faculty, government, and industry officials to make connections and to share their experiences of professional growth. Don't miss out on this excellent opportunity to make the connections you need to succeed.

Beer*, soft drinks, snacks, and music will be provided.

**Note: In accordance with the California State Law, alcoholic beverages will be served only to attendees who are 21 years of age or older; proper photo ID with birth date must be presented upon entry.*

DONATE A DOOR PRIZE FOR THE NETWORKING MIXER!

Student Chapters are asked to use their creativity and donate a door prize item. TMS will also be donating items. The more prizes donated, the better your chance to win!

STUDENT CHAPTERS

Don't forget to select a representative and submit the TMS Travel Reimbursement Program form and travel receipts, granting each chapter up to \$500 per calendar year to send student(s) to TMS conferences!

STUDENT CHAPTER SCHOOL DISPLAYS

Check out the school displays in the exhibit hall during the exhibit hours. Student Chapters will display their chapter's activities, research projects, & school information. Students who are interested in participating, contact: Diane Scheuring at: dscheuring@tms.org.



DIVISION TRAVEL SCHOLARSHIPS

Three of the five technical divisions of TMS offer a limited number of travel scholarships of \$500 each to TMS student members interested in attending the TMS 2005 Annual Meeting & Exhibition. At present, this assistance is provided by the Electronic, Magnetic & Photonic Materials Division; the Structural Materials Division; and the Materials Processing & Manufacturing Division.

Application Deadline: December 15, 2004

To apply, send a letter of application (e-mail is welcome), stating what meeting you wish to attend and why to the following:

TMS Student Travel Scholarships

184 Thorn Hill Road

Warrendale PA 15086

Fax (724) 776-3770

Telephone (724) 776-9000, ext. 220

E-mail: students@tms.org

Your letter must mention which division's technical programming you are interested in and complete information on how you can be contacted. If we cannot contact you, your award will be forfeited.

Your letter will be reviewed by a subcommittee of the appropriate sponsoring division, and this group will

select the applicants to receive the travel scholarships. Those receiving travel scholarships will be contacted by TMS Headquarters shortly after a decision is made. Students receiving travel scholarships are responsible for making their own travel and hotel arrangements as well as for registering for the meeting.

ARE YOU A STUDENT MEMBER?

Student members of TMS may attend the technical sessions, exhibits, and lectures held Monday through Thursday on a complimentary basis. Registration for students who are not members is \$25, which will be applied toward a Student Membership in 2005.

7th ANNUAL TMS STUDENT POSTER SESSION

This students-only poster session will be held in conjunction with the TMS 2005 Annual Meeting & Exhibition. Presentations will be displayed on 4' x 4' poster boards; no formal presentation is required. The poster session will begin Monday, February 14 and remain in place through Wednesday, February 16 at the Moscone West Convention Center. Annual Meeting attendees will have the opportunity to vote for the "Best Poster", with the winning poster receiving \$500.

ATTENTION ALL NON-MEMBER AND NON-MEMBER AUTHOR REGISTRANTS!

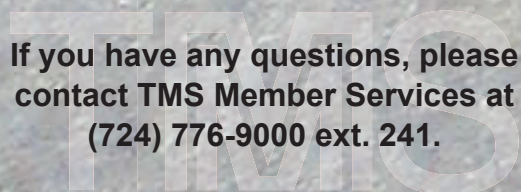
All attendees and authors of the 134th TMS 2005 Annual Meeting & Exhibition, who register at the non-member or non-member author fee, will automatically receive a one-year, complimentary associate membership for 2005!

Associate members receive all the same great benefits as members, including a free print and electronic subscription to *JOM*, on-line subscription to TMS Letters, and discounts on TMS publications available via the Document Ordering Center. Associate members are also eligible for reduced registration fees for all TMS-sponsored meetings, be included in and have access to the TMS Membership Directory on TMS OnLine, plus an array of

other personalized membership benefits and services.

Your membership card and new member packet, along with a postal card asking for additional information for our records will be sent to you immediately after the meeting. Your associate membership will be activated upon completion of your registration form and payment of the non-member or non-member author registration fee.

If you have any questions, please contact TMS Member Services at (724) 776-9000 ext. 241.



GENERAL INFORMATION

The TMS 2005 Annual Meeting & Exhibition will take place in San Francisco, California. The Marriott San Francisco Hotel will be the headquarters hotel. All conference events, including registration, technical sessions, and the exhibition will take place at the Moscone West Convention Center.

Registration Policy

All attendees and authors must register for the meeting. Non-member authors may register at the special non-member author rate. Badges are required for admission to all technical sessions, the exhibition, and social functions.

Advance Registration

Take advantage of the discounted advance registration fees. Complete the TMS 2005 Annual Meeting Advance Registration form in this brochure on page 43 and return it to TMS no later than Monday, January 17, 2005. Advance registration is encouraged. For your convenience, you may charge your registration fees on MasterCard, VISA, American Express, or Diner's Club credit cards. Full payment of registration fees and social function tickets must accompany the completed Advanced Registration form. Complete the registration form in this brochure and mail or fax it today.

Advance Registration Deadline:
Monday, January 17, 2005

Register Via TMS OnLine

You may register any time, day or night, via the TMS 2005 Annual Meeting & Exhibition Home Page at <http://www.tms.org/AnnualMeeting.html>. TMS On-Line provides detailed information on this and all TMS sponsored conferences.

Advance Registrant Packet Availability

Advance registrants should obtain their registration packets in the Lobby of the Moscone West Convention Center during registration hours. Full payment of registration fees and social function tickets must accompany the completed Advance Registration form.

At Meeting Registration

Registration will be held in the Lobby of the Moscone West Convention Center during the following hours:

Sunday, February 13 11:00 am–6:00 pm
Monday, February 14 7:00 am–6:00 pm
Tuesday, February 15 7:00 am–5:30 pm
Wednesday, February 16 7:00 am–5:00 pm
Thursday, February 17 7:00 am–10:00 am

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 compliance with this Act, we ask that those requiring specific equipment or services as an attendee of the TMS Annual Meeting, contact the TMS Meeting Services department and advise of any specific requirements in advance.



For Questions on Advance Registration, Please Contact:

TMS Meeting Services
184 Thorn Hill Road
Warrendale, PA 15086
Telephone: (724) 776-9000, ext. 243
Fax: (724) 776-3770
E-mail: mtgserv@tms.org

Technical Sessions

Technical sessions will begin on Monday, February 14, 2005 and end on Thursday, February 17, 2005. Technical sessions will be held at the Moscone West Convention Center. Abstracts will be printed in the November 2004 issue of JOM and will also be available via TMS OnLine at <http://www.tms.org/AnnualMeeting.html>.

Audio/Video Recording Policy

TMS reserves the right to any audio and video reproduction of all presentations at every TMS-sponsored meeting. 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 the TMS Technical Programming Department to obtain a copy of the waiver release form.



TRAVEL & DESTINATION

HOTEL/AIRLINE/CAR RENTAL/GUEST INFORMATION

Housing Accommodations

The TMS headquarters hotel will be the Marriott San Francisco Hotel. Special conference rates have been contracted at all the hotels listed on the housing form found in this brochure. To receive the special convention rate, please use the enclosed form to make your hotel reservation, found on page 45 or log onto www.tms.org and follow the link to Travel Planners Inc.

Hotel reservations are processed on a first-come, first-served basis until Friday, January 7, 2005.

About the Marriott San Francisco Hotel

The Moscone West Charlotte Hotel is located across the street from Yerba Buena Gardens, adjacent to the Moscone Convention Center, and around the corner from the cable cars. You're in walking distance of world-class museums, shopping, and attractions.

The Marriott San Francisco Hotel is approximately 25 minutes from San Francisco and Oakland International Airports.

TMS has contracted a block of rooms at the headquarters hotel, Marriott San Francisco Hotel, along with each of the hotels listed on the housing form in this brochure, and therefore has assumed a financial liability for any and all rooms in the block that are not reserved. You are strongly encouraged to reserve your room(s) at the hotels listed to limit our financial liability. Please help TMS achieve overall success with the 134th TMS Annual Meeting & Exhibition by making your reservation at one of the listed hotels prior to the advance housing deadline. Thank you.

Airline/Car Rental

For airline and/or car rental discounts, please see www.tms.org - travel and housing link or call Travel Planners at 1-800-221-3531 (212) 532-1660.

Guest Hospitality

A special guest hospitality area will be hosted each day of the meeting from 7:00 am till 10:00 am in the Marriott San Francisco Hotel. TMS will sponsor a continental breakfast for the convenience of spouses and accompanying persons of meeting attendees. The Guest Hospitality Room will be a good place to meet, socialize, and gather before tour departures.

To register an accompanying person, please provide your guest's name on your meeting registration form. They will receive a complimentary badge identifying them as a Conference Guest, which allows admission to the TMS Exhibition and Reception, and the Guest Hospitality Room.

Note: The conference guest badge is intended for spouses and accompanying persons of registered attendees and for identification only. It does not permit access to technical presentations.



FUTURE TMS ANNUAL MEETING & EXHIBITION SITES

More than 1,200 technical presentations and 30,000 square feet of exhibitions will detail the latest advances and most critical developments in minerals, metals, and materials science and technology.

2006

San Antonio, TX

March 12-16

San Antonio Convention Center

2007

Orlando, FL

February 25 - March 1

Swan and Dolphin Hotels

2008

New Orleans, LA

March 9-13

Ernest N. Morial Convention Center

2009

San Francisco, CA

February 15-19

Moscone West Convention Center

For more information on any of these TMS Annual Meetings, please contact:

TMS Meeting Services Department

184 Thorn Hill Road

Warrendale, PA 15086

Telephone: (724)776-9000, ext. 243

Fax: (724)776-3770

E-mail: mtgserv@tms.org

Web: www.tms.org/meetings/meetings.asp

TOUR INFORMATION

OPTIONAL TOURS

Monday, February 14, 2005

San Francisco Deluxe City Tour

8:45 am-1:00 pm • \$31 per person

What do you imagine when you think of San Francisco? Cable cars and Victorian homes? Crooked streets and rolling hills? San Francisco is teeming with timeless images that seem nostalgic and recognizable to even first time visitors. The mesmerizing blend of distinct neighborhoods, each with its own flavor and character, sights and sounds, architecture and art, cuisine and shopping, is both intimidating and electrifying. With off-beat innovation and a showy-yet-shy attitude, San Francisco is the archetype for a diverse metropolis.

From quiet parks of Pacific Heights to the bustling, carefree activity of Fisherman's Wharf to the no-nonsense economic fervor of the Financial District, this is a city of contrasts, yet together they create a metropolitan symphony that cannot be matched.

San Francisco is so much more than the commercialized landmarks you may have seen before – you will be introduced to the wonders and delights of this breathtaking mosaic of a city.



Tuesday, February 15, 2005

Muir Woods/Sausalito

8:00 am-12:15 pm • \$41 per person

"This is the best tree-lovers monument that could possibly be found in all the forest of the world," declared conservationist John Muir when describing the majestic coast redwoods of Muir Woods.

Until the 1800's, many northern California coastal valleys were covered with coast redwood trees similar to those now found in Muir Woods National Monument. These magnificent specimens of nature's enormity would have been lost to logging had it not been for naturalist and philanthropist William Kent who lobbied President Theodore Roosevelt to preserve the area as a national monument in 1908.

Next, travel to Sausalito where you can find world class hotels, plentiful restaurants and a diverse selection of shopping opportunities, galleries, and retail fashion shops. The magic of this old Fisherman's village is found not only in the Mediterranean atmosphere but also in the spectacular views of San Francisco just across the Bay. The floating homes, waterfront community, and rich history define a town that prides itself on a strong and unique spirit. Please dress for the weather and bring layers as Muir Woods can be chilly and damp.



Tuesday, February 15, 2005

Wine Country Tour

12:45 pm-6:00 pm • \$61 per person

Travel through the valley of the grapes to historic Sonoma Valley. In the Carneros grape-growing region two wineries set themselves apart by painting superb winemaking with a Mediterranean flair.

Viansa Winery & Italian Marketplace, founded in 1989 by Sam and Vicki Sebastiani, was created as a way to share their love of good food, wine and their Italian heritage with visitors from around the world. Dedicated to the marriage of wine and food, Viansa (short for "Vicki and Sam") truly offers visitors a taste of Tuscany in Sonoma Valley. Today, this family-owned and operated winery is proud to be the premier producer of Italian varietals in the United States.

Opened to the public in 1986, Gloria Ferrer Champagne Caves has produced some of the world's most honored and acclaimed sparkling wines, winning over 50 gold medals in the last five years. Bringing the Spanish influence to Sonoma, Gloria Ferrer is an original champagnery. Explore the caves with a knowledgeable guide and taste some of the best the Wine Country has to offer.



Wednesday, February 16, 2005

Alcatraz & Pier 39

9:30 am-3:30 pm • \$49 per person

Alcatraz became the prison of choice for serious offenders for a single reason – “The Rock” was believed to be inescapable, that is until the Anglin brothers and Frank Morris floated away in a homemade raft in 1962. Home to such infamous characters as Al Capone, Robert “The Birdman” Stroud and George “Machine Gun” Kelly, this island attracted more prisoners than visitors until its closure in March 1963.

Born of necessity, perhaps even political pragmatism, Alcatraz represents the Federal government’s response to post-Prohibition, post-Depression America. Situated in the San Francisco Bay, Alcatraz is the epitome of isolation, a world unto itself, and thus perfect for a prison setting.

Following your escape from Alcatraz, take pleasure in the visual and auditory delights of Pier 39. With its oodles of shops, you can find anything from left-handed scissors to a store full of magnets. Enjoy a shopper’s paradise, but be sure to check out the colony of sea lions just off the pier.

Please dress for the weather as the ferry ride to/from Alcatraz can be windy.



TMS 2005 PLANT TOUR OPPORTUNITIES

Thursday, February 17, 2005

Lawrence Berkeley Laboratory Tour

Berkeley, California

1:00 pm-5:00 pm • \$25 per person

Just 40 minutes from the Moscone Convention Center, the laboratory will host a tour of TMS participants

The tour to the Lawrence Berkeley Laboratory will include roundtrip transportation on a private motorcoach, one and a half hour narrated tour of the facility

An historic site, the cyclotron, a device to investigate the particles of matter, was invented here by Ernest Lawrence and 16 chemical elements were discovered at the Lawrence Berkeley Lab. The Lab is the home of nine Nobel Prize winners, the birthplace of nuclear medicine, and where researchers first isolated lipoproteins.

A Berkeley Lab tour may include visits to 2-3 research areas. Photography is permitted. We recommend comfortable footwear. Due to heightened security after the September 11, 2001 events, tour participants will be

asked for photo identification and citizenship information.

Scientists and engineers guide guests through the research areas, demonstrating emerging science and technologies and discussing their current and possible applications. Typical visited facilities may include the following:

- The Advanced Light Source
- National Center for Electron Microscopy
- Environmental Energy Technologies Division
- Center for Beam Physics
- The Superconducting Magnet Program
- Center for Functional Imaging
- Center for Isotope Geochemistry, Analytic Rock Lab
- Energy Sciences Network facility
- Cancer Research Laboratories
- Genomic Sciences Laboratories
- National Energy Research Scientific Computing

Additional tickets may be purchased at the tour and housing station in the lobby of Moscone Center West, beginning Monday, February 14, 2005.

Thursday, February 17, 2005

Schnitzer Steel Scrap Shredding/ Recycling Facility Tour

Oakland, California

1:00 pm-4:00 pm • \$25 per person

Tour of Schnitzer Steel’s Oakland facility will include viewing of the shredding sorting, separation and handling facilities, for ferrous and non-ferrous materials.

SSI is one of the nation’s largest recyclers of ferrous metals, a leading recycler of used and recycled auto parts through its chain of Pick-N-Pull self service auto parts stores, and a manufacturer of finished steel

products. The company, with its joint venture partners, currently processes over 4.9 million tons of recycled metals a year. Operations are concentrated in key West Coast and Northeastern seaboard population centers, where multi-modal freight options provide smooth access to markets and materials.

SSI collects, processes and sells ferrous and nonferrous scrap metals. The corporation has a dozen wholly owned recycling yards, and participates in a number of joint ventures, involving virtually all types of metals recycling.

Tour participants will be required to present an ID or passport. The facility is 20-30 minutes from the Convention Center.

WEB <http://www.tms.org>
Web registration requires credit card payment.

FAX USA: 724-776-3770
Fax registration requires credit card payment.

MAIL Return with TMS, Meeting Services
payment to: 184 Thorn Hill Road
Warrendale, PA 15086

1. Member of: TMS AIST SME SPE Member Number: _____

Dr. Prof. Mr. Mrs. Ms. _____

Last Name First Name Middle Initial

Informal First Name to Appear on Badge: _____ Date of Birth: _____ mm / dd / yyyy

Employer/Affiliation: _____ Title: _____

Address: Business Home _____

City: _____ State/Province: _____ Zip/Postal Code: _____ Country: _____

Telephone: _____ Fax: _____ E-Mail: _____

Guest/Spouse Name: _____ *Guests do not receive admission to technical sessions.*

2. Registration Fees:

	Advance Fees until January 17, 2005	On-Site Fees after January 17, 2005
<input type="checkbox"/> Member.....	\$445 M	\$545 ML
<input type="checkbox"/> Non-member Author *	\$535 NMA	\$635 NMAL
<input type="checkbox"/> Non-member *	\$595 NM	\$695 NML
<input type="checkbox"/> Student Member ##	\$0 STU	\$25 STUL
<input type="checkbox"/> Student Non-member ## *	\$25 STUN	\$50 STUNL
<input type="checkbox"/> TMS Senior Member.....	\$285 RM	\$335 RML
<input type="checkbox"/> Exhibit Booth Personnel	\$0 E	\$0 EL
<input type="checkbox"/> Exhibit Only.....	\$50 EO	\$50 EOL

Registration TOTAL \$ _____

* Includes TMS membership for 2005
Students must attach a copy of their school's student identification card.

4. Tutorial Luncheon Tickets:

	Fee	Quantity	Total
Monday 2/14/05 The Young Leader Tutorial Lecture is free. You may purchase the optional box lunch for.....	\$35	_____	\$ _____ EM

3. Social Function Tickets:

	Fee	Quantity	Total
Monday 2/14/05			
Jagdish Narayan Honorary Dinner.....	\$65	_____	\$ _____ ND
Terence Langdon Honorary Dinner.....	\$55	_____	\$ _____ TD
James Li Honorary Dinner	\$55	_____	\$ _____ LD
John Morral Honorary Dinner.....	\$65	_____	\$ _____ MD
John Campbell Honorary Dinner.....	\$65	_____	\$ _____ CD
TMS-AIME Banquet	\$65	_____	\$ _____ AD
Tables of 8.....	\$520	_____	\$ _____ AD8
Tuesday 2/15/05			
Table Sign to Read		_____	
Extraction & Processing Division Luncheon.....	\$45	_____	\$ _____ EP
Tables of 8.....	\$360	_____	\$ _____ EP8
Table Sign to Read		_____	
Wednesday 2/16/05			
Light Metals Division Luncheon	\$45	_____	\$ _____ LM
Tables of 8.....	\$360	_____	\$ _____ LM8
Table Sign to Read		_____	
Social Function TOTAL \$			_____

For any special dietary needs, please contact the Meeting Services Department at 724-776-9000, ext. 243.

5. Publication Orders: All orders that are not indicated for shipment on this form must be picked up at the meeting.

Order Number	Title	Shipping Weight	Quantity	Subtotal Weight	At-Meeting Price	List Price	Subtotal Price
05-5808-G	Light Metals 2005 (Book and CD-ROM set)	8	_____	_____	\$175	\$249	\$ _____
05-5824-G	Magnesium Technology (Book and CD-ROM Set)	4	_____	_____	\$141	\$201	\$ _____
05-5832-G	Shape Casting: The John Campbell Symposium (Book and CD-ROM Set)	3	_____	_____	\$107	\$152	\$ _____
05-5840	Friction Stir Welding and Processing III	3	_____	_____	\$112	\$160	\$ _____
05-5913	Sixth Global Innovations Symposia on Materials Processing: Trends in Mat'ls & Mfg Technologies and Powder Metallurgy R&D in the Transportation Industry	3	_____	_____	\$109	\$155	\$ _____
05-5905	Surface Engineering in Materials Science III	2	_____	_____	\$150	\$213	\$ _____
05-5816-CD	EPD Congress 2005 (CD-ROM)	1	_____	_____	\$156	\$222	\$ _____
05-5859	Arsenic Metallurgy: Fundamentals and Practices	2	_____	_____	\$104	\$148	\$ _____
05-5867	Converter and Fire Refining Practices	2	_____	_____	\$121	\$173	\$ _____
05-593X	The Science of Complex Alloy Phases	2	_____	_____	\$125	\$179	\$ _____
				↓	Subtotal \$ _____		

WEIGHT AND ZONE CHART FOR 2005 TMS ANNUAL MEETING

Weight	USA	Canada	Mexico	Western Europe	J. A. NZ	EE, C/S Am, Pac. Rim.	Middle East, Africa
1	\$5.00	\$4.50	\$5.50	\$5.00	\$5.00	\$6.00	\$8.00
2	\$5.50	\$8.50	\$10.00	\$9.50	\$9.50	\$11.50	\$15.50
3	\$6.00	\$12.50	\$14.50	\$14.00	\$14.00	\$17.00	\$23.00
4	\$6.50	\$16.50	\$19.00	\$18.50	\$18.50	\$22.50	\$30.50
5	\$7.00	\$20.50	\$23.50	\$23.00	\$23.00	\$28.00	\$38.00
6	\$7.50	\$24.50	\$28.00	\$27.50	\$27.50	\$33.50	\$45.50
7	\$8.00	\$28.50	\$32.50	\$32.00	\$32.00	\$39.00	\$53.00
8	\$8.50	\$32.50	\$37.00	\$36.50	\$36.50	\$44.50	\$60.50

If books are to be shipped, please complete the following.

Total Weight _____ Calculate shipping fees from the chart (at left) \$ _____

One-time \$5 handling fee per order shipped \$ _____

NOTE: If your order exceeds 12 pounds, add the amount that it is over from the chart (at the left) to reach the total weight of your order. [Example: 12 lbs. (delivered in U.S.A.) would be 8 lbs. (\$8.50) + 4 lbs (\$6.50) = 12 lbs. (\$15.00)]

Publications TOTAL \$ _____

6. Continuing Education Short Courses:

Courses are to be held on Saturday, February 12th and/or Sunday, February 13th.

	Advance Fees until January 17, 2005	On-Site Fees after January 17, 2005
	Member Non-member	Member Non-member
<input type="checkbox"/> 1. Aluminum Smelter Control (Sun)	\$475 \$560	\$525 \$610
<input type="checkbox"/> 2. The Materials Science and Engineering, Industrial Applications, and Processing of Magnesium Products (Sat/Sun)	\$645 \$735	\$695 \$785
<input type="checkbox"/> 3. Arsenic - Its Processing, Removal and Stabilization in Non-Ferrous Metals Industry (Sun).....	\$475 \$560	\$525 \$610
<input type="checkbox"/> 4. Carbon Nanotubes (Sun).....	\$475 \$560	\$525 \$610
<input type="checkbox"/> 5. FactSage (Sun).....	\$475 \$560	\$525 \$610
<input type="checkbox"/> 6. Integrating Lean and Six Sigma in an Aluminum Smelter (Sun).....	\$475 \$560	\$525 \$610

Short Course TOTAL \$ _____ \$ _____

7. 2005 Membership Dues: For current TMS members only

Full Member..... \$105 FM

Junior Member..... \$52.50 JM

ACerS/ASM/TMS Material Advantage Student Member \$25 ST

8. Payment enclosed:

Check, Bank Draft, Money Order

Make checks payable to TMS. Payment shall be made in USA dollars drawn on a USA bank.

Credit Card Expiration Date: _____

Card No.: _____

Visa MasterCard Diners Club American Express

Cardholder Name: _____

Signature: _____

9. TOTAL FEES PAID \$ _____

Refund policy: Written requests must be mailed to TMS, post-marked no later than January 17, 2005. A \$75 processing fee will be charged for all cancellations. **No refunds will be processed after January 17, 2005.**

TMS2005

**134th Annual International Meeting & Exhibition
February 13-17, 2005 • San Francisco, California, USA**

HOUSING RESERVATION FORM

Mail or fax this housing form to:
Travel Planners, Inc., 381 Park Ave. South, New York, NY 10016
FAX: 212-779-6128 • PHONE: 800-221-3531
(in 212, 718, 516, 914, 631 or international call 212-532-1660)
(CHOOSE ONLY ONE OPTION)

Making your reservation is easier than ever through Travel Planners' real-time Internet reservation system! Just log on to www.tms.org, and follow the link to Travel Planners. You will be able to view actual

availability, learn about your hotel's features and services, and obtain local city and sightseeing information. Most importantly, you will receive instant confirmation of your reservation!

Reservations must be received at Travel Planners by: Friday, January 7, 2005

Arrival Date _____ Departure Date _____

Last Name _____ First Name _____ MI _____

Company _____

Street _____ Address _____

City _____ State/County _____ Zip/Postal Code _____ Country _____

Daytime Phone _____ Fax _____

Additional Room Occupants _____

E-mail _____ (confirmation will be sent via e-mail if address is provided)

Non-Smoking Room Requested _____ Special Needs _____

Indicate 1st, 2nd, & 3rd hotel choice:

1. _____
2. _____
3. _____

Type of Accommodations: (check one)

- Single 1 person/1bed Double 2 people/1bed Twin 2 people/2 beds
 Triple 3 people/2 beds Quad 4 people/2 beds

If all three (3) requested hotels are unavailable, please process this reservation according to: (check one) ROOM RATE LOCATION

TMS has contracted a block of rooms at the headquarters hotel, San Francisco Marriott, along with each of the hotels, and therefore has assumed a financial liability for any and all rooms in that block that are not reserved. You are strongly encouraged to reserve your room(s) at the hotels listed to limit our financial liability. Please help TMS achieve overall success with the 134th TMS Annual Meeting & Exhibition by making your reservation at one of the listed hotels prior to the advance housing deadline. Thank you.

Confirmations: Confirmations will be e-mailed, faxed or mailed to you from Travel Planners, Inc. once your reservation has been secured with a deposit or credit card. You will not receive a confirmation from your hotel. If you do not receive a confirmation within 7 days, please call Travel Planners, Inc.

Changes/Cancellations: All changes and cancellations in hotel reservations must be made with Travel Planners, Inc. up until 3 business days prior to arrival and are subject to the individual hotel's cancellation policies. Cancellations and changes within 3 days of arrival MUST be made with your hotel directly. Many hotels are now imposing fees for early departure. This rate is set by each hotel and may vary accordingly. Please reconfirm your departure date at the time of check-in.

Reservations/Deposits: All reservations are being coordinated by Travel Planners, Inc. Arrangements for housing must be made through Travel Planners, Inc. and NOT with the hotel directly. Reservations via Internet, phone or fax will be accepted with a major credit card only. Housing forms and written requests will be accepted with a major credit card or deposit of one night's room and tax payable to Travel Planners, Inc. Check must be drawn in US funds on a US bank. No wire transfers will be accepted. Deposit policies are set by each hotel, and are outlined on your hotel confirmation.

Please read all hotel information prior to completing and submitting this form to Travel Planners, Inc. Keep a copy of this form. Use one form per room required. Make additional copies if needed.

HEADQUARTERS

1 San Francisco Marriott
\$229 single • \$249 double

2 Argent Hotel
\$189 single • \$199 double

3 Palomar Hotel
\$199 king single/double
\$219 double/double

4 Courtyard San Francisco
\$155 single/double

5 Sir Francis Drake
\$119 single/double

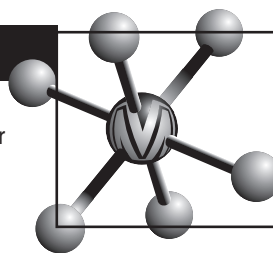
6 Hotel Nikko
\$169 single/double

Deposit Payment: Check American Express MasterCard VISA Discover Diners

Account Number _____ Expiration Date _____

Card Holder Name _____ Authorized Signature _____

TOUR REGISTRATION FORM



FUNDAMENTAL SCIENCE
EMERGING TECHNOLOGY
PRACTICAL APPLICATION

134th Annual Meeting & Exhibition

TMS2005

WHERE THE CONNECTION IS MADE

REGISTRATION AND PAYMENT

Complete and return this form with your check or money order (U.S. Funds only) or fax the form with your VISA/Mastercard card number to (415) 397-6301. To ensure confirmation of your registration, please include your email address or fax number. The San Francisco Company will send confirmation within 3-5 business days.

Name: _____

Address: _____

City: _____

State: _____

Zip Code: _____

Phone: _____

Fax: _____

E-mail: _____

OPTIONAL TOURS	ADULTS	QUANTITY	CHILDREN	QUANTITY	AMOUNT
San Francisco Deluxe City Tour Monday, February 14, 2005 8:45 a.m. - 1:00 p.m.	\$31.00	<input type="text"/>	\$31.00	<input type="text"/>	<input type="text"/>
Muir Woods/Sausalito Tuesday, February 15, 2005 8:00 a.m. - 12:15 p.m.	\$41.00	<input type="text"/>	\$41.00	<input type="text"/>	<input type="text"/>
Wine Country Tour Tuesday, February 15, 2005 12:45 p.m. - 6:00 p.m.	\$61.00	<input type="text"/>	\$41.00	<input type="text"/>	<input type="text"/>
Alcatraz & Pier 39 Wednesday, February 16, 2005 9:30 a.m. - 3:30 p.m.	\$49.00	<input type="text"/>	\$43.00	<input type="text"/>	<input type="text"/>
OPTIONAL PLANT TOURS					
Lawrence Berkeley Laboratory Thursday, February 17, 2005 1:00 p.m. - 5:00 p.m.	\$25.00	<input type="text"/>	N/A	<input type="text"/>	<input type="text"/>
Schnitzer Steel Scrap Shredding/ Recycling Facility Tour Thursday, February 17, 2005 1:00 p.m. - 4:00 p.m.	\$25.00	<input type="text"/>	N/A	<input type="text"/>	<input type="text"/>
TOTAL					<input type="text"/>

PAYMENT OPTIONS

Check Visa Mastercard

Cardholder's Name: _____

Card Number: _____

Exp. Date: _____

Signature: _____

Registration Deadline

The registration deadline is Monday January 31, 2005. After this date, tour registration will be on a space-available basis only at the Tour Desk at the Moscone Convention Center.

Cancellations

Cancellations must be received in writing by January 31, 2005. In the event of tour cancellation, all pre-registration money will be returned.

Tour Departures

Tours depart promptly from the Moscone Center West Driveway. Please arrive 15 minutes prior to departure time.

Picking Up Tickets

Tickets will be held at the Tour Desk located in Moscone Center West and can be picked up beginning at 7:30 a.m. Monday February 14, 2005

Questions? Call The San Francisco Company at (415) 397-6300 or email info@sfcompany.com
The San Francisco Company
101 The Embarcadero, Suite 212
San Francisco, CA 94105
Phone (415) 397-6300
Fax: (415) 397-6301
www.sfcompany.com
info@sfcompany.com

Support the TMS Foundation and You Could Win a Set of Callaway Golf Clubs and Bag!



In conjunction with the 2005 TMS Annual Meeting & Exhibition, the TMS Foundation will be sponsoring a drawing for a set of Callaway Big Bertha Titanium Woods, Callaway X-16 Pro-Series Irons and a Callaway Big Bertha cart bag.

For a \$20 donation to the TMS Foundation, you can be entered in the drawing. Only the first 500 paid entries will be accepted and eligible for this drawing.* The winner will be drawn Wednesday, February 16, 2005 at the TMS 2005 Annual Meeting Exhibition.

Here's what you can win:

- Big Bertha Titanium Woods — The Big Bertha Driver, 3-wood, and 5-wood are the newest versions of the legendary clubs. They feature the latest technology titanium heads and graphite shafts.
- Steelhead X-16 Irons — Callaway has blended golf's most innovative and advanced technologies into the Steelhead X-16 irons.
- Big Bertha Cart Bag.



SPECIAL BONUS PRIZE!

You need not attend the TMS 2005 event in San Francisco to win the Callaway clubs and bag. However, if the winner's name is drawn and that person is a registered attendee of the meeting, they will receive a \$500 cash bonus.



To enter, mail the form below with your payment, or visit the TMS 2005 Annual Meeting & Exhibition web site at <http://www.tms.org/AnnualMeeting.html>, or stop by the TMS Membership area.

The official registration form and financial information of The Minerals, Metals & Materials Society, Inc. may be obtained from the Pennsylvania Department of State by calling toll-free within Pennsylvania, 1-800-732-0999. Registration does not imply endorsement. TMS is an I.R.C. 501(c) (3) not-for-profit organization. (F.E.I.N. 25-1494913)



Please accept my donation of \$20 to the TMS Foundation and enter my name in the Callaway Golf Giveaway.

Name _____

Address _____ City _____ State _____

Country _____ Zip/Postal Code _____

Telephone _____ Email _____

Please check payment method (in U.S. dollars):

Check Enclosed for \$20 (Please make checks payable to TMS Foundation.)

Credit Card: Visa MasterCard American Express Diner's Club

Credit Card # _____ Expiration Date _____

Card Holder Name # _____ Cardholder Signature _____

Mail to: TMS Foundation, 184 Thorn Hill Road, Warrendale, PA 15086-7514

Fax to: (724) 776-3770

- Employees of The Minerals, Metals & Materials Society and their families are not eligible for this drawing.
- The number of entries will be limited to the first 500 received by the TMS Foundation.



HOT TOPICS AT TMS 2005

Each year, the TMS Annual Meeting & Exhibition program seeks to include informative sessions that reflect our commitment to address today's most important issues and newsworthy challenges to the global materials community. For instance:

TMS 2002 *Materials Issues Related to the Collapse of the World Trade Center and Energy Issues in the Aluminum Industry*

TMS 2003 *Materials Research to Meet 21st Century Defense Needs and Increasing Energy Efficiency in Aluminum*

TMS 2004 *Materials Analysis: Understanding the Columbia Disaster and Materials Issues in Fuel Cells: State of the Art*

TMS 2005 will continue the tradition with the following planned "Hot Topic" sessions:

INDUSTRIAL ENERGY REDUCTION: MATERIALS OPPORTUNITY ANALYSES

Sponsored by TMS and the Department of Energy

New and advanced materials and materials fabrication techniques can have a significant effect on energy efficiency in industrial processing through improved component performance and life extension. Although numerous opportunities exist for materials solutions to play a beneficial role in manufacturing, it is not always obvious in which applications advanced materials will have a key impact on energy efficiency. Analytical studies can be used to understand and identify the most promising materials related opportunities, and to quantify the potential benefits. They provide useful information for prioritization and planning for materials development.

GLOBALIZATION OF MATERIALS R&D

Sponsored by the National Materials Advisory Board and the TMS Public & Governmental Affairs Committee

This session will discuss the findings of an ad hoc committee of the National Materials Advisory Board that conducted a study to assess the status and impacts of the globalization of materials research and development. The committee conducted a brief survey (based on earlier studies) of materials R&D being carried out around the world, and identified major trends, especially those that affect U.S. capabilities in this area. The group also assessed the forces that are driving these trends, assessed their impacts, and recommended actions to assure U.S. access to current materials R&D.

Stay tuned to the TMS 2005 web site at <http://www.tms.org/AnnualMeeting.html> for further details and scheduling information for these important sessions.

February 13-17, 2005
Moscone West Convention Center • San Francisco, CA

TMS

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