

# TMS 2003

## 132nd Annual Meeting & Exhibition

*featuring the*

### The TMS 2003 International Metals & Materials Exhibition

*with program contributions by*

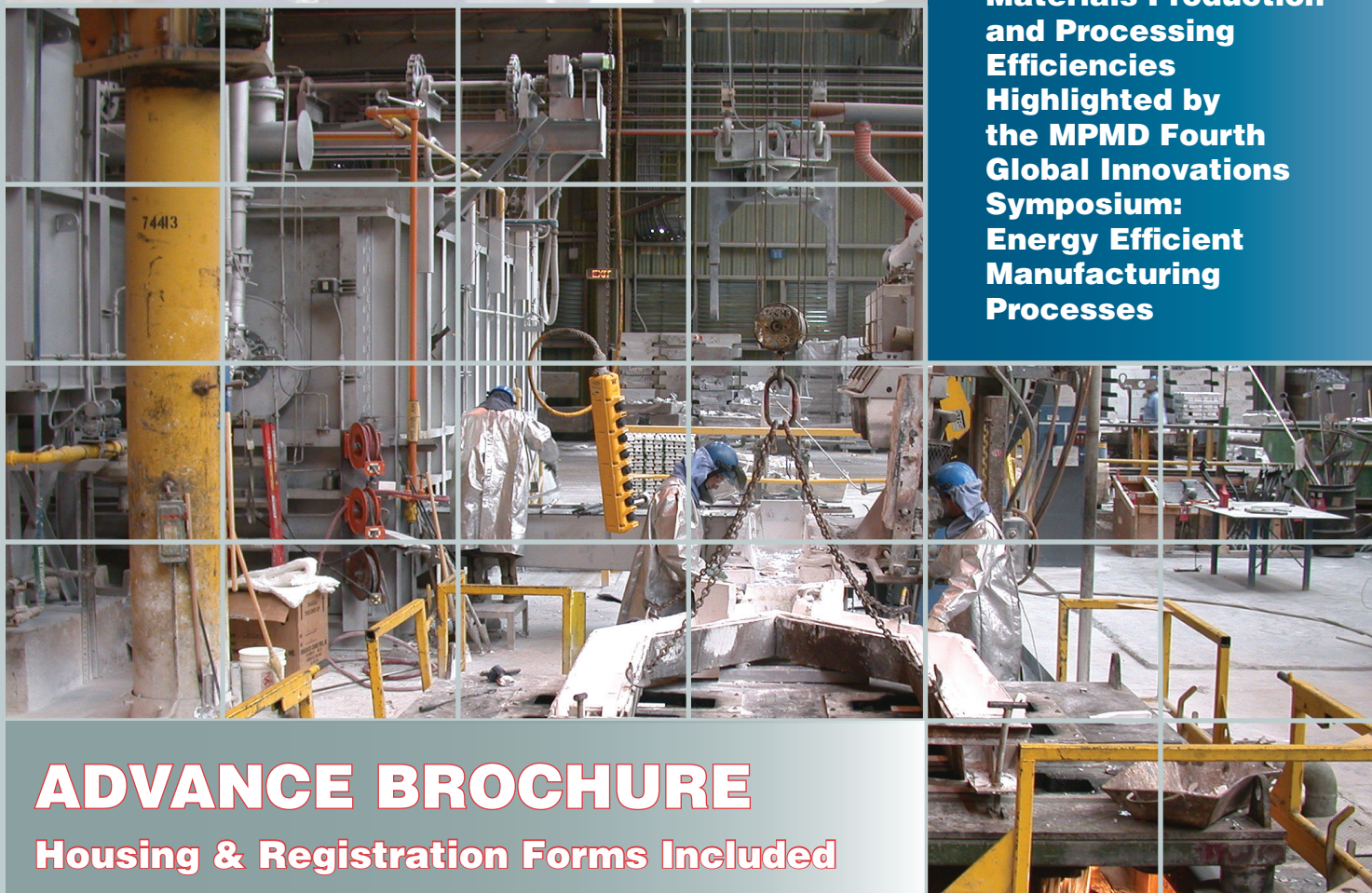
- TMS Education Committee
- Aluminum Association
- Materials Science Critical Technology Sector (ASM International)
- International Magnesium Association

**March 2-6, 2003**

**San Diego Convention Center  
San Diego, California, USA**

### **HOT TOPIC TRACK –**

**Materials Production  
and Processing  
Efficiencies  
Highlighted by  
the MPMD Fourth  
Global Innovations  
Symposium:  
Energy Efficient  
Manufacturing  
Processes**



**ADVANCE BROCHURE**

**Housing & Registration Forms Included**

*It's like  
attending  
7 conferences  
for the price  
of one!*

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Just as San Diego is renowned for its near ideal weather, the city is also known for bringing out the best in the TMS Annual Meeting & Exhibition. The 2003 Annual Meeting & Exhibition version will be no exception.

The 132<sup>nd</sup> TMS Annual Meeting & Exhibition promises to be an event to remember. What may be the most comprehensive presentation of metals- and materials-centered technology ever assembled is expected to attract a highly skilled international audience representing the scientific and industrial sectors of more than 60 countries. A program totaling more than 200 sessions and 1,800 individual presentations will be comprised of the following conference tracks:

- Aluminum and Magnesium: Production and Processing
- High-Temperature Materials
- Materials Characterization and Mechanical Properties
- Metallurgical Extraction, Processing, Shaping, Forming, and Recycling
- Micro- and Nanoscale Technologies
- Materials Science Education

**A special hot-topic track has also been added this year—**

- Materials Production and Processing Efficiencies – highlighted by the MPMD Fourth Global Innovations Symposium: Energy Efficient Manufacturing Processes

**It's like attending 7 conferences for the price of one!**

In addition to the Society's five technical divisions:

- Electronic, Magnetic & Photonic Materials Division (EMPMD),
- Extraction & Processing Division (EPD),
- Light Metals Division (LMD),
- Materials Processing & Manufacturing Division (MPMD),
- Structural Materials Division (SMD),

The Aluminum Association, Materials Science Critical Technologies Sector of ASM International, International Magnesium Association, and TMS Education Committee have also contributed to this landmark program.

Bringing technological innovation into an applied perspective will be the TMS 2003 International Metals and Materials Exhibition—a global representation of products and services that can make your job easier and lead to better productivity for your organization.

The extensive menu of value-added activities and networking opportunities found throughout this brochure, as well as the tremendous climate and hospitality of the city of San Diego, will do nothing but add to the terrific learning experience and pure enjoyment created by your participation in the TMS 2003 Annual Meeting & Exhibition.

**See you in San Diego!**

### Cover Photo Information:

*Casting The Metal.* In the casting process, the metal flows from holding furnaces to water-cooled molds that have been positioned over 30-foot pits. The cooling metal solidifies as it moves through the molds, conforming to a number of shapes. The Mt. Holly plant produces four basic ingot shapes: T-shaped ingots, rolling ingot, extrusion billet and 30 or 50-pound foundry ingot. Most of the metal is alloyed to customer specifications.

*Courtesy—Alcoa Mt. Holly.*

## SPECIAL PROGRAMMING EVENTS

*Mark your schedule now for the...*

Materials Processing & Manufacturing Division's  
Fourth Global Symposium:

### ENERGY EFFICIENT MANUFACTURING PROCESSES

*A part of the 132<sup>nd</sup> TMS Annual Meeting & Exhibition*

**Learn the latest technological improvements to enable you to achieve greater production efficiency while reducing energy consumption.**

Increasing energy prices offer manufacturers an excellent incentive to improve productivity while decreasing production costs. Many times, making a process more energy efficient involves utilizing waste heat or other waste products, leading to a cleaner process as well. The goal of this forum is to explore process improvements that result in energy savings while producing an equal or better product with less waste. One obvious target for improvement is processes involving melting and heating, but all processes for shaping and forming raw materials into finished products are also very energy intensive. This symposium will cover manufacturing processes beginning at initial mineral extraction through packaging and shipping strategies. Some materials are melted several times throughout their processing cycle, and eliminating even one of these processes can result in substantial savings. Even less obvious materials processes and properties that can be improved for energy efficiency include wear, fatigue, hot-cracking, and corrosion of surfaces in manufacturing equipment and machine tools. Many such dies, rolls, cutting tools, and other equipment must be repaired or replaced regularly, and an extension of their useful life can be very cost effective and save significant energy. Near-net shape and additive processes that reduce the need for machining certainly increase energy efficiency as well. Manufacturing processes for metals, ceramics, polymers, electronic materials, and composites are certainly all available for improvements in energy efficiency, and all these materials are used for manufacturing other products.

Complementing the focus of this symposium will be two workshops developed as a part of the U.S. Department of Energy's (DOE) Best Practices program:

**Process Heating Systems Optimization Workshop .....Saturday, March 1**

**Pumping System Assessment Tool Workshop (PSAT) ..... Sunday, March 2**

*See pages 27 and 28 of this brochure for workshop details.*



**Attention all plant managers, cast shop supervisors and personnel, and anyone interested in the safety issues facing today's aluminum producing organizations.**

*Open your personal conference schedule with this vital session...*

### CAST SHOP SAFETY

*A special opening presentation to the 2003 Cast Shop Technology Symposium*

**Monday, March 3, 2003  
San Diego Convention Center**

**Jointly sponsored by the Aluminum Committee of the TMS Light Metals Division and the Aluminum Association.**

**The planned program includes the following presentations:**

- 1.** The Aluminum Industry's Efforts to Prevent Molten Metal Explosions  
**Presenter:** S.G. Epstein, The Aluminum Association
- 2.** Melting Safety for Aluminum Processing Facilities  
**Presenters:** F.R. Hubbard, IMCO Recycling, Inc. and D.C. Pierce, Consultant
- 3.** Evaluating RSI Sows for Safe Charging into Molten Metal  
**Presenters:** J.J. Niedling, Alcoa, Inc. and M. Scherbak, Alcoa, Inc.
- 4.** Cause and Prevention of Explosions Involving Hot-Top Casting of Aluminum Extrusion Ingot  
**Presenters:** J.M. Ekenes, Hydro Aluminum Hycast and T. Saether, Hydro Aluminum Hycast
- 5.** Investigating Molten Aluminum Explosions  
**Presenter:** J.E. Jacoby, Consultant
- 6.** Industry Research Efforts to Identify FR Fabrics for Molten Aluminum Environments  
**Presenter:** C.D. Johnson, The Aluminum Association
- 7.** Panel Discussion

*Federal  
Funding  
Workshop*

*Wednesday  
Evening,  
March 5, 2003  
San Diego  
Convention Center*

In this special workshop, planned for Wednesday evening after the close of the day's technical program, representatives from the National Science Foundation (NSF), the U.S. Department of Energy (DOE), and the National Institute of Standards and Technology (NIST), are scheduled to present brief presentations on current funding programs for materials research. Included will be an overview of current programs and initiatives, collaboration opportunities, tips for proposal writing, deadline information, and time for questions and discussion. This workshop is free and open to all attendees, and may in itself be worth the conference registration fee.

## SYMPOSIA HIGHLIGHTS AND AVAILABLE PROCEEDINGS

### *Featured Programming:*

- **Aluminum and Magnesium: Production and Processing**
- **High-Temperature Materials**
- **Materials Characterization and Mechanical Properties**
- **Metallurgical Extraction, Processing, Shaping, Forming, and Recycling**
- **Micro- and Nanoscale Technologies**
- **Materials Science Education**

### *ALUMINUM AND MAGNESIUM: PRODUCTION AND PROCESSING TRACK*

*This track encompasses symposia that focus on the science and technological issues associated with the production and processing of the two most widely marketed and applied light metals—aluminum and magnesium. Programming will also examine progress in the development and refinement of related alloys and their performance. The TMS Annual Meeting & Exhibition is recognized as the global light metals community's preeminent forum for the presentation of primary and secondary aluminum technology. The proceedings of the alumina reduction, bauxite and alumina, carbon, cast shop, and recycling technology symposia are published in the annual volume—Light Metals. This book is widely recognized as the “bible of the aluminum industry.” Rapidly attaining similar status, Magnesium 2003 provides a like reference for scientists and engineers working with this extremely lightweight metal. A short course on “Magnesium Metallurgy—Processing and Industrial Applications” is also scheduled to complement the program.*

### **THE ENTIRE PROGRAM,**

*including abstracts, will be available in November on the 2003 TMS Annual Meeting & Exhibition web site <http://www.tms.org/AnnualMeeting.html>.*

*The program will also be published in the November issue of JOM.*

## Alumina and Bauxite

*Sponsored by: TMS Light Metals Division, Aluminum Committee.*

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. Subject areas include: Bayer Process: fundamentals, chemistry, operational experiences; Safety and environment with focus on residues; Bauxite mining; Process control; Analytical methods; Design of refineries; Inert anodes.

### Light Metals 2003

BUY THE PROCEEDINGS!

*P. Crepeau, editor*

ISBN 0-87339-531-X

*Illus., hardcover & CD-ROM*

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Shipping weight unit: 7 ■ See registration form to order.



## Aluminum Reduction Technology

*Sponsored by: TMS Light Metals Division, Aluminum Committee.*

The Aluminum Reduction Technology Symposium, along with alumina and bauxite, cast shop technology, carbon technology, recycling technology, and reactive metals, collectively form the Light Metals Symposium. Subject areas include: 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; Bath chemistry; Inert anodes.

### Light Metals 2003

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## Aluminum Reduction–Potroom Operations Symposium

*Sponsored by: TMS Light Metals Division, Aluminum Committee.*

Plant operational managers and technical managers of aluminum smelters will be making presentations specifically related to potroom operations and performance improvements at the 2003 TMS aluminum reduction session: potline amperage creep, potline shutdown & restart, power modulation, innovative potroom work practices, process improvements that increase metal production, cost reduction projects, and solutions to complex potroom operational problems.

### Aluminum Reduction–Potroom Operations

BUY THE PROCEEDINGS!

*A. Tabereaux, editor*

ISBN 0-87339-549-2

*Illus., hardcover & CD-ROM*

Order No. 03-5492-CD (CD ROM),

03-5492-E (PDF)



## Automotive Alloys 2003

*Sponsored by: TMS Light Metals Division, Aluminum Committee.*

Automotive Alloys 2003 symposium is capturing the ongoing research, development and testing activities for usage of aluminum and magnesium alloys in automotive applications.

### Aluminum 2003

PROCEEDINGS AVAILABLE AFTER THE CONFERENCE

*S.K. Das, editor*

ISBN 0-87339-542-5

*Approx. 506 pp., illus., hardcover*

Order No. 03-5425



## Carbon Technology

*Sponsored by: TMS Light Metals Division, Aluminum Committee.*

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. Subject areas include: Anode raw materials and properties; Paste plant design and operation; Baking furnace design and operation; Rodding room design and operation; Anode quality and performance; Carbon plant environmental and safety; Carbon cathode materials and performance.

### Light Metals 2003

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*P. Crepeau, editor*

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## Cast Shop Technology

*Sponsored by: TMS Light Metals Division, Aluminum Committee.*

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. Subject areas include: Charge materials; Melting; Filtration; Pre-furnace treatment; Casting processes; Fluxing; Environmental issues; Shape casting; Grain refinement; Modeling and control; Automation; Cast structures; Safety.

### Light Metals 2003

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*P. Crepeau, editor*

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## Casting and Solidification of Mg-Alloys

*Sponsored by: TMS Materials Processing & Manufacturing Division, Solidification Committee.*

The Mg committee and the Solidification committee of TMS are organizing a one-day joint symposium on Mg solidification. The symposium will focus on the following topics: Casting and welding technology; Simulation of casting; welding and solidification; Microstructural evolution in casting and welding; Casting and weld microstructural stability; and properties. The symposium will include invited lectures by keynote speakers and contributed presentations.

### Magnesium Technology 2003

BUY THE PROCEEDINGS!

*H. Kaplan, editor*

ISBN 0-87339-533-6

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*& CD-ROM*

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## Products, Applications, and Services Showcase

*Sponsored by: TMS Light Metals Division, Aluminum Committee.*

Intended for short technical/product presentations of a commercial nature. Preferences are given to contracted exhibitors and referrals from specific Program Chairpersons. The papers of the Product and Equipment Showcase Sessions will not be published in Light Metals 2003. Four sessions will be organized and scheduled concurrently with technical sessions. Topics: Alumina technology; Reduction technology; Furnaces; Refractories; Melt treatment; Miscellaneous.

## Friction Stir Welding and Processing II

Sponsored by: TMS Materials Processing & Manufacturing Division, Shaping and Forming Committee

The process of friction stir welding is a relatively new solid state joining process receiving considerable attention in the industry. FSW is the most-significant development in the joining industry in the last ten years. Friction stir welding not only provides a solution to join all types of aluminum alloys and composites, it also leads to significantly better joint properties. Also, some researchers are using the friction stir process as a grain refinement technique. In such cases, Friction Stir Processing (FSP) is likely to open up several new possibilities. This symposium will provide researchers with an opportunity to review the current status of the friction stir related processes and discuss the future possibilities.

### Friction Stir Welding and Processing II

BUY THE PROCEEDINGS!

*K.V. Jata, M. Mahoney, and R. Mishra*

ISBN 0-87339-536-0

Approx. 262 pp., illus., index, hardcover

Order No. 03-5360

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## Universities Servicing Education, Research and Technology Internationally for the Aluminium and Light Metals Industries

Sponsored by: TMS Light Metals Division

This symposium will provide a global update on university based R&D in the aluminum and light metals industries. In addition, the key role industry-specific courses and curricula play in the university community's service to industry will be discussed. Participation from both academia and industry is expected. Contributed papers may focus on these areas: a) How universities currently are and can best service the Aluminium and Light Metals industries, in terms of research and technology development, education and establishment of independent testing facilities; b) Needs, issues, approaches, and solutions relating to funding and support; critical "mass"/size of research groups; degree of international collaboration; collaboration between industry and universities; management of projects where people are geographically dispersed and may have different objectives/requirements; ownership of intellectual property and project confidentiality; c) There is particular interest in presentations that will show similarities and variance in university programs throughout the world. It is expected that participation will include all major industrial regions.

### Aluminum 2003

PROCEEDINGS AVAILABLE AFTER THE CONFERENCE

*S.K. Das, editor*

ISBN 0-87339-542-5

Approx. 506 pp.; Illus., hardcover

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## HIGH-TEMPERATURE MATERIALS TRACK

## International Symposium on Intermetallic and Advanced Metallic Materials: A Symposium Dedicated to Dr. C.T. Liu on his 65th Birthday

Sponsored by: TMS Structural Materials Division, Jt. Mechanical Behavior of Materials and ASM International: Materials Science Critical Technology Sector

For the past decade, substantial advances have been achieved in the understanding and development of intermetallic compounds and advanced metallic materials, such as high temperature alloys and bulk metallic glasses. These advances are a result of extensive technical efforts in conducting intriguing experiments using the state-of-the-art techniques and computer simulations performed at various length scales. This has also led to many commercial

## Hot Deformation of Aluminum Alloys

Sponsored by: Materials Processing and Manufacturing Division, Shaping and Forming Committee

This symposium will address recent progress in theoretical and experimental studies of hot deformation of aluminum alloys. All topics relating to hot deformation of aluminum alloys are solicited. This includes, but is not limited to: hot deformation mechanisms; the evolution of grain structure; texture; precipitates and damage in thermomechanical processes including: rolling; extrusion; forging; superplastic forming; friction stir welding; severe plastic deformation forming; hydroforming and semi-solid forming. Relevant issues include the influence of microstructure evolution and process parameters on the material performance, models and simulations of hot deformation and thermo-mechanical processes at all length and time scales, and constitutive description of large strain deformation. Submissions that address design and optimization of thermo-mechanical processes and microstructure using fundamental understanding, development of models and computer simulation are strongly encouraged. Papers relating to both fundamental research and industrial applications will be presented.

### Hot Deformation of Aluminum Alloys III

BUY THE PROCEEDINGS!

*Z. Jin, A. Beaudoin, T. Bieler,*

*and B. Radhakrishnan, editors*

ISBN 0-87339-538-7

Approx. 491 pp., illus., hardcover

Order No. 03-5387

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## Magnesium Technology 2003

Sponsored by: TMS Light Metals Division, Magnesium Committee, International Magnesium Association

This symposium topics will include 7 sessions on the following: magnesium primary production, recycling, environmental issues, alloy development, physical mechanical and high temperature properties, with a sub emphasis on solidification, casting, and welding.

### Magnesium Technology 2003

BUY THE PROCEEDINGS!

*H. Kaplan, editor*

ISBN 0-87339-533-6

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*The symposia of this track will provide a forum to explore the design, manufacture, applications, and service performance of high-temperature materials, including superalloys, ceramics, intermetallics, and composites.*

applications of these advanced intermetallics and metallics. The objective of this conference is to provide an international forum to discuss recent progress in both fundamentals and applications of these intermetallic and metallic materials. This will be a five-session symposium on all aspects of intermetallic compounds and advanced metallics, including high temperature alloys and bulk metallic glasses. Some examples of what might be included in the proposed sessions are: basic understanding of alloy design; experimental methods and studies; modeling and simulation; and material processing and commercial applications. This symposium is organized in honor of Dr. C.T. Liu who has made significant contributions in the development of intermetallic compounds and advanced metallics during the past thirty years.

## High Temperature Alloys: Processing for Properties

Sponsored by: TMS Structural Materials Division,  
High Temperature Alloys Committee

This symposium will focus on the development and optimization of processing techniques used for producing elevated temperature alloys with improved properties. The effect of processing on the microstructures and properties (e.g., creep, fatigue and tensile strength, fracture toughness, etc) of high temperature alloys, including superalloys, refractory metals, intermetallics and composites will be discussed. Processing techniques to be discussed include, but are not limited to, casting, wrought processing, powder metallurgy, and hybrid techniques. Papers are solicited from industry, government, and academia that describe the development and optimization processes.

## High Temperature Alloys: Processing for Properties

BUY THE PROCEEDINGS!

G. Fuchs and J. Wahl, editors

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## International Symposium on Gamma Titanium Aluminides

Sponsored by: TMS Structural Materials Division, ASM International:  
Materials Science Critical Technology Sector, Materials &  
Processing, High Temperature Alloys Committee, Titanium Committee

The 3rd International Symposium on Gamma Titanium Aluminides (ISGTA 2003) will deal with both basic and practical aspects in all areas of the gamma titanium aluminide materials technology. Topics to be included are: A) Basic Understanding: phase relations/transformations, alloy development, process development, mechanical behavior, microstructure/property relationships, and environmental effects; B) Materials Technology: casting, ingot metallurgy, powder metallurgy, hot-working and forming, fabrication & joining, machining, and other novel processes, evaluation, and cost analyses; C) Applications: status, aerospace, automotive, and other developments; D) Data Compilation: mechanical, physical, chemical, thermodynamic, environmental, and others; E) New Developments and Future Directions. The forum is intended to share the

progresses and achievements made toward applications that will have been made since ISGTA '99 and to steer and stimulate the future research and development of the gamma materials technology.

## Gamma Titanium Aluminides 2003

PROCEEDINGS AVAILABLE AFTER THE CONFERENCE

Y.-W. Kim, H. Clemens, and

A.H. Rosenberger, editors

ISBN 0-87339-543-3

Approx. 878 pp., illus., index, hardcover

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## Surface Engineering in Materials Science - II

Sponsored by: TMS Materials Processing & Manufacturing  
Division, Surface Engineering Committee

The Surface Engineering Symposium in Materials Science II will address the scientific issues related to Surface Engineering phenomena in synthesis, characterization, and application for all materials. 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.

## Surface Engineering in Materials Science II

BUY THE PROCEEDINGS!

S. Seal, N.B. Dahotre, J. Moore, A. Agarwal,  
and S. Suryanarayana, editors

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## MATERIALS CHARACTERIZATION AND MECHANICAL PROPERTIES TRACK

*The symposia of this track provide an opportunity to expand our understanding of structure-processing-property-performance relationships, as well as the associated physical and mechanical behavior. Within the context of the discussions, the application of electron microscopy, crystallography, computer modeling, and other techniques will be considered in the investigation of defects, fatigue, phase stability and transformation, radiation damage, hardening and softening, twinning, and other characteristics for a wide range of materials.*

## Defects and Deformation of Crystalline Solids— in Honor of Dr. Man H. Yoo

Sponsored by: TMS Structural Materials Division and ASM  
International: Materials Science Critical Technology Sector, Jt.  
Mechanical Behavior of Materials; TMS Electronic, Magnetic  
& Photonic Materials Division, Jt. Chemistry & Physics of  
Materials Committee; Physical Metallurgy Committee

Recently developed novel experimental techniques and rapid progress in com-

putational power have helped to develop a clearer understanding of the defects and deformation behavior of crystalline solids. Thus, we are a step closer to the stage of predicting the properties and performance of such materials and estimating the efficiency of pertinent technological processes. The symposium is intended for the presentation of recent findings and for discussion of fundamental features of the field to which Dr. Man H. Yoo of Oak Ridge National Laboratory has made noted contributions over recent decades.

## **Dynamic Deformation: Constitutive Modeling, Grain Size, and Other Effects: Symposium in Honor of Professor Ronald W. Armstrong**

*Sponsored by: TMS Structural Materials Division and ASM International: Materials Science Critical Technology Sector, Jt. Mechanical Behavior of Materials*

This symposium is organized to honor the work of Professor Ron Armstrong. The focus is on the dynamic behavior of materials, with emphasis in areas in which Prof. Armstrong has made seminal contributions: constitutive equations and grain-size effects. Dynamic deformation encompasses a broad range of phenomena with technological applications in military and civilian sectors. This will be the third in the series of symposia held on this subject, with the first symposium held in October 1994 and the second in October 1998, both in Rosemont, Illinois. Grain size effects on plastic deformation of materials have been a subject of consistent interest since the days of Hall and Petch, and the recent thrust in nanocrystalline materials has raised the interest to even higher levels. The macromechanical and physical processes that govern deformation at high-strain-rates and in materials with nanocrystalline grain sizes manifest themselves by a dazzling complexity of effects and morphologies. Professor Armstrong's noteworthy contributions in these areas have enhanced our predictive capability by enabling an improved understanding of the deformation mechanisms. The purpose of this symposium is to bring together researchers working in dynamic high-strain-rate deformation of solids, and on effects of grain size on plastic deformation, in particular, of nanocrystalline materials. The objective will be to review the state of the understanding of deformation mechanisms and mechanical properties as they are influenced by high-strain-rate and grain size effects. Unique consequences of dynamic deformation, including stress-induced chemical and physical changes, will also be discussed. The symposium will include invited and contributed papers in the following areas: high-strain-rate mechanical properties; mechanisms of dynamic deformation; constitutive equations; grain size effects on mechanical properties; strengthening mechanisms in nanocrystalline solids; stress-induced physical and chemical changes in inert and energetic materials. The organizers are planning to publish the proceedings from this symposium in *Metallurgical and Materials Transactions*.

## **Martensitic Transformations in Low Symmetry Materials**

*Sponsored by: TMS Structural Materials Division, Jt. Nuclear Materials Committee, Phase Transformations Committee and ASM International: Materials Science Critical Technology Sector*

Martensite transformations in low symmetry materials offer unique challenges in terms of the crystallographic relationships between the parent and product phases. However, many engineering materials rely on the details of the transformation mechanism in the performance of the material. Specifically, many structural materials, actinides, and shape memory alloys depend on a martensitic phase for a desired property response. This symposium is intended to present the current advancements in the understanding of martensites in low symmetry materials. Fundamental aspects to be covered include: theory/modeling, thermodynamics/kinetics, and crystallography. Specific emphasis will be placed on the applications of external fields and how they relate to the performance of these types of materials.

## **Materials Lifetime Science and Engineering**

*Sponsored by: TMS Structural Materials Division and ASM International: Materials Science Critical Technology Sector, Jt. Mechanical Behavior of Materials*

The most complex and damaging processes that control the lifetimes of structural materials are those that involve synergistic interactions between environmental and mechanical effects. Mechanistic understanding and theoretical modeling need to be provided to further the studies of materials lifetime science and engineering. Specifically, mechanical/environmental interactions, fatigue, corrosion fatigue, oxidation effects, pit initiation, crack initiation and propagation, and final failure will be emphasized.

## **Materials Lifetime Science and Engineering** BUY THE PROCEEDINGS!

*P.K. Liaw, R.A. Buchanan, D.L. Klarstrom, R.P. Wei, and D.G. Harlow, editors*  
**ISBN 0-87339-544-1**

*Approx. 212 pp., illus., index, softcover*  
**Order No. 03-5441**

**MEMBER PRICE \$91 ■ LIST PRICE \$130**

*Shipping weight unit: 2 ■ See registration form to order.*



## **Materials Prognosis: Integrating Damage-State Awareness and Mechanism-Based Prediction**

*Sponsored by: TMS Structural Materials Division*

This symposium is intended to highlight scientific tools and approaches for development of a comprehensive damage prognosis technology for materials. The objective of such a prognosis capability is to enable continual assessment and prediction of the current and future health of materials in a complex mechanical system or subsystem, such as a turbine engine, helicopter gearbox, or aircraft. The ultimate goal is the development of quantitative models that relate a system's-level structural response to material's-level microstructural events. Areas of emphasis include: (1) methods for in situ interrogation of the damage state of a material, such as that from fatigue and/or creep, (2) physically-based models of the formation and growth of material damage under realistic loading, and (3) coupled state-awareness and life models, including probabilistic and uncertainty approaches. The symposium is expected to attract participants from diverse but interdependent disciplines including materials science, mechanical engineering, physics, and diagnostic state-awareness engineering.

## **Measurement and Interpretation of Internal/Residual Stresses**

*Sponsored by: TMS Structural Materials Division, ASM International: Materials Science Critical Technology Sector, TMS Materials Processing & Manufacturing Division, Jt. Mechanical Behavior of Materials, Shaping and Forming Committee*

Residual stresses play an important role in the behavior of metal matrix composites, multi-component and multi-phase alloys. These stresses form during processing and service due to transformation or thermal expansion mismatch as well as elastic and plastic mismatch during deformation. In order to develop a deeper understanding of the thermo-mechanical behavior of these materials, over a variety of length scales from bulk to the nano-structure, it is of key interest to examine the development of such residual and/or internal stresses. This symposium is targeted to the measurement and interpretation of internal and/or residual stresses. The basic principle of internal stress measurement is identical in that they record strains via changes in lattice parameter, which are converted to stresses. A host of Neutrons, X-Ray and other microscopic techniques are available, though the length-scales at which such techniques operate vary. Within the context of internal stresses, this symposium invites contributions attempting internal/residual stress measurements over mm to sub-micron scale via Neutron, X-Ray, Synchrotron, and other novel techniques including SEM based EBSP methods.

## **Microstructural Processes in Irradiated Materials**

*Sponsored by: TMS Structural Materials Division and ASM International: Materials Science Critical Technology Sector, Jt. Nuclear Materials Committee*

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 fifth 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. Both experimental and theoretical studies are solicited with a particular



emphasis on linking state-of-the-art modeling with experimental observation. Specific topics where contributions are encouraged include: Amorphization and recrystallization; Phase stability and solute segregation; Radiation-enhanced or induced diffusion; Irradiation spectrum and dose rate effects; Defect characterization; Ion implantation-induced precipitation; Damage in fusion & fission reactor materials.

### **The Mike Meshii Symposium on Electron Microscopy: Its Role in Materials Research**

*Sponsored by: ASM International: Materials Science Critical Technology Sector, TMS Structural Materials Division, and Jt. Mechanical Behavior of Materials*

Electron microscopy has played a critical role in advancing the materials science paradigm. Direct imaging of structures at the microstructural and nanostructural levels allows structure-property relations to become better elucidated. This is particularly true for defects, either induced by the microscope as radiation damage or pre-existent as initiation sites for fatigue or phase transformations. The Mike Meshii Symposium is intended to capture the current research activities and to assess the state-of-the-art use of electron microscopy to solve problems in materials science and engineering. We are organizing a four-session symposium on electron microscopy, specifically its role in materials research. Some examples of what might be included in the proposed sessions are: defects and radiation damage; fatigue; solid solution softening and; phase transformations. We propose to dedicate this symposium in honor of Dr. Masahiro (Mike) Meshii who will retire from Northwestern University after more than 40 years of service in September 2003. Professor Meshii has made important contributions to the field using electron microscopy, particularly, amorphization, galvanization, solid-solution softening, and fatigue.

#### **Electron Microscopy: Its Role in Materials Science**

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### **Phase Stability, Phase Transformations & Reactive Phase Formation in Electronic Materials**

*Sponsored by: TMS Electronic, Magnetic & Photonic Materials*

*Division and Structural Materials*

*Division, Jt. Alloy Phases*

*Committee*

This symposium addresses phase stability, phase transformation, and reactive phase formation issues in electronic materials. Topics of interest include, but are not limited to, phase stability of flip-chip UBM, interfacial reactions at solder joints, phase transformations in lead-free solders during the soldering process, stability of solder joints in optoelectronics, phase transformations in silicide materials, phase stability of contacts and interconnects in ICs, new barrier layers for Cu processes, multicomponent III-V materials, and chemical interactions between electronic materials. The organizers are planning to publish the proceedings from this symposium in the *Journal of Electronic Materials*.



### **Terence E. Mitchell Symposium on the Magic of Materials: Structures and Properties**

*Sponsored by: ASM International: Materials Science Critical Technology Sector, TMS Structural Materials Division, and Jt. Mechanical Behavior of Materials*

This symposium is being organized to honor Dr. Terry Mitchell for his seminal contributions to materials science in his 40+ years of illustrious career at Cambridge University (UK), Case Western Reserve University, and Los Alamos National Laboratory. The theme of the symposium will be structure-property relationships in crystalline materials, with emphasis on defects, crystallography and transmission electron microscopy. Distinguished speakers will be invited from all over the world to present invited talks in topical areas of continued interest where Dr. Mitchell has made significant contributions. Some of these topics include: deformation behavior of fcc and bcc refractory metals, intermetallics, structural ceramics, composites, and metallic multi-layers, defects in ferroelectrics, semiconductors and functional ceramics, solid solution hardening and softening, work hardening, twinning, radiation effects, oxidation, etc. The organizers are planning to publish the proceedings from this symposium in *Metallurgical and Materials Transactions*.

## **METALLURGICAL EXTRACTION, PROCESSING, SHAPING, FORMING, AND RECYCLING TRACK**

*Embracing the cornerstone issues of the global primary metals production field, this track provides an opportunity to address issues related to the emergence of materials; the increasing role of the computer in all facets of processing; mineral preparation, handling, extraction, and refining; manufacturing processes such as shaping and forming; recycling and waste minimization; and regulatory matters. Many of the presentations will appear in the 2003 EPD Congress, the annual volume of the TMS Extraction & Processing Division which provides coverage of the optimized processing approaches to ferrous and nonferrous metals.*

### **Actinide Materials: Processing, Characterization, and Behavior**

*Sponsored by: TMS Light Metals Division and Structural Materials Division, Jt. Nuclear Materials Committee,*

*Reactive Metals Committee*

Actinide materials, especially U and Pu, are the foundation of the nuclear energy fuel cycle. The thermodynamic stability of actinide compounds places them in a chemical processing category with Al, Ti, Mg, and other reactive metals. Even so, the basic behavior and structure of these metals and their compounds is quite complex. In addition, their natural long-term radioactivity creates unique technical challenges for waste disposal. Subject areas include: the processing, characterization, and behavior of actinide materials in commercial and advanced nuclear fuels, high level nuclear waste forms, and medical applications.

### **Applications and Processing of Powder Metallurgy Refractory Metals and Alloys**

*Sponsored by: TMS Structural Materials Division, Refractory Metals Committee, Physical Metallurgy Committee*

This symposium is intended as a forum for the presentation of current research and engineering results in the area of powder metallurgy refractory metals and alloys. The organizers expect that the symposium will be divided into sessions as follows: structural applications, electronics applications, consolidation processes, mechanical properties, and physical properties. The organizers are planning to publish the proceedings from this symposium in *JOM*.



## General Topics in Waste Treatment and Minimization

Sponsored by: TMS Extraction & Processing Division, Waste Treatment & Minimization Committee.

This symposium will address pertinent topics in waste treatment and minimization, with subjects to be decided later.

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## Global Development of Copper and Gold Deposits

Sponsored by: TMS Extraction & Processing Division, Process Mineralogy Committee, Precious Metals Committee

The presentations will focus on the various aspects of the exploitation of copper and gold deposits, including, but not limited to, process mineralogy, mineral processing, pyrometallurgy, hydrometallurgy and environmental aspects.

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## International Symposium on Smelter Maintenance, Productivity and Efficiency

Sponsored by: TMS Extraction & Processing Division, Lead and Zinc Committee, Pyrometallurgy Committee

Profitable smelting relies heavily on cost control, high metal recovery and productivity. Topics include: Smelter maintenance: (maintenance practice, planning, accounting, prevention; corrosion, dust-build-ups, accretions, tap-holes, break-outs, material standards, documentation); Productivity: (furnace availability, total quality management, furnace integrity, scheduling, furnace cooling, outsourcing of services, start-up, learning curve); Efficiency: (metal recovery, slag handling, practical slag chemistry, reduction, fuming, slag concentrating, electric furnace operation).

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## Materials Processing Fundamentals

Sponsored by: TMS Extraction & Processing Division and TMS Materials Processing & Manufacturing Division, Jt. Processing Modeling Analysis & Control Committee; and Extraction & Processing Division, Process Fundamentals Committee

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 and in-plant validation are especially encouraged.

## Materials Processing Under the Influence of Electrical and Magnetic Fields

Sponsored by: TMS Extraction & Processing Division and TMS Materials Processing & Manufacturing Division, Jt. Processing Modeling Analysis & Control Committee; and Extraction & Processing Division, Process Fundamentals Committee

The symposium will cover physical phenomena, analytical and numerical models, numerical algorithms, experimental studies, physical modeling, and the development of new processes related to materials processing under the influence of electric and magnetic fields. Numerical topics may include the comparison of different software packages on the basis of their applicability, reliability, user-friendliness, accuracy, and cost. The symposium will include both presented papers and discussions in a workshop format. Summary and recommendations for future research topics of direct relevance to analytical model developers and numerical simulation software developers will be finalized during a round table discussion in the concluding sessions of the workshop. The objective of the workshop will be to create an environment that will lead to the formation of technical teams to work collaboratively on materials theory and computational algorithms pertinent to materials processing under the influence of electric and magnetic fields involving industry, academia, and national laboratories.

## Mercury Management

Sponsored by: TMS Extraction & Processing Division, Waste Treatment & Minimization Committee.

Mercury contamination is widespread. Its cleanup is not trivial. Descriptions of technologies that have been demonstrated to be effective (on the lab scale, pilot scale, and full scale) are solicited. Also, descriptions of specific site contamination and the management protocols utilized in successful cleanup operations (case histories) are solicited.

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## Reactive Metals

Sponsored by: TMS Light Metals Division, Reactive Metals Committee. The Reactive Metals Symposium, along with carbon technology, aluminum reduction technology, alumina and bauxite, cast shop technology, and recycling technology, 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. Subject areas include: Reactive metals and advances in molten salt processing.

### Light Metals 2003

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## Recycling – General Sessions

Sponsored by: TMS Light Metals Division, Recycling Committee

The Recycling Technology Symposium, along with reactive metals, carbon technology, aluminum reduction technology, alumina and bauxite, and cast shop technology, 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. Authors are invited to submit papers in the following subject areas: Any aspect associated with light metals recycling, including cross processing.

**General Recycling: Light Metals Session  
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**General Recycling: Heavy Metals Session**

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**Residue Handling in Metals Processing**

*Sponsored by: TMS Extraction & Processing Division,  
Waste Treatment & Minimization Committee.*

Most metals-producing processes create residue streams, which must be further processed for sale or disposal. This symposium will focus on these residue streams in ferrous and non-ferrous metals processing. Acceptable topics for presentation include: generation of residues and source reduction; processing of residues for sale or safe disposal; economic aspects; and environmental issues.

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**Sensors and Control in Materials Processing**

*Sponsored by: TMS Extraction & Processing Division and  
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Processing Modeling Analysis & Control Committee*

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**Yazawa International Symposium on Metallurgical  
and Materials Processing: Principles and Technologies**

*Sponsored by: TMS Extraction & Processing Division, Aqueous  
Processing Committee, Copper, Nickel, Cobalt Committee,  
Process Fundamentals Committee, Lead and Zinc Committee,  
Pyrometallurgy Committee*

This symposium is organized to share and discuss recent developments in physical chemistry of metallurgical processes and physicochemical principles involved in materials processing. These are the subjects of the lifetime work of Professor Akira Yazawa in whose honor this symposium is named. Many exciting new process technologies have in recent years been developed in the fields of chemical and process metallurgy and materials processing, and many have been adopted by the industry. The international symposium will provide a stimulating forum to critically examine the role of thermochemical and basic

physicochemical principles in the development and operation of these new processes. The results of basic and applied research as well as those of plant operations will be covered in this symposium. The specific topics to be covered include but are not limited to thermodynamics of sulfide smelting, thermo and physio-chemical principles relevant to pyrometallurgical and hydrometallurgical plant operations, advances in nonferrous production technologies, thermochemistry of ferrous production, environmental topics related to metals and materials production, new reactor design, control and optimization methods, basic principles of advanced materials processing, advances in materials processing technologies, energy and new raw materials. A complementary short course is also scheduled.

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**Waste from Metal Plating Industries**

*Sponsored by: TMS Extraction & Processing Division,  
Waste Treatment & Minimization Committee*

Various kinds of metal plating, Ni, Cr, Cu, Au and Pd etc. are adopted in metal plating industry. Recently, electroless or chemical plating is used in the field of Ni, Cu, Au and Pd plating. A large amount of wasted solution containing various metal ions and reduction agents is discharged from the metal plating industry. The effective and environmentally friendly treatment methods of the solution are needed from environmental and economical aspects. The session will cover the above topics and related areas.

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## MICRO AND NANOSCALE TECHNOLOGIES TRACK

*Developments in the synthesis, analysis, and application of these small-scale materials will be explored in this track of symposia. Materials in various forms, including thin films, coatings, powders, and bulk materials as well as the practical use of the same (e.g., electronic packaging) will be addressed.*

### Advances in MEMS and Optical Packaging

*Sponsored by: TMS Electronic, Magnetic & Photonic Materials Division, Electronic Packaging and Interconnection Materials Committee*



The silicon technology that led to the computer revolution and the silicon-oxide optical fiber technology that led to the telecommunications revolution have significantly changed the world in recent years by stimulating the explosion of information flow through internet networks and the increase in productivity. Micro-Electro-Mechanical Systems (MEMS) based on silicon technology are poised for a revolution now by virtue of their potential for significant reduction in size, weight and cost as well as substantial improvement in device density, speed, and precision. MEMS devices provide efficient interfaces between the macro- and micro-world, and are useful for various mechanical, chemical and biological sensors and actuator applications as well as for global optical telecommunication networks. Many issues remain to be resolved, for example, related to the materials choices, fabrication, integration, assembly processes using solder or other packaging materials, reliability aspects affected by materials and processes during handling, wafer level packaging, materials compatibility, out-gassing and vacuum packaging, etc. Materials and processing issues related to the packaging of MEMS and optical communication devices and systems will be covered. The organizers are planning to publish the proceedings in the *Journal of Electronic Materials*.

### International Symposium on Structures and Properties of Nanocrystalline Materials

*Sponsored by: TMS Structural Materials Division and ASM International: Materials Science Critical Technology Sector, Jt. Mechanical Behavior of Materials, Chemistry & Physics of Materials Committee*

In recent years, a wide range of nano-structured materials has been processed by a variety of processing routes and methods to engineer desired structures as well as properties. Such nanostructured materials include bulk form: electro-deposited sheets, ECAP rods, ball-milled & consolidated pellets; thin composite films by a variety of deposit techniques. Therefore, the properties of these materials exhibit a much more diversified nature. This symposium will provide a forum to discuss unique microstructure aspects including defect structures, grain boundary structures, interface structures; characterized properties: elastic, anelastic and plastic properties; electrical and magnetic properties; chemical and catalytic properties; and optical properties. Other related topics include computer simulations of microstructures and properties based on micro- and macroscopic models; processing-property relationship, structure-property relationship; and industrial applications.

### Lead-Free Solders and Processing Issues Relevant to Microelectronics Packaging

*Sponsored by: TMS Electronic, Magnetic & Photonic Materials Division, Electronic Packaging and Interconnection Materials Committee*



This symposium will address materials and processing issues related to the use of emerging and established lead-free and lead-bearing solders. Soldering processes, metallization, (board and component finishes) and manufacturing aspects will be addressed for microelectronics applications. Solder materials development for use in optical/optoelectronic and MEMS packaging are also included. Topics considered will consist of materials and manufacturing challenges in solder alloy design, structure-property-processing relationships of bulk solders and solder joints, influence of surface and underbump metallization on solderability and reliability of solder joints, microstructure modeling and

control, reliability modeling, and testing methodologies of various classes of electronic packages. The symposium will also cover lead-free materials for metal-semiconductor contacts, alternative interconnect technology for stress management at both the wafer level and the chip to package level, and the issues involved in the design and integration of conductive adhesives in electronic packages. Topics related to lead-free soldering in optoelectronic and microelectronic packages, such as BGA, micro-BGA, chip-scale etc. are also of special interest. The organizers are planning to publish the proceedings in the *Journal of Electronic Materials*.

### Materials and Processes for Submicron Technologies—III

*Sponsored by: TMS Electronic, Magnetic & Photonic Materials Division, Thin Films & Interfaces Committee*



This symposium is the third in a series devoted to advanced research in materials and processes for microelectronic systems comprising submicron-size features. The objective is to provide an interactive forum of multidisciplinary discussion on the science and technology of advanced materials, processing, and critical reliability issues in microelectronic device fabrication. Specific topics include, but are not limited to: Metallization: materials and processes for contacts, thin-film barriers and interconnects; film properties related to device performance, process integration, and reliability. Low-Dielectric Constant Materials: characterization; thermal and mechanical property control; process integration challenges in organic and inorganic dielectrics. High-Dielectric Constant Materials: materials design, processing and characterization challenges. Chemical Mechanical Polishing: process modeling and simulation; advanced slurry and pad development; defect characterization and control. Contacts and Silicides Technology: formation, kinetics and stability of silicides; process integration; barrier processing; film property control; rapid thermal processes. Reliability: electromigration; mechanical reliability (e.g. stress voiding, adhesion); corrosion; dielectric breakdown; diffusion-barrier reliability. Advanced Study on Thin Film Microstructures, Surfaces and Interfaces: characterization; defect control; morphology evolution and stability; response to thermal processing. The organizers are planning to publish the proceedings in the *Journal of Electronic Materials*.

### Science and Technology of Magnetic and Electronic Nanostructures

*Sponsored by: TMS Electronic, Magnetic & Photonic Materials Division and Structural Materials Division, Jt. Chemistry & Physics of Materials Committee*

With potential decrease in electronic device feature sizes from the current sub-micron to the sub-10 nm scale, the electrical, optical, magnetic and other physical properties of these materials must be understood at the nanoscale. They may be significantly different from the properties of the bulk materials. These new properties, particularly those arising from quantum confinement and size effects, will undoubtedly lead to new classes of devices. This symposium will address fundamental and applied issues pertinent to the science of this class of nanomaterials and nanostructures. The symposium will focus on the confluence of both magnetism and electrical character with microstructure and nanoscale phenomena in broad classes of materials. The primary goal of this symposium is to bring together materials scientists, physicists, chemists and engineers working in the field of magnetism and electronics to explore the interplay between micro (and nano) structure, processing and the manifestations in the physical responses. Of specific interest to this symposium are approaches to create and characterize magnetic and electronic nanostructures, thereby enabling new or better functionality.

## MATERIALS SCIENCE EDUCATION TRACK

*This track will present advances in content, approach, and methodology for undergraduate and graduate materials education.*

### Computational Methods in Materials Education

*Sponsored by: TMS Education Committee.*

This symposium will discuss the current new courses in computational methods in materials education and improvement of existing courses using new computational methods.

## HOT-TOPIC TRACK MATERIALS PRODUCTION AND PROCESSING EFFICIENCIES

*Featuring the TMS Materials Processing & Manufacturing Division's Fourth Global Innovations Symposium: Energy Efficient Manufacturing Processes. This spotlight programming track will present technological innovations and advancements that advance the growing global concern of achieving greater production efficiency while simultaneously reducing resource consumption.*

### The MPMD Fourth Global Innovations Symposium: Energy Efficient Manufacturing Processes

*Sponsored by: TMS Materials Processing and Manufacturing Division.*

Increasing energy prices offer manufacturers an excellent incentive to improve productivity while decreasing production costs. Many times, making a process more energy efficient involves utilizing waste heat or other waste products, leading to a cleaner process as well. The goal of this forum is to explore process improvements that result in energy savings while producing an equal or better product with less waste. One obvious target for improvement is processes involving melting and heating, but all processes for shaping and forming raw materials into finished products are also very energy intensive. This symposium will cover manufacturing processes beginning at initial mineral extraction through packaging and shipping strategies. Some materials are melted several times throughout their processing cycle, and eliminating even one of these processes can result in substantial savings. Even less obvious materials processes and properties that can be improved for energy efficiency include wear, fatigue, hot-cracking, and corrosion of surfaces in manufacturing equipment and machine tools. Many such dies, rolls, cutting tools, and other equipment must be repaired or replaced regularly, and an extension of their useful life can be very cost effective and save significant energy. Near-net shape and additive processes that reduce the need for machining certainly increase

energy efficiency as well. Manufacturing processes for metals, ceramics, polymers, electronic materials, and composites are certainly all available for improvements in energy efficiency, and all these materials are used for manufacturing other products. This global symposium highlights the importance of efficiency in manufacturing processes and the potential for advances in this area. Authors represent government, industry, and academia in the following areas: process optimization and control; powder processing; solidification; shaping and forming; surface engineering; and computational process modeling. The organizers are planning to publish the proceedings from this symposium in a volume available after the 2003 TMS Annual Meeting.

### Increasing Energy Efficiency in Aluminum

*Sponsored by: TMS Light Metals Division, Aluminum Committee.*

A presentation of reports on current research projects will be performed by Secat, the national laboratories, and universities, and funded by the Department of Energy, Office of Information Technology, and the aluminum production industry, that focus on increasing the energy efficiency of aluminum melting, casting, and processing.

#### Aluminum 2003

PROCEEDINGS AVAILABLE AFTER THE CONFERENCE

*S.K. Das, editor*

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## GENERAL ABSTRACT INFORMATION

General abstract sessions are planned for the 2003 TMS Annual Meeting. 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 sponsoring 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

A technical, noncommercial poster session will be held in conjunction with the 2003 TMS Annual Meeting. Presentations will be displayed on 4x8-foot poster boards; no formal presentation is required. Individuals should refrain from the use of brand names and specific product endorsements. The Poster Session will begin on Monday and remain in place through Wednesday.

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## SPECIAL LECTURES/LUNCHEONS/DINNERS

### Young Leaders Extractive Metallurgy Tutorial

*Monday, March 3, 2003*

*“Doing Science for Fun and National Security”*

*Presented by:* Alan Hurd, Group Leader, Los Alamos National Laboratory

*About the topic:* Ambitious people want to make a difference. And they want to enjoy their careers. For some, financial impact in industry satisfies both needs; for others, teaching the next generation is the answer. In the post-9-11 era, hundreds of early career scientists and engineers discover each year that national security research at the national labs is a rewarding career path offering great intellectual diversity, challenge, and excitement. This presentation will discuss the mission of Los Alamos National Lab in the current world order and how one physicist came to appreciate national security research.

*About the presenter:* At Los Alamos National Laboratory, Hurd is the Director of the Manuel Lujan Jr Neutron Scattering Center and Group Leader of LANSCE-12, the neutron scattering group. Prior to February 2001, he worked at Sandia National Laboratories where he managed a department that combines catalysis and soft matter research. Before joining Sandia in 1984, he taught physics at Brandeis University, arriving there in 1981 to do postdoctoral research in liquid crystals. His degrees are in physics from Colorado School of Mines and the University of Colorado, where he was a National Science Foundation Fellow. Currently, he is an adjunct professor of physics at the University of New Mexico and a member of their Center for Advanced Studies and Center for Micro-Engineered Ceramics.

*Optional box lunch for \$25 may be purchased via the 2003 TMS Annual Meeting Registration form.*



Alan Hurd

### Light Metals Division Luncheon

*Wednesday, March 5, 2003*

*“The Future of Aluminium of Automotive Engines”*

*Presented by:* Dr. Dieter Braun, Hydro Aluminium Deutschland

*About the topic:* The growing demands on the safety, comfort, performance and environmental compatibility of passenger vehicles have led to an enormous increase in vehicle weight. For this reason, the development of lightweight designs with regard to vehicle construction and material substitution is of ever-greater importance. Material substitution plays a major role, especially in the engine. By substituting aluminium casting alloys for cast iron - the material traditionally used for cylinder heads and engine blocks - the weight of a medium-sized European car engine can be reduced by 30 - 35kg. Modern, high-performance petrol and diesel engines made from aluminium have to meet high specific requirements for cylinder heads and engine blocks. Solutions to important technological questions have been developed, allowing the increased use of aluminium for motor vehicle engines in the future. From 2005 onwards, more aluminium engine blocks than cast iron engine blocks will likely be used in Western Europe. With regard to cylinder heads, this substitution process of aluminium for cast iron has largely been completed in Europe.

*About the presenter:* Dr. Braun has been a Member of Board for VAW aluminium AG since 1996. He has been employed with VAW for 22 years in various capacities beginning with the Inorganic Chemistry Section; Anorganic Chemistry Section, R&D; Head of the Chemistry Department; Head of the Corporate Environmental Protection Department, General Agent; Authorized signatory; Head of Sales, Specialty Alumina Division; Head of the Specialty Alumina Division; Head of the Engine Castings Division; Managing Director, VAW motor GmbH; and serving most recently as Executive Manager.

He currently serves as Chairman of the Board of Management of Hydro Aluminium Deutschland GmbH (the former VAW aluminium AG). He was a member of the Executive Board, Automotive Products, for VAW in Bonn from 1997 to July 2002.

Dr. Braun was born in Plaidt, Germany. He served in the Military until 1970 then completed his Masters' degree in Chemistry at Giessen University in 1976. He completed in PhD in Natural Sciences in 1979 and earned an Advanced Management Program at INSEAD in 1991.

*Luncheon tickets are \$30 and may be purchased via the 2003 TMS Annual Meeting Registration form.*



Dr. Dieter Braun

## Extraction & Processing Division Luncheon

Tuesday, March 4, 2003

*“Developments in the Processing of Nickel Ores and Concentrates”*

Presented by: Dr. Wm. Gordon Bacon, Vice President, Technology and Engineering, Inco Ltd.



Dr. Wm. Gordon Bacon

*About the topic:* There have been significant developments in the exploitation of nickel ores and concentrates the last decade that will reform nickel production in the near future.

*About the presenter:* Gord Bacon graduated with a B. A. Sc. In Mineral Processing Engineering (1967) and a Ph.D. in Metallurgical Engineering (1979), both from UBC in British Columbia in Canada.

His early career was in the potash and copper industries with IMCC Corp and Kennecott respectively. He then founded Bacon Donaldson and Associates Ltd.; a Vancouver, B.C. Canada based firm. This firm is a consulting metallurgical firm providing physical and extractive metallurgical services to the resource industries around the world. He was president and senior partner for twenty-one years. During this period he was an Adjunct Professor in the Metals and Materials Engineering and Minerals Engineering Departments at the University of British Columbia for 10 years.

Gord then joined Sherritt Gordon Mines Ltd. As the Research Director and then became Vice President, Technology, for Sherritt International. Then he joined Inco Ltd. As Vice President of Primary Metals Technology, then added Engineering to become Vice President of Technology and Engineering, the position he currently holds.

Gord is a Professional Engineer in B.C., Alberta and Ontario, Canada and a Fellow of the Institute of Mining and Metallurgy in England.

*Luncheon tickets are \$30 and may be purchased via the 2003 TMS Annual Meeting Registration form.*

## Structural Materials Division Luncheon

Honoring John Cahn on being named the recipient

of the Franklin Institute's 2002 Bower Award and Prize for Achievement in Science

Wednesday, March 5, 2003

Featuring a presentation by Dr. Cahn of his award lecture:

*“Revolutions at the Crossroads – Interdisciplinary Opportunities For Making Scientific Advances”*



John W. Cahn

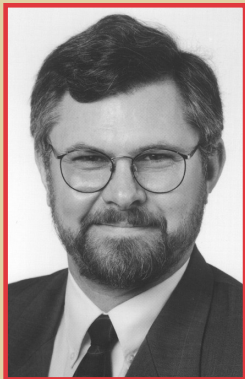
*About the topic:* When ideas from one field are tested in a quite different context, success enlarges the idea and leads to consilience; whereas failure leads to creation of new paradigms or even to scientific revolutions. Materials science, a recently created “interdisciplinary discipline,” is full of such idea transfers at the crossroads between its component disciplines. A range of examples are traced from their long pre-science history in ancient craft knowledge, ancient philosophy, and medieval scholarship, and finally to their disparate and often unreconciled modern roots in physics, chemistry, crystallography, mathematics, the materials disciplines of metallurgy, ceramics and polymers, and engineering.

*About the presenter:* John Cahn's research interest are in the development of principles needed for materials science, with emphasis on microstructure evolution. Two partial differential equations, that grew out of his work, are widely studied and used. He is also interested in thermodynamic principles and their application to stressed solids, to anisotropic surfaces and interfaces, and to kinetics. As an outgrowth of a study of rapid solidification in the early 1980s he participated in the discovery of icosahedral quasiperiodic crystals. He has published about 250 papers.

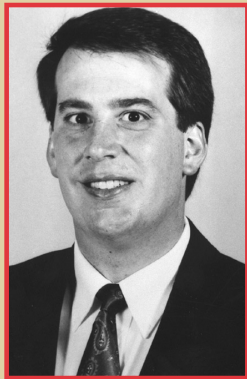
He is a Senior Fellow at the Materials Science and Engineering Laboratory of the National Institute of Standards and Technology (formerly NBS) in Gaithersburg, Maryland, where he has been for 26 years. He received his B.S. in Chemistry in 1949 from the University of Michigan, and his Ph.D in Physical Chemistry in 1953 from the University of California at Berkeley. He holds honorary doctorates from Northwestern University and Université d'Evry in France.

Prior to coming to NBS, he held positions at the University of Chicago's Institute for the Study of Metals (now the James Franck Institute), at the GE Research Laboratory during the Hollomon era in the group founded by David Turnbull. From 1964 until 1978 he was a Professor of Metallurgy at MIT. In 1960 he was awarded a Guggenheim fellowship, which he spent at Cambridge University. He has been a visiting professor in Sweden, Israel, and Iran, and since 1984 an affiliate professor jointly in physics and materials engineering at the University of Washington in Seattle. His many awards and honors include: the Bower Prize from the Franklin Institute, the 1998 National Medal of Science, memberships in the National Academy of Sciences, the National Academy of Engineering, and the American Academy of Arts and Sciences, the Dickson Prize of Carnegie-Mellon University, the Michelson-Morley Award of Case-Western University, the Harvey Prize from the Technion in Israel, Fellow of both TMS and ASM, ASM's Sauveur and Hume-Rothery Awards, the Acta Metallurgica gold medal, NBS's Stratton award, and a gold medal from the US Department of Commerce, the Bakhuis-Roozeboom medal from the Dutch Academy of Science, a gold medal from the Japan Institute of Metals. and the Emil Heyn medal from the German Materials Society (DGM). He has given the Institute of Metals Lecture (now the Mehl Lecture) of TMS in 1967, and the Von Hippel Lecture of MRS, and two McDonald lectures 30 years apart of the Canadian Metallurgical Society.

*Luncheon tickets are \$30 and may be purchased via the 2003 TMS Annual Meeting Registration form.*



John E. Allison  
2002 TMS President



Dan J. Thoma  
2003 TMS President

### 132<sup>nd</sup> TMS Dinner and Awards Presentation With Installation of 2003 TMS President

The Annual TMS Dinner and Awards Presentations will be held at 7:00 pm, Tuesday, March 4, 2003 at the San Diego Marriott Hotel and Marina. 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 2002 President John E. Allison, who will then introduce Dan J. Thoma, the 2003 President.

Dr. Dan J. Thoma received his BS degree in Metallurgical Engineering from the University of Cincinnati. During that time, he worked at NASA-Lewis Research Center in Cleveland, Ohio. He continued his education at the University of Wisconsin-Madison, where he received his MS and PhD in Metallurgical Engineering. Dr. Thoma has been employed at Los Alamos National Laboratory since 1992, where he is currently the team leader and project leader for Alloy Design and Development within the Metallurgy Group in the Materials Science and Technology Division.

Dr. Thoma takes part in several professional society activities. He is a current member of TMS, ASM, MRS, and ACerS. Within in TMS he has served on the Board of Directors as Programming Director. In addition, he is the past Chair of the Solidification Committee and serves on the Powder Materials Committee and the Nuclear Materials Committee. He has also served on the Education Committee and MPMD Council.

*Banquet tickets are \$60 and may be purchased via the 2003 TMS Annual Meeting Registration form.*





*In conjunction with the symposium: **Dynamic Deformation: Constitutive Modeling, Grain Size, and Other Effects: Symposium in Honor of Professor Ronald W. Armstrong***  
**Ronald Armstrong Honorary Dinner**

**Monday, March 3, 2003**

**San Diego Marriott Hotel & Marina**

*Sponsored by: TMS Structural Materials Division and ASM International:*

*Materials Science Critical Technology Sector, Jt. Mechanical Behavior of Materials*

This symposium is organized to honor the work of Professor Ron Armstrong. The focus is on the dynamic behavior of materials, with emphasis in areas in which Prof. Armstrong has made seminal contributions: constitutive equations and grain-size effects. Dynamic deformation encompasses a broad range of phenomena with technological applications in military and civilian sectors. This will be the third in the series of symposia held on this subject, with the first symposium held in October 1994 and the second in October 1998, both in Rosemont, Illinois. Grain size effects on plastic deformation of materials have been a subject of consistent interest since the days of Hall and Petch, and the recent thrust in nanocrystalline materials has raised the interest to even higher levels. The macromechanical and physical processes that govern deformation at high-strain-rates and in materials with nanocrystalline grain sizes manifest themselves by a dazzling complexity of effects and morphologies. Professor Armstrong's noteworthy contributions in these areas have enhanced our predictive capability by enabling an improved understanding of the deformation mechanisms. The purpose of this symposium is to bring together researchers working in dynamic high-strain-rate deformation of solids, and on effects of grain size on plastic deformation, in particular, of nanocrystalline materials. The objective will be to review the state of the understanding of deformation mechanisms and mechanical properties as they are influenced by high-strain-rate and grain size effects. Unique consequences of dynamic deformation, including stress-induced chemical and physical changes, will also be discussed. The symposium will include invited and contributed papers in the following areas: high-strain-rate mechanical properties; mechanisms of dynamic deformation; constitutive equations; grain size effects on mechanical properties; strengthening mechanisms in nanocrystalline solids; stress-induced physical and chemical changes in inert and energetic materials. The organizers are planning to publish the proceedings from this symposium in Metallurgical and Materials Transactions.

*Dinner tickets are \$60 and may be purchased via the 2003 TMS Annual Meeting Registration form.*

*In conjunction with the symposium: **A Symposium Dedicated to Dr. C.T. Liu on his 65th Birthday***  
**C.T. Liu Honorary Dinner**

**Monday, March 3, 2003**

**San Diego Marriott Hotel & Marina**

*Sponsored by: TMS Structural Materials Division and ASM International: Materials Science Critical*

*Technology Sector, Jt. Mechanical Behavior of Materials*

For the past decade, substantial advances have been achieved in the understanding and development of intermetallic compounds and advanced metallic materials, such as high temperature alloys and bulk metallic glasses. These advances are a result of extensive technical efforts in conducting intriguing experiments using the state-of-the-art techniques and computer simulations performed at various length scales. This has also led to many commercial applications of these advanced intermetallics and metallics. The objective of this conference is to provide an international forum to discuss recent progress in both fundamentals and applications of these intermetallic and metallic materials. We propose to organize a five-session symposium on all aspects of intermetallic compounds and advanced metallics, including high temperature alloys and bulk metallic glasses. Some examples of what might be included in the proposed sessions are: basic understanding of alloy design; experimental methods and studies; modeling and simulation; and material processing and commercial applications. This symposium is organized in honor of Dr. C.T. Liu who has made significant contributions in the development of intermetallic compounds and advanced metallics during the past thirty years. The organizers are planning to publish the proceedings from this symposium in a volume available at the 2003 TMS Annual Meeting.

*Dinner tickets are \$60 and may be purchased via the 2003 TMS Annual Meeting Registration form.*

In conjunction with the symposium: **The Mike Meshii Symposium on Electron Microscopy: Its Role in Materials Research**  
**Michael Meshii Honorary Dinner**

*Monday, March 3, 2003*

*San Diego Marriott Hotel & Marina*

*Sponsored by: TMS Structural Materials Division and ASM International: Materials Science Critical Technology Sector, Jt. Mechanical Behavior of Materials*

Electron microscopy has played a critical role in advancing the materials science paradigm. Direct imaging of structures at the microstructural and nanostructural levels allows structure-property relations to become better elucidated. This is particularly true for defects, either induced by the microscope as radiation damage or pre-existent as initiation sites for fatigue or phase transformations. The Mike Meshii Symposium is intended to capture the current research activities and to assess the state-of-the-art the use of electron microscopy to solve problems in materials science and engineering. We are organizing a four-session symposium on electron microscopy, specifically its role in materials research. Some examples of what might be included in the proposed sessions are: defects and radiation damage; fatigue; solid solution softening and; phase transformations. We propose to dedicate this symposium in honor of Dr. Masahiro (Mike) Meshii who will retire from Northwestern University after more than 40 years of service in September 2003. Professor Meshii has made important contributions to the field using electron microscopy, particularly, amorphization, galvanization, solid-solution softening and fatigue. The organizers are planning to publish the proceedings from this symposium in a volume available at the 2003 TMS Annual Meeting.

*Dinner tickets are \$60 and may be purchased via the 2003 TMS Annual Meeting Registration form.*

In conjunction with the Symposium: **Yazawa International Symposium on Metallurgical and Materials Processing: Principles and Technologies**

*\*Refer to Page 36 for Society and Company Co-Sponsors*

**Welcoming Reception**

*Sunday, March 2, 2003*

*San Diego Marriott Hotel & Marina ■ Reception is by invitation only*

**Akira Yazawa Honorary Dinner**

*Monday, March 3, 2003*

*San Diego Marriott Hotel & Marina*

*Sponsored by: TMS Extraction & Processing Division, Aqueous Processing Committee, Copper, Nickel, Cobalt Committee, Process Fundamentals Committee, Lead and Zinc Committee, Pyrometallurgy Committee*

This symposium is organized to share and discuss recent developments in physical chemistry of metallurgical processes and physicochemical principles involved in materials processing. These are the subjects of the lifetime work of Professor Akira Yazawa in whose honor this symposium is named. Many exciting new process technologies have in recent years been developed in the fields of chemical and process metallurgy and materials processing, and many have been adopted by the industry. The international symposium will provide a stimulating forum to critically examine the role of thermochemical and basic physicochemical principles in the development and operation of these new processes. The results of basic and applied research as well as those of plant operations will be covered in this symposium. The specific topics to be covered include but are not limited to thermodynamics of sulfide smelting, thermo and physico-chemical principles relevant to pyrometallurgical and hydrometallurgical plant operations, advances in nonferrous production technologies, thermochemistry of ferrous production, environmental topics related to metals and materials production, new reactor design, control and optimization methods, basic principles of advanced materials processing, advances in materials processing technologies, energy and new raw materials.

*Dinner tickets are \$60 and may be purchased via the 2003 TMS Annual Meeting Registration form.*

**Informal Entertaining Event (Barbecue/Karaoke)**

*Wednesday, March 5, 2003*

*San Diego Marriott Hotel & Marina ■ Event is by invitation only*

**Boat Cruise**

*Thursday, March 6, 2003*

*Off-site venue ■ Boat Cruise is by invitation only*

**University Alumni Receptions**

*Alumni receptions for various universities will be scheduled at the San Diego Marriott Hotel & Marina. Please refer to the final program (available onsite) for a detailed listing.*

## 2003 TMS INTERNATIONAL METALS AND MATERIALS EXHIBITION



2003's Exhibition will feature more than 150 booths displaying new products and processes, ideas and information for your business.

The exhibition brings it all together with an outstanding face-to-face business environment, a primary source of practical, hands-on information.

See technology put into practical application in featured products and services—problem-solving solutions you can put to work today!

### San Diego Convention Center Halls A&B

*The exhibition celebrates its 16<sup>th</sup> year as part of the TMS Annual Meeting!  
The event has grown to feature:*

Over 25,000 square feet of exhibits

More than 150 exhibiting companies

Here are just a few of the products and services that are a part of the exhibition:

- Air pollution control equipment
- Aluminum production technology & equipment
- Aluminum quality
- Aluminum refining systems
- Anode assembly, cleaning, rod stub welding, transportation
- Automation/computer simulation/software
- Butt crushing/stripping:
- Carbon: paste production & equipment, technology and supplies
- Casting
- Chemicals and additives
- Combustion technology
- Cranes
- Degassing
- Dross: handling/processing equipment, cooling/removal
- Engineering and consulting services
- Filtration
- Furnaces
- Graphite parts
- Grain refiners/hardeners
- Ingot & sow casting handling & stacking
- Instrumentation
- Lubricants
- Master alloys
- Material handling
- Measurement/testing and analysis
- Molten metal pumps
- Process equipment
- Protective clothing
- Publishers
- Recycling/scrap processing
- Refractory & insulating: products, maintenance/repair
- Research & development
- Service contractors
- Software
- Vehicles for potrooms & casthouses
- Water cooling & treatment
- and much more!



## Exhibitor List: *As of October 1, 2002*

<b>Company</b>	<b>Booth Number</b>	<b>Company</b>	<b>Booth Number</b>
ABB Inc .....	407	LMI Selcom .....	515
Advanced Dynamics Corp .....	507	LOI Inc.....	428
Alcan Inc.....	414	L P Royer Inc.....	1034
Aleastur .....	400	MagChem.....	1216
Almeq Norway AS.....	800	Master Alloys Co .....	419
ALMEX USA Inc .....	1213	MDN .....	1220
Aluminium International Today.....	615	Megaquip Ind Ltd .....	306
Aluminium Intl Journal.....	606	Metal Bulletin .....	535
Aluminium Times .....	1121	Metallurg Aluminium.....	913
Anter Corporation.....	323	Metallurgical Society of CIM .....	629
B&P Process Equipment Systems LLC.....	301	Metaullics Systems Co LP.....	807
BDH Industries Inc .....	422	Mid-Mountain Materials.....	721
GE Betz.....	700	Milward Alloys Inc .....	421
BHA Group Inc.....	804	Minteq International Inc .....	528
Bloom Engineering .....	608	Moltech .....	729
Borgestad Fabrikker AS .....	728	Molten Metal Equipment Innovations Inc .....	835
Brochot.....	635	MTI Corporation .....	516
Buehler Ltd .....	822	Murlin Chemical Inc .....	919
CA Picard.....	829	NKM/Noell .....	832
CSA-Cambridge Scientific Abstracts.....	719	NORMELT .....	820
Canadian Overhead Handling Inc.....	834	North American Mfg Co Ltd.....	1015
Carl Zeiss MicroImaging Inc .....	505	Oak Ridge National Laboratory.....	1211
Clayburn Industries Ltd .....	529	Opsis Inc .....	600
Consolidated Ceramic Products Inc.....	709	Outokumpu/Aisco Systems Inc.....	821
Culimeta America Inc .....	634	Pechiney Group.....	813
Danieli Corus Canada Inc .....	429	Port of Longview .....	534
Davy Process Technology (Switzerland) AG.....	522	Precimeter Inc .....	1020
ECL .....	1118	Procedair Industries .....	621
EDAX Inc/TSL .....	322	Pyrotek Inc .....	401
Eirich Machines Inc .....	511	RAG Trading GmbH.....	521
Elsevier Science .....	1019	R&D Carbon Ltd.....	521
FCB Aluminium/Procedair/SAS .....	621	Rex Roto Corporation .....	1105
GLAMA Maschinenbau GmbH.....	605	Rigaku .....	417
GNA Alutech Inc .....	311	Saint Gobain Industrial Ceramics .....	814
Gouda Vuurvast.....	509	Selee Corporation.....	801
Graphite Engineering & Sales .....	701	SERMAS Industrie .....	418
Hamilton Research & Technology .....	715	SETARAM.....	1128
Hauck Manufacturing Co.....	307	Silver Needle Inc.....	1028
Hencon BV.....	828	Skamol Americas Inc .....	928
Hereaus Electro-Nite Co.....	1117	SMV .....	520
Hertwich Engineering .....	932	STAS .....	410
H G Engineering .....	818	Stellar Materials .....	935
HMR Hydeq.....	1114	Techint Technologies Inc .....	628
Holton Machinery Ltd.....	923	Techmo Car s.p.a.....	714
Hysitron.....	705	Thermal Ceramics.....	501
Industrial Heating Magazine.....	435	Thermal Systems America .....	404
innovatherm GmbH+Co.KG .....	704	Thermcon Ovens BV .....	1122
Intl Magnesium Association .....	630	ThermoARL.....	632
Jayne Industries.....	1029	Thermo-Calc Software.....	1131
Jünger+Bräter GmbH Feuerfestbau .....	1029	Thorpe Technologies Inc.....	601
Kabert Industries .....	1018	UES Software Inc .....	1129
KB Alloys Inc .....	614	US Department of Energy.....	1207
KBM Affilips BV .....	423	Wagstaff, Inc. ....	1001
KEMPE International.....	300	Wahl Refractories.....	1033
Laeis Bucher GmbH .....	521	Western Industrial Ceramics .....	617
LECO Corporation.....	329	Wienalco .....	929
Leeman Labs Inc.....	315	Zircar Ceramics Inc.....	602
Light Metal Age .....	518		

## SHORT COURSES

TMS will offer a selection of learning intensive courses designed to enhance your technical and professional expertise. Programmed in conjunction with the 132<sup>nd</sup> 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 qualifications of the respective presenters, and join us in one of the following courses.

## SULFIDE SMELTING: PRINCIPLES, TECHNOLOGIES, AND ENVIRONMENTAL CONSIDERATIONS

### Complementing the Symposium

Saturday, March 1, 2003..... 8:30AM-5:00PM  
Sunday, March 2, 2003..... 8:30AM-12:00PM

#### Presented by:

Hong Yong Sohn, University of Utah  
Kimio Itagaki, Tohoku University  
Florian Kongoli, FLOGEN Technologies

Fees: \$645.00 Members; \$735.00 Non Members

#### Sponsored by: TMS Extraction & Processing Division

**Who should attend:** This 2-day course is intended for managers, supervisors, engineers, and scientists employed in either research or operations associated with sulfide smelting. This short course is also highly recommended to current students interested in learning about chemical processes of nonferrous metal production.

**Course overview:** This intensive short course will cover the basic principles involved in sulfide smelting and their practical implications, including thermodynamics and physical chemistry; efficient flux strategies and practices; slag, matte and metals properties; new ways of representing multicomponent systems; control of magnetite precipitation, furnace build-ups and active volume, refractory degradation, metal separation and recovery, effect of minor components and/or fluxes; thermochemical modeling and simulation; process control, optimization and automation; software; behavior of minor elements, fluid flow, and reaction engineering. The leading smelting processes, new technologies, and proposed future variants will be discussed, with emphasis on copper production and environmental issues. The beneficial effect of the new, environmentally friendly technologies on the competitiveness of the metal industry of industrialized nations will be discussed. The course will be concluded by a discussion of the future of the smelting industry with audience participation.

#### About the presenters:

**H. Y. Sohn** received his Ph.D. degree in 1970 from the University of California at Berkeley. Dr. Sohn joined the Department of Metallurgical Engineering at the University of Utah in 1974. Professor Sohn's work has been recognized through various awards, including the 2001 James Douglas Gold Medal Award (for research and education of nonferrous extractive metallurgy) from AIME, the TMS Champion H. Mathewson Gold Medal Award (1993), the TMS Extractive Metallurgy Lecturer Award (1990, in recognition as an outstanding scientific leader in the field of nonferrous extraction), the TMS Extraction and Processing Science Award (1990, for work on flash smelting; 1994; and 1999), the Fulbright Dis-



tinguished Lecturer (1983). Dr. Sohn has co-authored two monographs, co-edited 13 books, and written some 300 papers. He has served as a Director of TMS. Dr. Sohn has acquired an international reputation in the field of sulfide smelting for computer modeling and analysis of the flash smelting/converting processes as well as of the minor-element behavior. He has also worked on the analysis of a channel reactor for continuous smelting by the countercurrent contacting of slag and matte/metal phases with bottom gas injection.

**Kimio Itagaki** was born on August 4, 1943 in Tokyo. He graduated from Tohoku University, Metallurgical Engineering, in March 1966, finished Master of Engineering at the same university in March 1968, was appointed Research Associate at Research Institute of Mineral Dressing and Metallurgy, Tohoku University in April 1968, and worked with Prof. Akira Yazawa to obtain Dr. Engineering Degree by Thesis at Tohoku University. In January 1976, he was appointed Lecturer and in May 1976 Associate Professor at the same institute. In April 1978, he stayed at Technical University of Aachen in Germany as a research fellow of the Alexander von Humboldt Foundation and worked with Prof. Kubas-



chewski and Prof. Knacke on high temperature calorimetry from 1980-1981. Since 1991, he is Full Professor of Tohoku University (1991-1992, Research Institute of Mineral Dressing and Metallurgy, 1992-2001, Institute for Advanced Materials Processing and 2001-present, Institute of Multidisciplinary Research for Advanced Materials - the institute changed the name twice). Research fields: thermochemistry of metallurgical substances, nonferrous pyrometallurgy, processing of functional alloys. Association member: TMS, GDMB (Germany), Japan Institute of Metals, Mining and Materials Processing Institute of Japan, Japan Institute of Calorimetry.

**Florian Kongoli** [BSc (Honors), MScA, (U.Montreal)/MTMS, MCIM] is Executive President of FLOGEN Technologies Inc. ([www.flogen.com](http://www.flogen.com)), a technology, research and consulting company. He has 15 years of research and development and academic (lecturer) experience. He has successfully carried out many industrial research projects for companies such as, Mitsubishi, Sumitomo, Fal-



conbridge, INCO, WMC, and Noranda. In his pure research work he has worked and cooperated with several well-known universities around the world such as Tohoku University (Japan), Curtin University (Australia), University of Montreal (Canada), etc. His work is oriented in developing new low cost technologies through thermophysical-chemical modeling, simulation and laboratory experimental studies applicable in various metallurgical and chemical processes in nonferrous (Ni, Cu, Zn, Pb, Fe-Ni) extraction and processing as well as in iron and steel making industry. In the past 4 years, he has published 25 scientific articles dealing with novel technological applications, modeling of multicomponent mattes, slags, metals, liquidus temperature and phase diagrams, effect of minor components, fluxing strategies etc. He is also author of some other 70 articles, technical reports, invited lectures and research presentations.

## MAGNESIUM METALLURGY – PROCESSING AND INDUSTRIAL APPLICATIONS

Saturday, March 1, 2003 .....8:30AM–5:00PM

Sunday, March 2, 2003 .....8:30AM–5:00PM

*Presented by:*

Robert E. Brown, Metallurgical Consultant  
Gerald Cole, formerly Ford Motor Corporation  
Weinan Ding, Sinomag  
Ramana G. Reddy, Green Manufacturing

*Fees:* \$645.00 Members; \$735.00 Non Members

*Sponsored by:* TMS Light Metals Division

*Who should attend:* This 2-day course is intended for managers, analysts, engineers, metallurgists, scientists and any other people who are interested in gaining an in-depth understanding of the technical, commercial and economic potential of the Global magnesium industry.

*Course overview:* The magnesium industry is much smaller than the aluminum industry, but is presently experiencing dramatic growth. This course will cover the history of the global industry, production technologies, both electrolytic and thermal, that are being used to produce magnesium. The history of the various technologies, thermodynamics and electrochemical reactions and the vast improvements in cell sizes and efficiencies will be discussed. New research and new process technologies will be reviewed. An overview of the capital and operating costs of the various processes will be discussed in a general sense.

Production, downstream uses, products, and a summary of world producers and fabricators will be presented. Special emphasis will be applied to the rapidly growing magnesium fabrication industry. This will include die-casting, rolled products, forgings, extrusions, and thixomolded products. Continuous twin roll casting will be a special topic in the course.

The course will discuss the major uses of magnesium and the future of these uses. This will include magnesium as an alloying element in aluminum, magnesium in the desulfurization of steel and magnesium alloys in die-casting. Magnesium in cathodic protection and as a reducing agent for titanium, zirconium, beryllium, and uranium will also be reviewed.

Automotive applications will be reviewed; both present uses and projected future uses where the metallurgy of magnesium will present a great advantage. New alloys under development will be discussed, in particular, the high temperature resistant magnesium alloys. Some problems areas such as corrosion and safety of magnesium use will be discussed.

China has become the largest magnesium producing nation in recent years. A special section of the course will be devoted to a review of the production of magnesium in China. This will include the rapidly growing downstream industries and a discussion of the future potential of the Chinese magnesium industry to influence Western magnesium uses.

Magnesium recycling is growing rapidly on a global basis. The technologies used and the size of the industry will be discussed along with projections for the future of the industry. The course will have a special discussion on the safety aspects of handling magnesium and will conclude with a panel discussion.



Robert E. Brown



Gerald Cole



Weinan Ding



Ramana Reddy

*About the presenters:*

**Robert E. (Bob) Brown** - Forty years of varied metals industry experience in both ferrous and non-ferrous materials. Twenty years in the technical management areas of light metal foundries or reduction plants. Metallurgical consultant to major magnesium companies. Publisher of Magnesium Monthly Review since 1971. Contributing Editor and columnist for Light Metal Age and Australian Journal of Mining. Writes annual world magnesium review for Mining Journal (London). Graduate of Michigan Tech with a BS in Metallurgical Engineering. Mr. Brown is a long time member of TMS and received a special TMS award for delivering the keynote address at the first Magnesium Technology sessions held in Nashville in 2000.

**Gerald Cole, PhD, FASM**, performed R&D in the solidification of metals and foundry engineering for most of his career, before retiring late last year from Ford Motor Company. Jerry is now a senior development advisor to the Australian Magnesium Corporation through his consulting company, Light Weight Strategies LLC. Jerry helped formulate Ford's strategy on reducing vehicle mass with cast magnesium and aluminum and worked closely with Corporate engineering and purchasing as well as Ford's Tier 1 and die casting supply base. Jerry was a director of The International Metallographic Society, AFS's Detroit Chapter and the International Magnesium Association. He is an ASM fellow and is listed in American Men/Women of Science as well as three Who's Who. Jerry has published 130 papers and has been issued 9 patents. He has presented hundreds of seminars around the world, most recently on the automotive uses of light metals, especially magnesium. He has been an adjunct professor in materials and manufacturing at 5 universities and has prepared/presented week-long courses on magnesium in 3 countries. Dr. Cole is recognized throughout the world as a foremost automotive expert in magnesium technology.

**Weinan Ding** - Founder of Sinomag, a large Chinese metals trading group. Mr. Ding has been deeply involved in the development of the Chinese magnesium industry. He completed studies at Shanghai International Studies University and did graduate studies in Goettingen/Bonn and Berlin, Germany. Returned to China and started in the magnesium business in 1991 selling metals, including magnesium to the end users. Has worked on the staff of China National Minerals and Metals Corp. Non-ferrous division. Mr. Ding has conducted several international seminars in Beijing and has hosted visits of many Western groups to Chinese magnesium production plants in several provinces. He is also a major participant in the downstream development of the magnesium fabrication industry, including forging, rolling, casting, and powder production. Mr. Ding has presented several papers on magnesium in China, which have included cost structure analysis of both the operating costs and the construction costs. Has recently set up Sinomag, North America with warehouse in Baltimore. He is a member of International Magnesium Association.

**Ramana G. Reddy** - Dr. Ramana G. Reddy is an ACIPCO Chair Professor of Metallurgical and Materials Engineering; Associate Director of Center for Green Manufacturing; and Adjunct Professor of Chemical Engineering at The University of Alabama, Tuscaloosa, Alabama. His academic and research work experiences include: Professor and Chairman of the Department of Chemical and Metallurgical Engineering at University of Nevada, Reno; Visiting Researcher at Lawrence Berkeley Laboratory, Berkeley; Indian Institute of Technology, Bombay; and Argonne National Laboratory, Chicago.

Professor Reddy has 20 years of teaching and research experience in the field of chemical and materials engineering. He obtained his Ph.D. degree from the University of Utah. He has conducted projects involving thermodynamics and kinetics of metallurgical reactions; Pyrometallurgy, Hydrometallurgy, Plasma processing, Molten Salt Electrolysis, Waste Processing and Fuel Cells.

Dr. Reddy has published over 172 research papers and 6 books including one undergraduate student textbook in Thermodynamics. He has also delivered more than 124 invited lectures and research presentations in USA and abroad and is the recipient of the 2002 Extraction & Processing Distinguished Lecturer Award. He has received the Service Award from the TMS Light Metals; Research Award from J. Manufacturing Society and Best Research Paper Award from Light Metals Division, TMS.





## HEAT TREATMENT OF WROUGHT AND CAST ALUMINUM ALLOYS

Saturday, March 1, 2003 .....8:30AM–5:00PM

Sunday, March 2, 2003 .....8:30AM–5:00PM

*Presented by:* Murat Tiryakioglu, Robert Morris University and James T. Staley, Consultant

*Fees:* \$645.00 Members; \$735.00 Non Members

*Sponsored by:* TMS Light Metals Division



Murat Tiryakioglu



James Staley

*Who should attend:* This 2-day course is intended for metallurgists, engineers, and technicians employed in either research or operations at facilities where cast or wrought aluminum alloy products are heat treated. Operations both at producers and users will be covered.

*Course overview:* The course combines theory with many practical examples. Strengthening mechanisms in aluminum alloy products are first reviewed. Then the general principles of precipitation hardening including phase diagrams are discussed. This is followed by an overview of the metallurgy of heat treatment. The hardening precipitates in the major alloys will be identified. A major element of the course is a description of how to use simple kinetic equations to predict effects of quenching and aging on properties. Graphical computer programs that illustrate these points will be demonstrated.

Contents of the course include solution heat treatment of castings with emphasis on homogenization and rounding of Si particles and effects of time and temperature. Discussion of the important step of quenching will include quench sensitivity; water quenching and geometry; and effects of quench on residual stress, distortion, corrosion, strength, and fracture toughness. Examples will be taken from 3XX, 2XXX, 7XXX, and 6XXX alloys. A method of predicting the properties using a Time-Temperature-Property C-Curve and a cooling curve will be described, and the difference between T-T-P and C-C-P (Continuous Cooling Property) Curves will be explained. Interactions between quenching and aging will also be covered. Examples of natural aging and effects of time and temperature of artificial aging will then be discussed. Examples of the contrasting effects of cold work prior to aging 2XXX and 7XXX alloy products will be shown and reasons for the behaviors discussed. Multi-step aging treatments will also be discussed with emphasis on T7 aging of 7XXX alloy products and low-high temperature aging of Al-Si castings.

### *About the presenters:*

**Dr. Murat Tiryakioglu** received his Bachelor of Science Degree from Bogazici University, his M.Sc. and Ph.D. in Engineering Management degrees from the University of Missouri-Rolla, and his Ph.D. in Metallurgy and Materials Science degree from the University of Birmingham, UK. He worked at Tiryakioglu Metals Co., Inc, and The Boeing Co. on aluminum castings and heat treatment. He is the founder of Advanced Manufacturing Institute at Western Kentucky University, where he conducted research on heat treatment of aluminum alloys. Dr. Tiryakioglu is currently an Associate Professor of Engineering at Robert Morris University, and has served as a consultant to companies including Sumitomo, Tyco and Alcoa.

**Dr. James T. Staley, Sr.** recently retired after 35 years at Alcoa in R&D and operations. There he developed extensive experience in developing and applying heat treatments for aluminum alloy products. He led teams which wrote the Chapters on Metallurgy of heat treatment and general principles of precipitation hardening in Aluminum: Properties and Physical Metallurgy and Heat Treatment of Aluminum in an ASM International Metals Handbook. He continues to teach the metallurgy of heat treatment to Alcoa employees. He was awarded the James Douglas Gold Medal for distinguished achievement in nonferrous metallurgy by AIME and is a Fellow of ASM International.



## **PROCESS HEATING SYSTEMS OPTIMIZATION WORKSHOP**

*In cooperation with the U.S. Department of Environmental Resources*

**Saturday, March 1, 2003 ..... 8:30AM–5:00PM**

*Presented by:* Arvind Thekdi, E3M, Inc.

*Fees:* \$475.00 Members; \$560.00 Non Members

*Sponsored by:* TMS Materials Processing and Manufacturing Division, joint with the U.S. DOE



Dr. Arvind C. Thekdi

**Introduction:** Cost of energy used for process heating represents a large percentage of the cost of manufacturing for the primary industries and it is expected to increase in the future. Process heating energy is used in the form of combustion of natural gas in furnaces and boilers, heating by steam, or electric heating. In many cases these heating processes are inefficient with large amount of energy being wasted as flue gases and other heat losses from the heating equipment. Typically a furnace or melter used in the metals industry could be less than 40% efficient. Additionally inefficient operations could have negative effect on productivity, product quality and product yield in manufacturing operations. Many of these deficiencies can be reduced or eliminated and significant cost reductions can be achieved by use of proper operating practices and improved maintenance of the process heating equipment.

**Who Should Attend:** This 1 day course is intended for, supervisors, engineers and operating personnel responsible for energy efficiency improvements in heating equipment such as furnaces, ovens, melters, boilers used in the manufacturing plants. The attendees will receive a copy of PHAST software tool for their use.

**Course Overview:** This workshop includes an introduction to use of energy efficient process heating and process heating equipment such as furnaces, ovens, dryers, heaters, kilns etc. used by the metals and non-metals industries. It includes discussion of combustion and other heating methods, heat transfer in furnaces, heat containment, waste heat recovery, commonly used process heating controls and emission reduction related to process heating.

Application of the Process Heating Assessment and Survey Tool (PHAST) is also covered. PHAST can be used to survey furnaces, to identify major energy using equipment, to prioritize improvement opportunities, and assess available methods that can be used to reduce energy consumption in an industrial plant.

There are several general elements to the workshop:

- Introduction to fuels and combustion for industrial furnaces, heaters, kilns etc.
- Efficient operations and maintenance of combustion system (burners and associated components)
- Heat transfer methods and improvements in furnaces and heating systems.
- Reduction of heat losses in furnaces through improved insulation and housekeeping
- Methods of heat recovery from flue gases and waste heat produced in furnaces
- Reduction and control of NOx and other regulated emissions from heating equipment
- “Common sense” controls for efficient operation of furnaces

**About the Presenter:**

Dr. Thekdi has over 30 years of experience in design and development of furnaces used by all major industries. His area of expertise includes design and application of combustion and heating systems, waste heat recovery systems, emission (NOx) reduction systems and use of combined heat and power systems for process heating applications. He has worked in the areas of engineering, R&D, and marketing for major furnace companies that supply heating equipment to metals and nonmetals industries throughout the world. During the last 3 years Dr. Thekdi has participated in more than a dozen Plant Wide Energy Assessments for major industrial plants throughout the USA. He has contributed to the development of a software tool Process Heating Assessment and Survey Tool (PHAST), and developed and delivered training courses that offer instructions on practical and cost-effective methods to improve thermal efficiency of process heating equipment such as melters, furnaces, ovens, kilns etc. He holds 25 U.S. and foreign patents related to high temperature processes and equipment, published more than 50 technical papers and contributed to two books in the area of combustion, process heating and application of improved technologies in industries.





## **PUMPING SYSTEMS ASSESSMENT WORKSHOP**

*In cooperation with the U.S. Department of Environmental Resources*

**Sunday, March 2, 2003 .....8:30AM–5:00PM**

*Presented by:* Daryl Cox, Oak Ridge National Lab

*Fees:* \$475.00 Members; \$560.00 Non Members

*Sponsored by:* TMS Materials Processing and Manufacturing Division



Daryl Cox

**Who should attend?** Anyone involved with the use, management, or maintenance of pumping systems will find beneficial elements in the course. The course is applicable to engineers who need to understand the pump as part of a system rather than a single component. Managers will find useful tools for estimating the cost of particular modes of operation, and understand how to quantify identified energy savings.

**Course Overview:** Centrifugal pumps consume a large fraction of the energy used in American industry. 60% of industrial motor-system energy is related to fluid handling

- Fluid handling
- Material transport
- Utility support
- Process heating and cooling
- Environmental control

This workshop provides an in-depth discussion of energy efficiency factors for pumping systems, with an emphasis on considering the system instead of just components. There are three sections to the workshop.

- An overview of pump, motor, adjustable speed drive, and fluid system performance characteristics
- Practical issues involved in field measurements of fluid and electrical data
- Use of the PSAT software, including application to real-world situations (case studies)
- PSAT is a software program developed for the U.S. Department of Energy.

Its purpose is to assist users in assessing the extent of energy savings opportunities in pumping systems. PSAT relies on field measurements of flow rate, head, and either motor power or current to perform the assessment. Using algorithms from Hydraulic Institute standards and motor performance characteristics from the MotorMaster database, PSAT quickly estimates existing pump and motor efficiency and calculates potential energy and cost savings if the system was optimized.

**About the Presenter:** Daryl Cox has been a member of the research staff at the Oak Ridge National Laboratory (ORNL) since 1990. He has been heavily involved in the analysis of failure characteristics for fluid system components used in commercial nuclear power plants. He is currently involved in the design and construction of flow test facilities to support various types of research and energy optimization efforts for industrial pumping systems, and manages a flow test loop at ORNL.

Mr. Cox is a former member of the ASME Operations & Maintenance Working Group on Air-operated valves. He holds a BS in Mechanical Engineering from the University of Cincinnati.

He was formerly employed with the General Motors Corporation and the Tennessee Valley Authority, where he served on the corporate staff supporting engineering design

## COMPUTATIONAL MATERIALS DESIGN

Sunday, March 2, 2003 ..... 8:30AM–5:00PM

### *Presented by:*

Greg Olson, Northwestern University  
Charles Kuehman, QuesTek Innovations

*Fees:* \$475.00 Members; \$560.00 Non Members

*Sponsored by:* TMS Materials Processing and Manufacturing Division



Charles Kuehmann



Greg Olson

**Who should attend:** This course will be useful to individuals that are involved in materials and/or process development and would like to expand their skills to take advantage of emerging computational modeling and systems design technologies. Attendees will learn how mechanistic modeling coupled with an engineering systems approach to materials structure and processing can cut development time and cost.

**Course overview:** Traditional materials and process development is a highly empirical, time consuming and expensive process. Often the results of such activities are poorly understood and suffer failure during scale-up or in the field because they are not robust. Simply replacing experiment with computational modeling in this process is beneficial but not ideal. To achieve the optimal results a design-centered approach is necessary.

This course will demonstrate how to treat materials as systems, realizing the necessary complexity of real materials yet building a framework that breaks it into pieces that are manageable. Computational modeling capabilities will be reviewed from a design perspective to illustrate how to build and select appropriate tools. Techniques to generate and evaluate design alternatives will be covered and some specific examples will be provided. Design principles for robust solutions will also be presented. The course will wrap-up with an overview of emerging technologies to aid materials development beyond design into development and implementation.

### *About the presenters:*

**Charles Kuehmann** is a leader in the field of computer-aided systems design of materials. As a founding member of QuesTek Innovations, he has directed the development of advanced gear and bearing steels, ultra high-strength steels, and ferritic superalloys using Thermo-Calc, DICTRA and other custom thermochemical and kinetic models. He directed the applications of these tools to achieve improvements in strength, toughness, corrosion resistance, fatigue, hydrogen resistance, and magnetic properties by the Materials by Design® method. Dr. Kuehmann holds a Ph.D. in Materials Science and Engineering from Northwestern University.

**Greg Olson** is a recognized world leader in materials design. A co-founder of QuesTek Innovations, and founder of the multi-institutional Steel Research Group (SRG), he has been a Professor in the Department of Materials Science and Engineering at Northwestern University since 1988, and Wilson-Cook Professor of Engineering Design since 1999. Current areas of research include general kinematic theory of inter-phase boundary structure, the mechanism and kinetics of coupled diffusional/displacive transformations, the electronic basis of embrittlement mechanisms in metals, the "first principles" design of new steels, structure and mobility of crystal interfaces, structure/mechanical property relations, application of high-resolution microscopy and microanalysis and applications of materials science to molecular biology. Prof. Olson holds an Sc.D. in Materials Science and Engineering from MIT.

## SHORT COURSE REGISTRATION

To register for a course, please use the 2003 TMS Annual Meeting Registration Form in this brochure. All courses will be held at the San Diego Marriott Hotel & Marina the weekend prior to the meeting, Saturday and Sunday, March 1-2, 2003.

You may register any time prior to the Annual Meeting and on site, but if you register by the advanced registration deadline of February 3, 2003 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 postmarked no later than February 3, 2003. A \$50 processing fee will be charged for all cancellations.

*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:

TMS – Christina Raabe  
184 Thorn Hill Road, Warrendale PA 15086 USA  
Telephone: (724) 776-9000, ext. 212  
Fax: (724) 776-3770 ■ E-mail: raabe@tms.org

## HONORS & AWARDS

*Congratulations to the 2003 TMS Award Winners!*

### **FELLOW CLASS OF 2003**

Didier DeFontaine, University of California  
George Krauss, Colorado School of Mines  
Hans Conrad, North Carolina State University  
William L. Johnson, California Institute of Technology  
Robert H. Wagoner, The Ohio State University

### **APPLICATION TO PRACTICE AWARD**

James C. Williams, The Ohio State University

### **JOHN BARDEEN AWARD**

Gerald B. Stringfellow, University of Utah

### **BRUCE CHALMERS AWARD**

Kenneth A. Jackson, University of Arizona

### **EDUCATOR AWARD**

Robert A. Rapp, The Ohio State University

### **ROBERT LANSING HARDY AWARD**

John Ballato, Clemson University

### **INSTITUTE OF METALS/ ROBERT FRANKLIN MEHL AWARD**

Colin Humphreys, University of Cambridge

### **CHAMPION H. MATHEWSON AWARD**

Fabrice Patisson, Ecole des Mines  
Etienne Lebas, Institute Francais du Petrole  
Francois Hanrot, IRSID  
Denis Ablitzer, Ecole des Mines  
Jean-Léon Houzelot, Ecole Nationale Supérieure  
des Industries Chimiques

## **Technical Division Award Winners**

### **ALUMINUM DISTINGUISHED SERVICE AWARD**

Wayne Hale, Kennecott Minerals Co

### **EXTRACTION & PROCESSING LECTURER**

Kenneth N. Han, South Dakota School of Mines and Technology

### **EXTRACTION & PROCESSING SCIENCE AWARD**

Tamas Kekesi, University of Miskolc  
Masahito Uchikoshi, Fine Metals Corp.  
Kouji Mimura, Tohoku University  
Minoru Isshiki, Tohoku University

### **EXTRACTION & PROCESSING TECHNOLOGY AWARD**

Stephen C. Britten, Mars and Company  
Uday B. Pal, Boston University

### **LIGHT METALS TECHNICAL SERVICE AWARD**

Halvor Kvande, Hydro Aluminium Metal Products

### **LIGHT METALS AWARD**

Marc Bertherat, Aluminum Dunkerque  
Thierry Odievre, Pechiney Research Center  
Michel Allibert, Centre Nationale De La Research Science  
Pierre LeBrun, Pechiney Grp

### **STRUCTURAL MATERIALS DISTINGUISHED SCIENCE/ENGINEER AWARD**

Marc A. Meyers, University of California, San Diego

## INSTITUTE OF METALS LECTURE & ROBERT F. MEHL MEDALIST

Monday, March 3, 2003

*Designing Materials: From Turbine Blades to Brilliant Light Emitting Diodes*

Colin Humphreys, University of Cambridge



Colin Humphreys

*About the topic:* Our understanding of physics, chemistry, and materials science is now sufficiently good that we can increasingly design and create man-made materials to meet specific needs. This lecture will focus on two very different examples of materials design. The first concerns complex, multi-element structural materials for turbine blades for power plant, which are too complex to be designed from first principles. The second shows how we can design, from first principles, new semiconductor materials and devices based on gallium nitride. These devices have a huge range of applications, from traffic lights to home and office lighting to medical. Both examples illustrate the huge economic importance of designing new and improved materials, and also both examples demonstrate how materials science can be used to reduce global warming.

*About the presenter:* Colin Humphreys is the Goldsmith's Professor of Materials Science at the University of Cambridge since 1990. He also serves as the Director of the Rolls-Royce-Cambridge University Technology Center in Gas Turbine Alloys and also the Research Director of the Joint UK-Japan International Research Program on Atom Arrangement, Design, and Control for New Materials. He received his B.Sc in physics, at the Imperial College, London and his M.A. from Oxford University and Ph.D. from Cambridge University.

Prof. Humphreys has conducted creative and original work on semi-conductors, ceramic super-conductors and inter-metallic compounds and has received eight awards recognizing his contributions to the field of materials science. He was awarded the Rosenhain Medal and Prize of the Institute of Metals in 1989. He was Selby Fellow of the Australian Academy of Science in 1997 and is a member of Academia Europaea.

He is the author of more than 350 publications and is a member of 10 UK National committees in the materials field. His breadth of knowledge of materials research is reflected in his presence on the Editorial Board of seven high quality international journals, including Journal of the Physics and Chemistry of Solids and the Journal of Materials Science – Materials in Electronics.

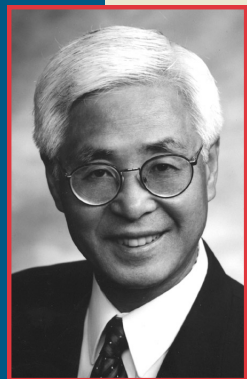
One of Prof. Humphreys particular skills is the communication of the excitement and creativity in materials science to young people. He is currently Fellow in the Public Understanding of Physics at the Institute of Physics and is a member of the BBC's Independent Advice Panel on Engineering and Technology Programs. He has appeared on television and radio many times to promote science and engineering.

## EXTRACTION & PROCESSING DIVISION DISTINGUISHED LECTURER

Tuesday, March 4, 2003

*The Interdisciplinary Nature of Hydrometallurgy*

Kenneth N. Han, South Dakota School of Mines and Technology



Kenneth N. Han

*About the topic:* Hydrometallurgical extraction of metals is an important widely-practiced technology in the metallurgical industry for treating both primary and secondary resources of valuable metals.

Successful hydrometallurgical approaches to metal extraction require full understanding of a wide spectrum of scientific and engineering principles in many disciplines. These include solution chemistry, electrochemistry, thermodynamics, kinetics, transport processes and, frequently, biology.

In this paper, intricate relationships among various disciplines influencing hydrometallurgical extraction are reviewed and analyzed with pertinent examples. The effect of operating parameters on the overall extraction strategy are examined and discussed.

*About the presenter:* Dr. Kenneth N. Han is the Regents Distinguished Professor and Douglas W. Fuerstenau Professor in the Department of Materials & Metallurgical Engineering at the South Dakota School of Mines and Technology (SDSM&T). He was with the Department of Chemical Engineering, Monash University, Melbourne, Australia from 1971-1980. In 1981, he joined SDSM&T. He was head of the Department of Metallurgical Engineering from 1987-94 and dean of the College of Materials Science and Engineering from 1994-99.

His research interests include hydrometallurgy, interfacial phenomena, metallurgical kinetics, solution chemistry, fine particle recovery, and electrometallurgy. He has directed over 70 graduate students and post-doctorate researchers, published more than 150 papers in national and international journals, and presented more than 100 papers at international conferences. He is an author of 10 monographs and holds eight patents in the area of extractive metallurgy.

In 1987, Dr. Han received the Presidential Professor Award from SDSM&T. In 1994, he received the Ernest L. Buckley Award, a South Dakota State Governor's Award for his industrial research efforts. He received the Milton E. Wadsworth Award and the Arthur F. Taggart Award from the Society of Mining, Metallurgical and Exploration in 1995. In 1997, he received the Distinguished Alumni Award from the College of Engineering of SNU. He became an SME Distinguished Member in 1998. In 1998, he was awarded the Excellence in Research by the SD Board of Regents. In 2000, he received the AIME Mineral Industry Education Award and in 2002, the Robert H. Richards Award from AIME.

Dr. Han was inducted into the National Academy of Engineering in 1996. He has been a foreign member of the National Academy of Engineering of Korea since 1998 and was inducted to the Korea Academy of Science and Technology in 1999.

## STUDENT INFORMATION

The 2003 TMS 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.

### **Non-member Students Receive a Free Year of TMS Membership!**

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 TMS Student Membership in 2003.

### **5<sup>th</sup> Annual TMS Student Poster Session**

This students-only Poster Session will be held in conjunction with the 2003 TMS Annual Meeting & Exhibition. Presentations will be displayed on 4' by 4' poster boards; no formal presentation is required. The Poster Session will begin Monday, March 3 and remain in place through Wednesday, March 5. Annual Meeting attendees will have the opportunity to vote for the "Best Poster", with the winning poster receiving \$500.

To enter, contact the TMS Member Services Department for a submittal form or visit the student pages of TMS OnLine. All forms must be received at TMS by December 13, 2002.

### **Student Travel Assistance**

TMS Technical Division Student Travel Scholarships – This program sponsored by the TMS technical division can help pay your travel expense. Students receiving travel scholarships are responsible for making their own travel and

hotel arrangements and registering for the meeting. To apply for travel assistance, send a letter of application and state why you wish to attend the 132<sup>nd</sup> TMS Annual Meeting and Exhibition in San Diego, CA, by December 13, 2002. Name the TMS division in whose technical programming you are most interested, MPMD, SMD, or EMPMD, and include complete information on how you can be contacted. You must be a TMS student member to qualify. If we cannot contact you, your award will be forfeited. A subcommittee of the appropriate sponsoring division will review your letter and select the applicants to receive the travel scholarships. Those receiving travel scholarships will be contacted by TMS shortly after a decision is made. Send letters of application to:

TMS  
Diane Scheuring  
184 Thorn Hill Road  
Warrendale, PA 15086 USA  
Fax: (724) 776-3770  
E-mail: dscheuring@tms.org

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

### **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 must report to Authors' Coffee each morning that they are scheduled to monitor sessions. Monitors positions are limited and will be assigned on a first-come basis. To obtain work forms and schedule, contact Charlotte Kobert, (724) 776-9000, ext. 253, ckobert@tms.org. The deadline to submit completed work forms is January 29, 2003.

### **TMS Student Leaders Career Forum**

**Sunday, March 2, 2003 ..... 2:00 pm–4:00 pm  
San Diego Marriott Hotel and Marina**

Pursuing an appropriate career path is an important task of any metals and materials student. The TMS Student Leaders 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 an interactive session that will follow the main presentations.



### **Student Networking Mixer Sunday, March 2, 2003 8:00 pm–10:30 pm San Diego Marriott Hotel and Marina**

*Sponsored by the 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. Students are encouraged to show their school pride by wearing their school's colors.

### **Donate a door prize!**

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

**\*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.

## GENERAL INFORMATION

The 2003 TMS Annual Meeting & Exhibition will take place in San Diego, California. The San Diego Marriott Hotel & Marina will be the headquarters hotel. All conference events, including registration, technical sessions, and the exhibition will take place at the San Diego 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 2003 TMS Annual Meeting Advance Registration form in this brochure on page 37 and return it to TMS no later than February 3, 2003. 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: February 3, 2003

### Register Via TMS OnLine

You may register any time, day or night, via the 2003 TMS Annual Meeting & Exhibition Home Page on the World Wide Web at <http://www.tms.org/AnnualMeeting.html>. TMS On-Line also provides detailed information on this and all TMS sponsored conferences.

### Advance Registrant Packet Pick Up

Advance registrants should pick up their registration packets in Hall A of the San Diego 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 Hall A in the San Diego Convention Center during the following hours:

<i>Sunday, March 2</i> .....	<i>11:00 am–6:00 pm</i>
<i>Monday, March 3</i> .....	<i>7:00 am–5:00 pm</i>
<i>Tuesday, March 4</i> .....	<i>7:00 am–5:00 pm</i>
<i>Wednesday, March 5</i> .....	<i>7:00 am–5:00 pm</i>
<i>Thursday, March 6</i> .....	<i>7:00 am–10:00 am</i>



### 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](mailto:mtgserv@tms.org)

### Technical Sessions

Technical sessions will begin on Monday, March 3, 2003 and end on Thursday, March 6, 2003. Technical sessions will be held at the San Diego Convention Center. Abstracts will be printed in the November 2002 issue of *JOM* and will also be available via TMS OnLine on the World Wide Web 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.

## POSTER SESSION

A technical, noncommercial poster session will be held in conjunction with the 2003 TMS Annual Meeting. Presentations will be displayed on 4x8-foot poster boards. No formal presentation is required. Individuals should refrain from the use of brand names and specific product endorsements. The Poster Session will begin on Monday, March 3 and remain in place through Wednesday, March 5. Abstracts of 150 words or less must be submitted to the Conference Management System (CMS) at <http://cms.tms.org> by January 6, 2002. If you do not have access to the World Wide Web, abstracts may be mailed to:  
Charlotte Kobert,  
TMS,  
184 Thorn Hill Road,  
Warrendale, PA 15086,  
Fax: (724) 776-3770.



*TMS has contracted a block of rooms at the headquarters hotel, San Diego Marriott Hotel & Marina, 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 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 132<sup>nd</sup> TMS Annual Meeting & Exhibition by making your reservation at one of the listed hotels prior to the advance housing deadline.*

*Thank you.*

## TRAVEL & DESTINATION INFORMATION

### Housing Accommodations

The TMS headquarters hotel will be the San Diego Marriott Hotel & Marina. Special conference rates have been contracted at all the hotels listed on the housing form found in this brochure. Please note there is a \$20.00 coupon included with each reservation at the Embassy Suites to be used at the hotel's restaurant. Also, if you are canceling or changing a reservation at the Hyatt after February 20, you must call the Hyatt directly. To receive the special convention rate, please use the enclosed form to make your hotel reservation, found on page 39 or log on to [www.tms.org](http://www.tms.org) and follow the link to Travel Planners.

*Hotel reservations are processed on a first-come, first-served basis until Monday, February 3, 2003.*

### About the San Diego Marriott Hotel & Marina

The San Diego Marriott Hotel & Marina is the city's largest and finest hotel. It is located just minutes from all the best of this international city, situated on San Diego Bay adjacent to the Convention Center. The hotel offers an abundance of amenities including five award-winning restaurants and lounges, a 446-slip marina, full service business center, two outdoor heated pools, health club, sauna, and six lighted tennis courts. Nearby are shopping, jogging trails, a city park, and miles of beaches. The shops and boutiques of San Diego's internationally famous Horton Plaza and Seaport Village are within walking distance. With all of this, the hotel offers its visitors a veritable wealth of things to do and see.

### Shuttle Service

**Shuttle service will be provided to the convention center from the following hotels only:** Holiday Inn on the Bay, Best Western, and Embassy Suites. The shuttle service is not responsible for items left on the buses. Also, no glass containers are permitted on the buses. The shuttle service will be available beginning Monday, March 3, 2003 from 6:30AM to 9:30AM and 1:30PM to 6:00PM. This schedule will be followed for Tuesday, March 4 and Wednesday, March 5. Service on Thursday, March 6 will be available from 6:30AM to 12:30PM.

### Guest Hospitality

A special guest hospitality area will be hosted each day of the meeting from 7:00AM till 10:00AM in the San Diego Marriott Hotel & Marina. 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.*

### Transportation

The San Diego International Airport is 10 minutes from downtown. Airport shuttle is available through CLOUD 9 SHUTTLE at (619) 278-8877. This service accesses all major airlines and Amtrak. Public buses, trolleys, and coasters provide transportation throughout the city and county with travel to and from the airport, all shopping centers, attractions, beaches, hotels, and Mexico. Visit the following website for more transportation options and information, <http://www.sandiego.org/gettingaround.asp>.



## SPECIAL AIRFARE

### US Airways

Official Carrier for attendees to the  
2003 TMS Annual Meeting & Exhibition

US Airways agrees to offer an exclusive low fare for attendees traveling to the 2003 TMS Annual Meeting & Exhibition in San Diego.

This special fare will offer a **7%** discount off First or Envoy Class and any published US Airways promotional round trip fare. A **12%** discount off unrestricted "Y" or B8US/B4AUS fares will apply with 7 day advance reservations and ticketing required. **Plan ahead and receive an additional discount by ticketing 60 days or more prior to departure.** These discounts are valid provided all rules and restrictions are met and are applicable for travel from all points on US Airways' route system. These discounts are not combinable with other discounts or promotions.

US Airways will also offer *exclusive negotiated rates* for attendees who are unable to meet the restrictions of the promotional round trip fares. Certain restrictions, including advance purchase requirements, may apply. Additional restrictions may apply on international travel.

**Discounts are valid February 27 through March 9, 2003.**

To obtain these discounts, you or your professional travel consultant must call US Airways' Group and Meeting Reservation Office toll free at (877) 874-7687; 8:00 am – 9:30 pm, Eastern Time.

#### REFER TO GOLD FILE NO. 71182495

Once your reservations are confirmed, USAirways will mail the tickets to you or suggest several other convenient methods of purchase.

If you normally use the services of a travel agent or corporate travel department, please have them place the call so that they may obtain the same advantages for you. The special meeting fare is only available through the US Airways Group and Meeting Reservation Office.

US Airways group and meeting customers may take advantage of special negotiated rates with Avis Rent A Car. Please call Avis, toll free, at (866) 629-6995 and Reference AWD K609400 for additional information.



# U-S AIRWAYS

## SPECIAL CAR RENTAL

### Hertz Rent-a-Car System

Has been selected as the Official Car Rental company for the 2003 TMS Annual Meeting & Exhibition, March 2-6, 2003 in San Diego, California.

Meeting rates listed below, with free unlimited mileage, are guaranteed one week before through one week after the actual meeting dates and are subject to availability. Rates are available from all southern California locations.

Advance reservations may be made by booking online at [www.hertz.com](http://www.hertz.com) or calling the Hertz reservations line at 1-800-654-2240 in the US; 1-800-263-0600 in Canada; International - contact your nearest Hertz reservation center. **Identify yourself as an attendee of the TMS Annual Meeting & Exhibition and reference the following CV number: CV#02QJ0004.** You must give the reservations agent the Hertz CV# to receive the special rates. Advance reservations are recommended.



CAR CLASS	DAILY Per Day	WEEKEND Per Day	WEEKLY 5-7 Days
A Economy 2DR	\$35.99	\$21.99	\$135.99
B Compact 4DR	\$40.99	\$25.99	\$149.99
C Midsize 2/4DR	\$44.99	\$27.99	\$169.99
D Sporty 2DR	\$46.99	\$32.99	\$183.99
F Full-size 4DR	\$49.99	\$34.99	\$199.99
G Premium	\$54.99	\$39.99	\$209.99
I Towncar	\$65.99	\$62.99	\$274.99
L 4-Wheel Drive	\$65.99	\$62.99	\$274.99
R Minivan	\$69.99	\$64.99	\$289.99
U Convertible	\$65.99	\$62.99	\$274.99

#### Terms and Conditions

-UNLIMITED MILEAGE ALLOWANCE ON ABOVE RATES.

- One way rentals will be given the current one-way rate at the time of making their reservations. Meeting rates are not available on one way rentals.
- Additional daily charges for optional coverage (Loss Damage Waiver, Personal Accident Insurance, Personal Effect Protection, refueling and state tax) are not included in the above rates.
- Drivers must meet standard Hertz age, driver, and credit requirements.
- Hertz is a frequent flyer partner with US Airways, Delta, Northwest, United, and American Airlines. Frequent flyer information may be requested at time of car booking.
- Weekly rentals are from five to seven days. Weekend rentals have a minimum two-day keep and Thursday pick-up requires a minimum three-day keep.

**2003 TMS  
ANNUAL MEETING**

**PROGRAM  
COMMITTEE**

*Chairperson*

**Richard Wright**

Idaho National Engineering Lab

*Past Chairperson*

**Dan J. Thoma**

Los Alamos National Lab

*EPD Representative*

**Thomas P. Battle**

DuPont Co

*EPD Representative*

**Adrian Deneys**

Praxair Inc

*EMPMD Representative*

**Antonios Gonis**

Lawrence Livermore National Lab

*LMD Representative*

**John J. Chen**

University of Auckland

*MPMD Representative*

**James C. Foley**

Iowa State University

*MPMD Representative*

**Srinath Viswanathan**

Oak Ridge National Lab

*MSCTS Representative*

**James C. Earthman**

University of California

*MSCTS Representative*

**Howard W. Sizak**

Special Metals Corp

*SMD Representative*

**Dennis Dimiduk**

US Air Force

*SMD Representative*

**Eric M. Taleff**

University of Texas

*Member-At-Large*

**Rusty T. Gray, III**

Los Alamos National Lab

*Member-At-Large*

**John E. Smugeresky**

Sandia National Lab

*The organizers of the Yazawa International Symposium on Metallurgical and Materials Processing: Principles and Technologies wish to thank the following co-sponsors:*

**Society Co-Sponsors:**

ASM International  
Asociacion Argentina de Materiales/Materials Research Society of Argentina  
Associacao Brasileira de Metalurgia e Materiais  
Associazione Italiana di Metallurgia  
Australasian Institute of Mining and Metallurgy  
Chinese Metals Society  
Czech Society for New Materials and Technologies  
Dansk Metallurgisk Selskab/Danish Metallurgical Society  
Deutsche Gesellschaft fuer Materialkunde  
Federation of European Materials Societies  
Finnish Association of Mining and Metallurgical Engineers  
Institute of Materials (UK)  
Institution of Mining and Metallurgy  
Instituto Argentino de Siderurgia  
Instituto de Ingenieros de Minas de Chile  
Iron and Steel Institute of Japan  
Iron and Steel Society  
Japan Institute of Metals  
Korean Institute of Metals & Materials  
Metallurgical Society CIM  
Mining and Materials Processing Institute of Japan  
Non-ferrous Metals Society of China  
Slovak Metallurgical Society  
Slovensko drustvo za materiale/Slovenian Society of Materials  
Societe Francaise de Metallurgie et de Materiaux  
Society for Mining, Metallurgy and Exploration  
South African Institute of Mining and Metallurgy

**Company Co-Sponsors:**

Dowa Mining Co., Ltd.  
FLOGEN Technologies Inc.  
Furukawa Co., Ltd.  
Mitsubishi Materials Corp.  
Mitsui Mining and Smelting Co., Ltd.  
Nippon Mining & Metals Co., Ltd.  
Outokumpu Oyj, Finland  
Sumitomo Metal Mining Co., Ltd.  
Toho Zinc Co., Ltd.

**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.

**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.  Dr.  Prof.  Mr.  Mrs.  Ms. Member of:  TMS  ISS  SME  SPE Member Number: \_\_\_\_\_

\_\_\_\_\_  
Last Name First Name Middle Initial

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 February 3, 2003	On-Site Fees after February 3, 2003
<input type="checkbox"/> Member.....	\$400 M	\$500 ML
<input type="checkbox"/> Non-member Author*	\$455 NMA	\$555 NMAL
<input type="checkbox"/> Non-member *	\$525 NM	\$625 NML
<input type="checkbox"/> Student Member ##	\$0 STU	\$0 STUL
<input type="checkbox"/> Student Non-member ## *	\$25 STUN	\$25 STUNL
<input type="checkbox"/> TMS Senior Member.....	\$225 RM	\$225 RML
<input type="checkbox"/> Exhibit Booth Personnel.....	\$0 E	\$0 EL
<input type="checkbox"/> Exhibit Only.....	\$35 EO	\$35 EOL

Registration TOTAL \$ \_\_\_\_\_

\* Includes TMS membership for 2003

## Students must attach a copy of their school's student identification card.

### 4. Tutorial Luncheon Tickets:

Monday 3/3/03	Fee	Quantity	Total
The Young Leader Tutorial Lecture is free.			
You may purchase the optional box lunch for.....	\$25	_____	\$_____ EM

### 3. Social Function Tickets:

	Fee	Quantity	Total
<b>Monday 3/3/03</b>			
Michael Meshii Honorary Dinner.....	\$60	_____	\$_____ MD
Akira Yazawa Honorary Dinner.....	\$60	_____	\$_____ YD
Ronald Armstrong Honorary Dinner.....	\$60	_____	\$_____ RD
TMS Banquet.....	\$60	_____	\$_____ AD
Tables of 8.....	\$480	_____	\$_____ AD8
<b>Tuesday 3/4/03</b>			
Table Sign to Read			
Extraction & Processing Division Luncheon.....	\$30	_____	\$_____ EP
Tables of 8.....	\$240	_____	\$_____ EP8
Table Sign to Read			
Light Metals Division Luncheon.....	\$30	_____	\$_____ LM
Tables of 8.....	\$240	_____	\$_____ LM8
<b>Wednesday 3/5/03</b>			
Table Sign to Read			
Structural Materials Division Luncheon.....	\$30	_____	\$_____ SM
Tables of 8.....	\$240	_____	\$_____ SM8
Table Sign to Read			
Gamma Titanium Aluminides Dinner.....	\$60	_____	\$_____ GTD
Social Function TOTAL \$			_____

### 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	Member Price	Non-member Price	Sub-Total Price
03-5352	Electron Microscopy (Meshii) .....	3	_____	_____	\$96	\$137	\$_____
03-5344	Metallurgical & Materials Processing (Yazawa)—Three-volume Set .....	11	_____	_____	\$337	\$538	\$_____
03-5468	Vol. 1: Fundamentals & New Technologies (only) .....	4	_____	_____	\$154	\$220	\$_____
03-5476	Vol. 2: High-Temp. Metal Production (only) .....	4	_____	_____	\$154	\$220	\$_____
03-5484	Vol. 3: Aqueous & Electrochemical Process (only) .....	3	_____	_____	\$112	\$159	\$_____
03-5328	EPD Congress 2003 .....	3	_____	_____	\$87	\$123	\$_____
03-531X-G	Light Metals 2003 (book and CD set) .....	7	_____	_____	\$158	\$226	\$_____
03-5360	Friction Stir Welding and Processing II .....	3	_____	_____	\$110	\$157	\$_____
03-5336-G	Magnesium Technology 2003 (book and CD set) .....	3	_____	_____	\$113	\$161	\$_____
03-5395	High Temperature Alloys .....	2	_____	_____	\$75	\$107	\$_____
03-5387	Hot Deformation of Aluminum Alloys 2003 .....	4	_____	_____	\$123	\$175	\$_____
03-5441	Materials Lifetime Science & Engineering .....	2	_____	_____	\$91	\$130	\$_____
03-5379	Surface Engineering in Materials Science II .....	2	_____	_____	\$124	\$177	\$_____
03-5522	Energy Efficient Manufacturing Processes (4th MPMD Global Symp.) ...	2	_____	_____	\$65	\$92	\$_____
							SubTotal \$ _____

WEIGHT AND ZONE CHART									
Weight	USA	Canada	Mexico	Western Europe	Eastern Europe	Australia, New Zealand	Central, South America	Pac. Rim, Asia	Middle East, India, Africa
1	\$2.50	\$4.00	\$4.50	\$4.00	\$5.00	\$4.50	\$5.00	\$5.00	\$6.50
2	\$3.00	\$5.00	\$9.00	\$8.00	\$10.00	\$9.00	\$10.00	\$10.00	\$13.00
3	\$3.50	\$6.00	\$13.50	\$12.00	\$15.00	\$13.50	\$15.00	\$15.00	\$19.50
4	\$4.00	\$7.00	\$18.00	\$16.00	\$20.00	\$18.00	\$20.00	\$20.00	\$26.00
5	\$4.50	\$8.00	\$22.50	\$20.00	\$25.00	\$22.50	\$25.00	\$25.00	\$32.50
6	\$5.00	\$9.00	\$27.00	\$24.00	\$30.00	\$27.00	\$30.00	\$30.00	\$39.00
7	\$5.50	\$10.00	\$31.50	\$28.00	\$35.00	\$31.50	\$35.00	\$35.00	\$45.50
8	\$6.00	\$11.00	\$36.00	\$32.00	\$40.00	\$36.00	\$40.00	\$40.00	\$52.00
9	\$6.50	\$12.00	\$40.50	\$36.00	\$45.00	\$40.50	\$45.00	\$45.00	\$58.50
10	\$7.00	\$13.00	\$45.00	\$40.00	\$50.00	\$45.00	\$50.00	\$50.00	\$65.00
11	\$7.50	\$14.00	\$49.50	\$44.00	\$55.00	\$49.50	\$55.00	\$55.00	\$71.50
12	\$8.00	\$15.00	\$54.00	\$48.00	\$60.00	\$54.00	\$60.00	\$60.00	\$78.00

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

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

\$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: 16 lbs. (delivered in U.S.A.) would be 12 lbs. (\$8.00) + 4 lbs (\$4.00) = 16 lbs. (\$12.00)]

Publications TOTAL \$ \_\_\_\_\_

### 6. Continuing Education Short Courses: Saturday & Sunday, March 1-2, 2003

	Advance Fees until February 3, 2003		On-Site Fees after February 3, 2003	
	Member	Non-member	Member	Non-member
<input type="checkbox"/> 1. Sulfide Smelting: Principles, Technologies, and Environmental Considerations (Sat./Sun.) .....	\$645	\$735	\$695	\$785
<input type="checkbox"/> 2. Magnesium Metallurgy—Processing and Industrial Applications (Sat./Sun.) .....	\$645	\$735	\$695	\$785
<input type="checkbox"/> 3. Heat Treatment of Wrought and Cast Aluminum Alloys (Sat./Sun.) .....	\$645	\$735	\$695	\$785
<input type="checkbox"/> 4. Process Heating Workshop—Jt. TMS/DOE (Sat.) .....	\$475	\$560	\$525	\$610
<input type="checkbox"/> 5. Pumping Systems Assessment Workshop - Jt. TMS/DOE (Sun.) .....	\$475	\$560	\$525	\$610
<input type="checkbox"/> 6. Computational Materials Design..... (Sun.)	\$475	\$560	\$525	\$610
Short Course TOTAL	\$ _____	\$ _____		

### 7. 2003 Membership Dues: For current TMS members only

<input type="checkbox"/> Full Member.....	\$90	FM
<input type="checkbox"/> Junior Member.....	\$55	JM
<input type="checkbox"/> ASM/TMS Joint Student Member .....	\$25	ST

### 8. Payment enclosed:

Check, Bank Draft, Money Order

Make checks payable to TMS. Payment shall be made in US dollars drawn on a US 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 February 3, 2003. A \$50 processing fee will be charged for all cancellations. No refunds will be processed after February 3, 2003.

# TMS2003

**132nd Annual International Meeting & Exhibition  
March 2-6, 2003 • San Diego, 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, ext. 1  
(in 212, 718, 516, 914, 631 or international call 212-532-1660, ext. 1)  
(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](http://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: Monday, February 3, 2003**

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 Diego Marriott Hotel & Marina, 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 132nd 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. 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. (If canceling or changing a room at the Hyatt after February 20, 2003, you must call the Hyatt 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.

**HEADQUARTERS**

- 1 San Diego Marriott Hotel & Marina**  
\$212/s/d • \$232/bayview
- 2 Clarion Hotel**  
\$125/single • \$125/double
- 3 Westgate Hotel**  
\$160/single • \$160/double
- 4 The Horton Grand Hotel**  
\$169/single • \$169/double
- 5 Hyatt Regency San Diego**  
\$239/single • \$239/double
- 6 U.S. Grant Hotel**  
\$179/single • \$179/double
- 7 Embassy Suites Hotel**  
\$190/single • \$210/double
- 8 Best Western Bayside Inn**  
\$124/single • \$124/double
- 9 Holiday Inn - on The Bay**  
\$165/single • \$165/double
- 10 Wyndham Emerald Plaza Hotel**  
\$179/single • \$179/double

© San Diego Convention & Visitors Bureau, 1997

**Deposit Payment:**  Check  American Express  MasterCard  VISA  Discover  Diners

Account Number \_\_\_\_\_ Expiration Date \_\_\_\_\_

Card Holder Name \_\_\_\_\_ Authorized Signature \_\_\_\_\_

*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.*

# TMS2003

## 132nd Annual Meeting & Exhibition

## SAN DIEGO TOUR REGISTRATION FORM

March 2-6, 2003 • San Diego, California, USA

**1.** Register now! On-site registration will be limited in San Diego. Accommodations are a space-available basis only.

**2.** Closing date for receipt of advance registration is Monday, February 17, 2003. Refunds will be made only if written cancellation is received prior to February 17, 2003 and may be subject to a surcharge.

**3.** Full payment must accompany your registration form, either check, money order, or credit card. Credit card purchases are subject to a \$2.00 service charge.

**4.** Tickets may be picked up or purchased (based on space availability) at the Tour Desk located at the Convention Center.

**5.** The Meeting Manager reserves the right to cancel the tour due to lack of minimum attendance. If the tour is cancelled, your money will be refunded in full after the convention.

**6.** All tours will depart from and return to the Convention Center.

**7.** All tours are conducted by The Meeting Manager trained and uniformed guides with one guide per motorcoach.

**8.** The Meeting Manager reserves the right to change itineraries or make substitutions when necessary. For additional details, call (619)275-0181.

**Send completed San Diego Tour Registration Form with payment to:**

The Meeting Manager  
2437 Morena Blvd  
San Diego, CA 92110  
Attn: M. Stivers  
PH: (619)275-0181  
FAX: (619)275-4012

### Tour

*Monday, March 3, 2003*

#### City Tour

9:00 am-1:00 pm

**Cost per Person**

\$31.00

**# of Tickets**

\_\_\_\_\_ \$ \_\_\_\_\_

\$

*Tuesday, March 4, 2003*

#### San Diego Zoo Tour

9:00 am-1:00 pm

\$65.00

\_\_\_\_\_ \$ \_\_\_\_\_

\$

*Wednesday, March 5, 2003*

#### Whale Watching Tour

8:45 am-1:30 pm

\$61.00

\_\_\_\_\_ \$ \_\_\_\_\_

\$

*Wednesday, March 5, 2003*

#### Winery Tour

9:00 am-3:00 pm

\$82.00

\_\_\_\_\_ \$ \_\_\_\_\_

\$

*\*Box Lunch is Included.*

Add \$2 surcharge if paying by credit card

\$ \_\_\_\_\_

**TOTAL AMOUNT DUE**

\$ \_\_\_\_\_

Participant's Name: \_\_\_\_\_

Office Phone: \_\_\_\_\_ Home Phone: \_\_\_\_\_

Fax: \_\_\_\_\_

Company/Affiliation: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_ Country: \_\_\_\_\_

### Method of Payment

Check enclosed #: \_\_\_\_\_ Amount \$: \_\_\_\_\_

Visa  MasterCard (\$2 additional charge per credit card payment)

Credit Card #: \_\_\_\_\_ Expiration Date: \_\_\_\_\_

Signature: \_\_\_\_\_

Please print cardholders name: \_\_\_\_\_

Check here for special transportation needs. A representative from The Meeting Manager will contact you by telephone.

Check here for special dietary needs. A representative from The Meeting Manager will contact you by telephone.

## **FUTURE ANNUAL MEETING SITES**

### **TMS Annual Meeting & Exhibition**

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.

**2004** – Charlotte, NC ..... March 14-18 ..... Charlotte Convention Center

**2005** – San Francisco, CA ..... February 13-17 ..... Moscone West Convention Center

**2006** – San Antonio, TX ..... March 12-16 ..... San Antonio Convention Center

**2007** – Anaheim, CA ..... February 11-15 ..... Anaheim 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](mailto:mtgserv@tms.org)  
Web: <http://www.tms.org/Meetings/Meetings.html>

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

*All attendees and authors of the 132nd TMS Annual Meeting,  
who register at the non-member or non-member author fee,  
will automatically receive a one-year,  
complimentary associate membership for 2003!*

Associate members receive all of the same benefits as members, including a free print and electronic subscription to JOM, discounts on TMS publications available via the Document Ordering Center, reduced registration fees for all TMS-sponsored meetings, inclusion in and 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.



## ACCOMPANYING TOURS

The Meeting Manager has been designated the official tour company for the 2003 TMS Annual Meeting & Exhibition. The following tours are scheduled for your enjoyment. Tours will depart from the San Diego Convention Center outside of Hall A. You may reserve the tour(s) of your choice in advance by completing the enclosed registration form. **DO NOT MAIL THE FORM TO TMS.** Please complete the form and mail or FAX along with payment to: The Meeting Manager, 2437 Morena Blvd, San Diego, CA 92110 or (619) 275-4012. *Tickets will not be mailed in advance.* Upon arrival in San Diego, your tickets will be ready for you to pick up at the Tour Desk located near the conference registration desk at the San Diego Convention Center. In order to guarantee operation of tours, please make your reservations by the tour registration closing date of February 17, 2003.



### City Tour

*Monday, March 3, 2003*

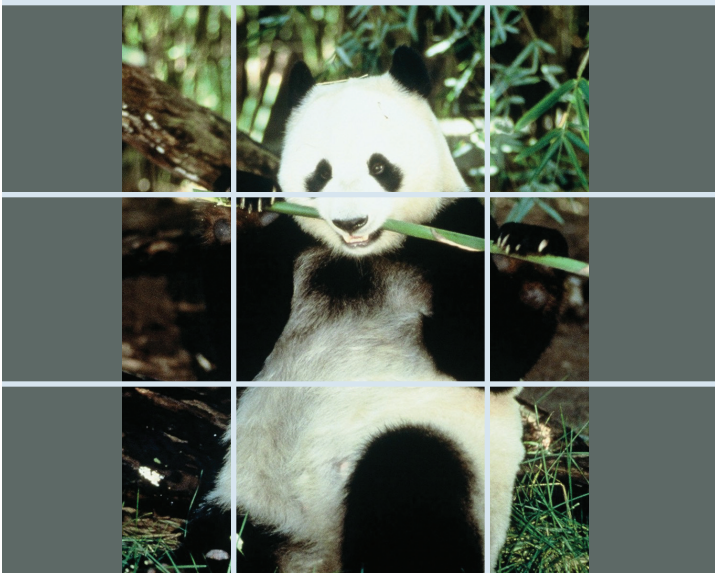
*9:00 AM–1:00 PM*

*\$31.00 per person*

San Diego is known as ‘America’s finest City’, and this customized tour will highlight the many reasons why. This tour is a great way to introduce guests to San Diego.

This tour will educate guests on the history of San Diego and charm guests with its beauty. Areas featured include Coronado Island, home of the Hotel Del Coronado; the Embarcadero (Spanish for “the landing”) where guests will see Navy Ships side-by-side; the Old World charm of the Gaslamp District; the rich history of Old Town, where San Diego was first founded in the 1700’s; and the beauty and cultural wealth of Balboa Park.

If shopping is on the agenda, guests will stop at one of the areas’ shops and boutiques. Pending tour logistics, we will select from downtown’s architecturally unique Horton Plaza, the waterfront’s Seaport Village, or elegant La Jolla.



### San Diego Zoo Tour

*Tuesday, March 4, 2003*

*9:00 AM–1:00 PM*

*\$65.00 per person*

The World Famous San Diego Zoo is home to more than 1,600 animals and 6,500 plant species, each ready to welcome guest when they pass through the entrance gates.

A day at the zoo offers a myriad of possibilities for getting to know the animals. Guests may choose to get an overview on board a 35-minute narrated bus safari, which encompasses 80% of the Zoo’s sprawling canyons and mesas. This is a fabulous way to meet a variety of animals, ranging from the tallest giraffes to the smallest meerkat. Guest may also proceed on foot and catch a ride back on the Skifari Tram that offers great views of the Zoo and Balboa Park.

What sets the San Diego Zoo apart is that it is also a certified botanical garden. Featured attractions include the elusive and cuddly Pandas; Tiger River; The Polar Bear Plunge; Gorilla Tropics; and Ituri Forest. The zoo has something for everyone. Come and talk with the animals!







### **Whale Watching Tour**

*Wednesday, March 5, 2003*

*8:45 AM–1:30 PM*

*\$61.00 per person*

Whales are truly one of the most special creatures on our planet; the opportunity to view them closely is unique and becoming more rare with each passing year. San Diego is lucky to play host to these majestic mammals every winter. Guest will experience the excitement on a whale watching expedition just offshore in the blue waters of the Pacific Ocean.

Each year the graceful gray whales leave their home in the Bering Straits of Alaska and head for the warm waters off Baja California, Mexico. More than 15,000 whales make the journey and as many as 200 a day have been counted during peak season. During the cruise, the ship's captain will discuss the whales' migration habits and biological characteristics, allowing a better understanding of these beautiful creatures.

***This is truly an unforgettable adventure  
that will create memories for years to come!***

### **Winery Tour**

*Wednesday, March 5, 2003*

*9:00 AM–3:00 PM*

*\$82.00 per person*

*Box Lunch is Included*

Temecule Valley is Southern California's celebrated Wine Country. Vistas of rolling hills are covered with uniquely designed wineries and vineyards. The blend of cool summer nights and a gap in the coastal mountain range allow the breezes from the Pacific Ocean to flow into the valley, creating a climate similar to the wine regions of Southern France.

The excursion will include a tour at one winery and tasting at two wineries. Wineries selected may include: Callaway Vineyard and Winery, the region's largest and most modern premium wine producer; Thornton Winery, whose champagne was chosen as one of the 1988 Presidential Inaugural champagnes; Mt. Palomar Winery, which produces a cream sherry in the old Spanish tradition; Cilurzo Winery, grower of Petite Sirah grapes; and Maurice Carrie Winery, producer of 14 different varieties. Guests will enjoy samplings of California's award-winning wines at these boutique wineries, each featuring their unique specialties.

**TMS wishes to thank the San Diego Convention & Visitors Bureau for the beautiful photos of the city and surrounding locations.**

# Prepare

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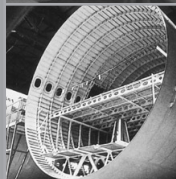
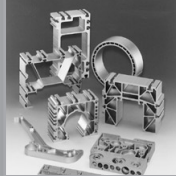
## To Register

**Call** us at: (724) 776-9000, ext. 243

**Fax** us at: (724) 776-3770

**E-mail** us at: [mtgserv@tms.org](mailto:mtgserv@tms.org)

**Write** us at: TMS Meeting Services  
184 Thorn Hill Road  
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**TMS2003**  
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For up-to-date information: Visit [www.tms.org/AnnualMeeting.html](http://www.tms.org/AnnualMeeting.html)

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