

# TMS2004

133rd Annual Meeting & Exhibition



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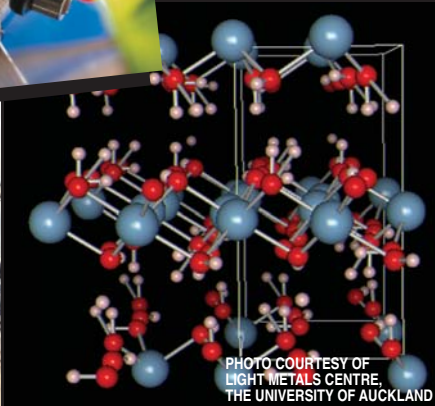


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## Special contributions made by:

- ASM International:  
Materials Science Critical  
Technologies Sector
- TMS Education Committee
- TMS Public &  
Governmental Affairs  
Committee
- National Science  
Foundation
- International Magnesium  
Association
- International Titanium  
Association

## HOT TOPIC TRACK:

- Building MSE Synergies –  
with a biotechnology  
subtext

FEATURING THE TMS 2004 ANNUAL MEETING EXHIBITION

Bringing Technology into Applied Perspectives

March 14–18, 2004  
Charlotte Convention Center  
Charlotte, North Carolina

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

## ADVANCE BROCHURE

**Housing & Registration Forms  
Included**

# TMS



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# MEETING HIGHLIGHTS

The TMS 2004 Annual Meeting & Exhibition continues to gain recognition as the preferred international forum for the timely presentation of scientific research, technological advances, and new product developments across the spectrum of metals and advanced materials. In fact in 2003, its 132<sup>nd</sup> year, the TMS Annual Meeting & Exhibition set a new high with more than 1,900 individual presentations by some of the most innovative materials scientists and engineers representing more than 60 countries.

For 2004, in Charlotte, North Carolina, even bigger things are expected for the 133<sup>rd</sup> annual event. A total of 54 different symposia are planned—another new high. But quantity will not be the focus in Charlotte. The overall quality and relevance of the program to today's most dynamic materials issues, will make the TMS 2004 Annual Meeting & Exhibition a must attend for every member of the materials community.

### The program will be comprised of six primary tracks:

- Advanced Materials
- Electronic Materials
- Extraction and Processing
- Light Metals
- Micro- and Nanoscale Technologies
- Physical Metallurgy

### PLUS a special Hot-Topic Track—

- Building MSE Synergies – a unique menu of symposia designed to build linkages across materials systems, technologies, research approaches, and engineering practice.

**If you can only attend one conference in 2004—the TMS 2004 Annual Meeting & Exhibition is the one!**

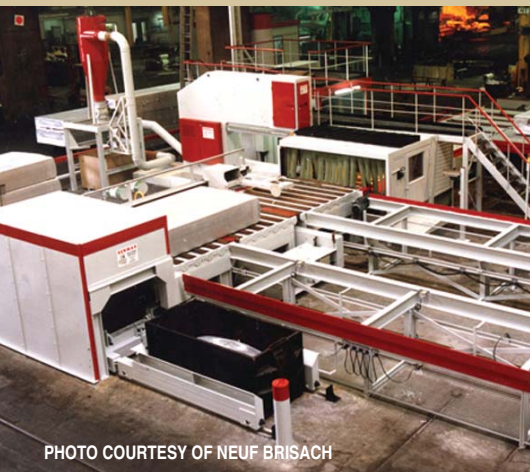


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The real value and advantage to attending TMS2004 is that you don't have to choose what track you want to attend. It's like attending 7 conferences for one registration fee. You can pick and choose from any of the more than 200 sessions, programmed by 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)

**With special contributions by—**

- ASM International: Materials Science Critical Technologies Sector
- TMS Education Committee
- TMS Public & Governmental Affairs Committee
- National Science Foundation
- International Magnesium Association
- International Titanium Association

One of the busiest locations at the TMS 2004 Annual Meeting & Exhibition will be the exhibit hall. There, you can join more than 3,500 of your colleagues viewing displays of the application of technology into industrial practice. More than 160 companies from around the globe will exhibit and demonstrate products and services that can provide answers to your most pressing needs.

For those of you who have never been to Charlotte, the city will surprise you. Located not far from the internationally recognized "Research Triangle," Charlotte is a blend of old and new, history and technology, business and fun. The area is a hotbed for NASCAR racing enthusiasts and is home to Lowe's Motor Speedway and many racing teams, including Dale Earnhardt, Inc.



*The TMS 2004 Annual Meeting & Exhibition will be a week jammed with opportunities for you to listen, experience, network, and learn. The following pages will give you details on the extensive technical program, short courses, tutorials, lectures, workshops, social activities, and non-stop networking that you can include in your personal meeting experience.*



**Be sure to include these outstanding symposia in your TMS 2004 Personal Conference Scheduler, <http://pcs.tms.org>.**

*A special post-conference workshop to be presented by the International Titanium Association:*

## **FUNDAMENTALS OF TITANIUM WORKSHOP**

*To be held in conjunction with TMS 2004 Annual Meeting & Exhibition*

*Friday, March 19, 2004*

### **Course Objectives:**

This comprehensive workshop will provide attendees with detailed information on the types, uses, and properties of common titanium alloys. Attendees will leave with an understanding of applied titanium metallurgy fundamentals.

### **Course Content:**

- Historical overview of titanium
- Cleaning & finishing
- Metallurgy & metallography of titanium
- Casting
- Mechanical properties and testing
- Powder metallurgy
- Titanium alloy processing
- Joining
- Corrosion resistance
- Heat-treating
- Machining and chemical shaping
- Applications overview

### **Who Should Attend**

This course is appropriate for professionals that use, process or fabricate components with titanium. Individuals who need an understanding of titanium and its alloys to facilitate their job functions.

#### **Past attendees include:**

- Marketing/Sales
- Quality
- Operations
- Administrators
- Purchasing
- Potential Users of Titanium

### **Why You Should Attend**

Fundamentals of Titanium will prepare you to present and work effectively with job-related functions that involve titanium. You will receive a complete overview of titanium and a thorough grounding in its metallurgy, characteristics, properties and uses.

The registration fees include: workshop materials, full day workshop, and lunch. Due to the interactive nature of this workshop, attendance is limited.

### **About the Presenter: Stanley Seagle**

Mr. Seagle has currently retired as Vice President of Technology at RMI Titanium Co., a leading producer of titanium mill products. Mr. Seagle has been involved for 40 years in all aspects of titanium technology including metal reduction, titanium metallurgy, and titanium processing and marketing. He served as the company's technical liaison with major airframe producers, gas turbine manufacturers, titanium fabricators, titanium casters and titanium forgers.

His early career centered around research in titanium physical metallurgy and alloy development. Several titanium alloys developed by Mr. Seagle are in current use in aerospace and corrosion-resistant applications. He has been involved in market development as well as providing technical service to titanium users. In his last position he had responsibility for research, quality assurance and process control.

Mr. Seagle earned his Bachelor of Science and Masters degree in Metal Engineering at Purdue University in 1955 and 1957 respectively. Products of a 38-year career include 14 patents (3 currently commercial alloys), 38 technical talks and 40 publications. He was the recipient of many awards; notably Distinguished Engineering Alumni, Purdue University 1982, Fellow of ASM International 1987, Warren Chapter ASM "Professional Accomplishment" 1987 and "Outstanding Person", Mahoning Valley Technical Council 1992. In retirement he maintains an association with the titanium industry as a consultant and lecturer.

### **Fee: \$195 per person**

#### **For more information or to register, please contact:**

International Titanium Association  
350 Interlocken Blvd., Suite 390  
Broomfield, CO 80021-3485 USA  
Tel: (303) 404-2221  
Fax: (303) 404-9111  
E-mail: [info@titanium.org](mailto:info@titanium.org)  
Web: [www.titanium.org](http://www.titanium.org)

*\*Note that this is not a TMS sponsored short course.*

# SPECIAL PROGRAMMING EVENTS

*TMS 2004 Announces the Materials Processing & Manufacturing Division's Fifth Global Innovations Symposium:*

## **TRENDS IN LIGA, MINIATURIZATION, AND NANO-SCALE MATERIALS, DEVICES AND TECHNOLOGIES**

New low cost techniques for the fabrication of micro-parts with typical features ranging between 1 to 1000 micrometers are being developed as miniaturization technology pushes the frontier to smaller and smaller devices. Using advanced material processing technologies, like LIGA technology, miniaturized parts are fabricated by electroplating or sintering of ceramic or metal nanoparticles shaped into molds. In addition to optimizing the baseline pre-form microfabrication technique, research is underway to develop methods for evaluating the properties of microparts and investigations into the effects of nanoparticle size, fabrication parameters, and sintering schedule on properties of these micro-part materials. This symposium will provide description, insight, challenges, and projections for advances in miniaturized part manufacturing, evaluation and applications. It is intended to bring together those people developing LIGA and LIGA-like technologies to discuss the fundamental materials and engineering challenges to advancing the technology and identify materials processing needs for further development of these technologies. There will be three types of talks: Overviews by invited speakers which describe the size scale of interest to the LIGA community, mini-tutorials by experts in the field that describe characteristics of commercially available nanoscale materials, and focused technical presentations that describe advanced techniques and materials issues for making miniature parts with nanocrystalline microstructures, including sensors, using LIGA and LIGA-like technologies.

Discussion will include but not be limited to:

- Materials processing needs for microfabricated devices
- Characterization of nanostructured materials
- Fundamental material science issues in nanostructured materials
- Stress and stress evolution in LIGA and LIGA-like parts
- Effects of restricted geometry on microstructure



*Opening this very important session will be the TMS/AIME Keynote Session*

*Featuring the following invited presentations:*

### **Featured Keynote Presentation:**

#### **Perspectives on Nanoscience and Nanotechnology**

*Presenter: M. S. Dresselhaus, Institute Professor and Professor of Physics and Electrical Engineering, Massachusetts Institute of Technology*

#### **NSF Nanomanufacturing Program Overview**

*Presenter: Harris Doumanidis, National Science Foundation*

#### **Nanoceramics, Nanotubes and Nanocomposites Paving the Way for Nanotechnology Revolution – A Review of the Industry and Markets**

*Presenter: Dr. Thomas Abraham, Vice President of Research, Business Communications Company*

#### **The Difficult Transition from Technology to Commercialization - Using the Events of the Past 50 Years to Exploit the Future**

*Presenter: Keith A. Blakely, CEO, NanoDynamics, Inc.*

#### **Future Trends in Nanoscience Materials R&D Needs for Impacting Electronic Component Commercialization**

*Presenter: Robert Gasser, Jr., Vice President – Technology and Manufacturing Group, Intel Corporation*

#### **Technology Transfer for Nanocrystalline Materials from a University Perspective**

*Presenter: Bernard Kear, Director of Center for Nanomaterials Research, Rutgers University*



# SYMPOSIUM HIGHLIGHTS & AVAILABLE PROCEEDINGS

## Featured Programming from the 7 Conference Tracks:

- *HOT TOPIC: Building MSE Synergies*
- *Advanced Materials*
- *Electronic Materials*
- *Extraction & Processing*
- *Light Metals*
- *Micro- and Nanoscale Technologies*
- *Physical Metallurgy*

*THE ENTIRE PROGRAM, including abstracts, will be available in November on the TMS 2004 Annual Meeting & Exhibition web site, <http://www.tms.org/AnnualMeeting.html>. The program will also be published in the November issue of JOM.*

## HOT-TOPIC TRACK BUILDING MSE SYNERGIES

This track consists of two unique hybrid symposia—both with a biotechnology subtext—designed to build linkages across materials, systems, technologies, research approaches, and engineering practice.

Consisting of invitation-only presentations and sponsored by the National Science Foundation, the symposium *Metals for the Future* will explore the future of the metals field, including opportunities that exist for fundamental and applied research. The symposium will address synergistic opportunities at the interfaces with other materials and disciplines such as mechanics and bioengineering. Today's metals research and future challenges will be considered.

The symposium *Materials by Design: Atoms to Applications* will bring together specialists in different technological applications to examine the integration of fundamental materials science into engineering systems. The discussion will range from materials synthesis at the molecular level to actual use in an engineering structure or device.

## Advanced Materials in Racecars

Stock Car Auto Racing is a powerful, challenging and exciting sport. Present day racecars are engineering marvels that get pushed to their performance limits. Speed and safety are of paramount concern that must be delivered by the sound and sturdy structure. Materials design and performance challenges are encountered in the frame, the body, the engine, the tire and the on-board devices. To learn about the materials issues in the fascinating world of racecars, TMS announces a 'Hot-Topic' Symposium on Advanced Materials in Racecars. Experts from the field of racecar design, development and engineering will present invited plenary talks. Presentations are also invited on racecar-related material issues to address the novel advanced developments.

## High Risk Technologies in Metallurgy with Commercial Potential

This one-day symposium will present a variety of new technologies in material engineering and metallurgy developed to enhance the competitive position of the USA.

PROCEEDINGS OF THIS SYMPOSIUM ARE PLANNED FOR POST-CONFERENCE PUBLICATION



## Materials by Design: Atoms to Applications

The aim of this conference is to explore experimental and computational methodologies in different materials applications which deal with ways one links length and time scales from materials synthesis (at the molecular level) up to the actual use in an engineering structure or device. The symposium will explore the latest advances in theory, computation and experimental techniques, which enable ways in which one may design materials for functionality across length scales. Approaches on how this transition from "atoms to applications" can be accelerated will be an important theme of this meeting. The conference will explore topics which help in:

- Linking models and experiments synergistically to enable speedy acquisition of data of relevance to the designer.
- Establishing a procedure for rapidly mining and searching for data based on robust mathematical principles integrated with scientifically meaningful interpretations.
- Developing an experimental protocol based on combinatorial techniques, to compress variables in the materials and processing parameter space into small volumes, permitting high throughput screening of relevant data.
- Applying a set of mathematical and accompanying computational methodologies linking length scales of materials properties to systems behavior.
- Reducing the amount of testing to fewer focused critical tests using component matched testing that predicts component and systems behavior from testing materials.

In this conference a variety of materials applications will be explored ranging from the aerospace industry to the chemical and biotechnology industry. By bringing together specialists in different technological applications, we hope to establish a discussion of generic scientific and engineering methodologies on ways fundamental materials science is integrated into engineering systems.

PROCEEDINGS OF THIS SYMPOSIUM ARE PLANNED FOR POST-CONFERENCE PUBLICATION



## Materials Education to Revitalize the Workforce

This symposium is aimed at building synergies in education and outreach to attract the best and brightest to future careers in Materials Science and Engineering. We recognize that the “graying” workforce in Materials Science and Engineering is should be revitalized with a fresh crop of highly capable and motivated professionals that can face the new challenges for materials in the future. The presentations will include a series of model educational efforts at all academic levels that are targeted at increasing awareness about and enrollment in materials-related fields at the undergraduate and graduate levels, as well as in continuing education programs. It is hoped that a concentrated interchange of beneficial ideas and practices in materials science and engineering education among professional educators and policy makers can stimulate more coordinated action at the K-12 and college/university levels. The goals are for several groups involved in materials education to learn about the possibilities for parallel activities and collaboration. Professional educators will become aware of potential sources of support. Funding organizations and policy makers will become acquainted with the needs and opportunities in materials education. A poster session is also planned.

## Materials Issues in Fuel Cells

Fuel cells are at the threshold of becoming one of the most viable forms of energy conversion devices. Energy can be harnessed through fuel cells for applications in many commercial sectors. The government and the industry have made a concerted commitment to make a profound impact on energy management. Many types of fuel cell devices are being developed globally. For fuel cells to potentially deliver the economic alternative that it envisages, significant material challenges have to be overcome in the near future. This session will include plenary lectures from leading experts and imminent researchers who will present a comprehensive analysis of materials challenges in fuel cells. Papers are invited to describe the state-of-the-art in fuel cells research and development from a materials perspective.

## Metals for the Future

A NSF sponsored Symposium that will explore the future of the field of metals, including the opportunities that exist for fundamental and applied research. The symposium will address synergistic opportunities at the interfaces with other materials and disciplines such as mechanics and bio-engineering. Invited speakers will present their views on the status of today's metals research and introduce future challenges that will be discussed.



## Nanostructured Magnetic Materials

This symposium will highlight recent scientific results and technological advances in the field of nanostructured magnetic materials and devices. Topics will include, but not limited to, the followings: (i) Self-Assembly and Nanomagnetism (ii) Magnetic Thin Films and Surfaces (iii) Ferromagnetic Semiconductors (iv) GMR and Spin-dependent Tunneling. Special focus will be on the fundamental studies of growth, structure, magnetic properties, and spin dynamics with particular emphasis on spintronic devices, GMR materials and magnetic recording media.



**PROCEEDINGS OF THIS SYMPOSIUM ARE PLANNED FOR POST-CONFERENCE PUBLICATION**

## ADVANCED MATERIALS

*Materials that must meet unique and daunting performance requirements are the focus of this programming track. Making materials that can withstand unusual and/or demanding applications, however, presents unique challenges in fundamental and applied research, processing, fabrication, and implementation. The symposia of this track will look at powder metallurgy processing and properties (inclusive of ceramics, metals, intermetallics, and composites); alternatives to nickel- and cobalt-based superalloys that may be capable of performing effectively at significantly higher temperatures (candidates include molybdenum borosilicides, niobium silicides, refractory metal alloys, and precious metal superalloys); and processing and mechanical behavior of bulk metallic glasses, which have certain advantageous characteristics as compared to conventional crystalline alloys (e.g., higher fracture strength, fracture toughness, and elasticity).*

*A significant new materials opportunity—and commensurate challenge—also exists in the area of energy conversion and power transmission and storage. To explore these issues, the advanced materials track will host the second installment of the symposia series Fundamentals of Advanced Materials for Energy Conversion. The original was a highly successful program during the 2002 TMS Annual Meeting in Seattle, Washington. Topics will include thermoelectronics, fuel cells, hydrogen storage, batteries, supercapacitors, superconductors, magnetics, and photovoltaics, among others.*

*Many of the presentations in this track are planned for proceedings publication.*

## Advanced Materials for Energy Conversion II

This symposium follows “Fundamentals of Advanced Materials for Energy Conversion I” TMS 2002 Annual Meeting in Seattle. We bring together researchers in the fields of Materials Science and Engineering working on energy conversion fundamentals and applications. The focus of this symposium is on new ideas and transmission of energy. The symposium sessions will include Thermoelectronics, Fuel Cells, Storage of Hydrogen and its Isotopes, Batteries, Supercapacitors, Superconductors, Magnets and Magnetic Refrigeration, Membrane Materials, Thermal Energy Storage Materials, Photovoltaics, and other related topics.

### Advanced Materials for Energy Conversion II BUY THE PROCEEDINGS!

**Dhanesh Chandra, Renato G. Bautista, and Louis Schlapbach, editors**

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## Beyond Nickel-Base Superalloys

Presently, nickel and cobalt-base superalloys are the logical choice for strong, tough, and oxidation-resistant high-temperature structural materials. However, above approximately 1000°C their strength drops dramatically. This symposium targets materials with engineering properties similar to those of superalloys, but at significantly higher temperatures. Recent developments such as niobium silicides, molybdenum borosilicides, and precious metal superalloys suggest that progress is being made. Materials systems of interest in this



symposium include also high-strength refractory metal alloys. Topics of interest include, but are not limited to, first principles modeling of alloy phases and their properties, measurement of physical properties, thermodynamics and phase diagrams, processing, microstructural characterization, oxidation and corrosion, and mechanical properties.

### **Bulk Metallic Glasses**

Provide fundamental understanding and theoretical modeling of processing and mechanical behavior of bulk metallic glasses (BMGs). In the last decade, new approaches to fabricating metallic glasses [i.e., by utilizing unique combinations of elements to form metallic-glass alloys] have resulted in the required cooling rate dropping from 105 C/s to as low as 1 C/s, and the specimen size increasing from 0.05 mm to as large as 80 mm. Because of the large sizes possible with this exciting technology, the metallic glasses are called BMGs. Mechanical behavior of BMGs is among the new, exciting fields of research that are fully illustrating their advantages over crystalline alloys. Generally, BMGs have higher fracture strengths, fracture toughnesses, and elasticities than their crystalline counterparts. There is great interest in BMGs for use in biomedical, structural, and mechanical applications. Some of the areas to be explored:

- (1) Material fabrication and processing
- (2) Nanocrystalline materials and composites based on BMGs
- (3) Mechanical behavior
- (4) Shearband formation, fatigue, deformation, and fracture mechanisms
- (5) Corrosion, physical, magnetic, electric, and thermal properties
- (6) Theoretical modeling and simulation
- (7) Industrial applications

#### **Bulk Metallic Glasses BUY THE PROCEEDINGS!**

*Peter K. Liaw and  
Raymond A. Buchanan, editors*

ISBN: 0-87339-573-5

Approx. 256 pp., softcover

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Member Price \$125 • Student Price \$99 • List Price \$179



### **Processing, Microstructure and Properties of Powder-Based Materials**

This symposium covers research on the processing, microstructures and properties of materials formed from powders. Materials covered include ceramics, metals, intermetallics, and metal matrix composites.



### **Roytburd Symposium on Polydomain Structures**

This symposium, held in honor of A.L. Roytburd, will focus on the theory, modeling and experimental studies of polydomain structures in materials. Topics include polydomain structures in bulk materials and in constrained films as a result of diffusionless phase transformations (martensitic, ferroelastic, ferroelectric and ordering), thermodynamics of coherent phase transformations, and phase-field modeling of martensitic and ferroelectric phase transformations in bulk materials and films. The symposium consists exclusively of invited presentations.

## **ELECTRONIC MATERIALS**

*Electronic materials—and their associate processing methodologies—represent the forefront of critical materials technologies, enabling rapid and sizeable advances in computing, sensor technology, miniaturization, nanotechnology, optoelectronics, and energy management, to name but a few.*

*This track will feature experimental, theoretical, and practical investigations into a number of electronic materials issues, including the environmentally and regulatory significance of identifying and employing alternatives to lead-based solders. Soldering processes, metallization, and manufacturing concerns for microelectronics applications will be addressed, as will solder materials development for use in optical/optoelectronic and micro-electromechanical system packaging. Other topics include phase stability, phase transformation, and reactive phase formation in electronic materials (e.g., flip-chip, solder joints, silicide materials, contacts, and interconnect in integrated circuits). Additionally, recent advances and challenges in thin-film science, technology, and applications will be reviewed.*

### **Challenges in Advanced Thin Films: Microstructures, Interfaces, and Reactions**

This symposium will provide a platform for presentation and discussion of recent advancements and challenges in thin-film science, technology and applications.



### **Lead-Free Solders and Processing Issues Relevant to Microelectronic Packaging**

This symposium will address materials and processing issues related to the use of emerging and established lead-free 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 kinds of electronic packages. The symposium will also cover lead-free materials for metal-semiconductor contacts, application such as thermal interface materials, alternative interconnect technologies for stress management at both the wafer level, and chip to package level, and issues involved in the design and integration of conductive adhesives in electronic packages. Topics related to lead-free soldering in optoelectronics and microelectronics packages, such as BGA, micro-BGA, CSP, etc. are also of interest.



### **Phase Stability, Phase Transformation, and Reactive Phase Formation in Electronic Materials III**

This symposium addresses phase stability of flip-chip USM, 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 111-V materials, and chemical interactions between electronic materials.





## EXTRACTION AND PROCESSING

*Embracing the cornerstone issues of the global primary metals production field, this track emphasizes the extraction, processing, synthesis, shaping, forming, treatment, handling, and recycling of metals and other materials (with the exceptions of like issues covered in the Light Metals track). Common themes will include environmental considerations, experimental and industrial-scale approaches, analytical techniques, computer modeling and process control, sustainability, and fundamental concerns such as physical chemistry, thermodynamics, and transport phenomena.*

*Many of the track's presentations will appear in the 2004 edition of EPD Congress, which is the annual volume of the TMS Extraction & Processing Division and which provides coverage of the optimized processing approaches to ferrous and nonferrous metals. Other publications are also planned.*

*A spotlight symposium on laterite nickel will mark the 25th anniversary of 1979's International Laterite Symposium by providing updates on certain products and outlining new developments that have occurred in the interim.*

## Educational Issues in Transport Phenomena in Materials Processing

Educators of transport phenomena in materials departments face a variety of challenges starting with the requirement to teach in one semester material which most other engineering departments cover in two. The selection and order of topics in standard texts follow the pattern set by Bird, Stewart and Lightfoot, which is well suited for chemical engineering, but alternative approaches have been suggested for materials engineering curricula. Also, in addition to the standard topics of fluid dynamics, heat and mass transfer, these courses often also include special topics such as solidification, computation, even process cost modeling; the requisite mathematics and dimensional/scaling analysis also play essential roles. All of this must be taught using examples and problems from across all classes of materials. Finally, a number of textbooks introduced in the past few years, and newly-available computer-based resources, have greatly expanded the number of primary and supplementary readings and teaching tools for this subject. Speakers will discuss experiences in navigating these challenges in teaching this subject, and integrating transport into other subjects which comprise both the undergraduate materials curriculum and continuing education offerings, from thermodynamics, kinetics, and mechanics to relevant laboratory experiences.

## General Pyrometallurgy

General topics in pyrometallurgy, covering the science, technology, and industrial practice of the processing of non-ferrous metals from their ores and or secondary sources by pyrometallurgical means, and their forming into semi-finished, or finished products.

**EPD Congress 2004**

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*Mark Schlesinger, editor*

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## International Laterite Nickel Symposium – 2004

The symposium is an update of the "International Laterite Symposium" held in 1979. The proposed 2004 symposium would serve to update certain projects and developments discussed in 1979, and cover happenings in the interim period for the following topics:

- Geology
- Mineralogy
- Mining
- Fundamentals/Research & Development
- Emerging Technologies
- Pyrometallurgy - Designs, Projects, Start-ups, and Operations
- Hydrometallurgy - Designs, Projects, Start-ups, and Operations

**Laterite Nickel 2004**

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*D.M. Lane and W.P. Imrie, editors*

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## Materials Processing Fundamentals

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

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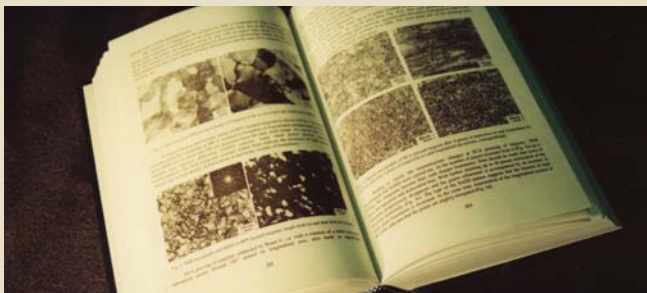
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## Recent Advances in Non-Ferrous Metals Processing

The Symposium on Recent Advances in Non-Ferrous Metals Processing will focus on two aspects of non-ferrous metallurgy. It addresses recent developments in processing, physical metallurgy and applications of lithium and other reactive metals and presents state-of-the art processes in sustainable development with particular reference to processing in primary metals production.



## Recycling - General Sessions

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

### Heavy Metal Sessions: EPD Congress 2004

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### Light Metal Sessions: Light Metals 2004

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## Solid and Aqueous Wastes from Non-Ferrous Metal Industry

Various kinds of solid and aqueous wastes are discharged from non-ferrous metal industries. They are solid wastes such as base metals, precious metals, precipitates, flue dust and fly ash, and aqueous wastes containing various metal ions. It is desirable from the viewpoint of environment and resources preservation that metal values are recovered from these wastes. The session covers generation, physical and chemical treatment, metal recovery and disposal on solid and aqueous wastes from non-ferrous metal industries.

### EPD Congress 2004

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## LIGHT METALS

*The TMS Annual Meeting & Exhibition is internationally recognized as the global light metals community's preeminent forum for exploring the science and technological issues associated with the production, processing, properties, application, and recycle of industrially significant light metals. In particular, this track will focus on myriad issues associated with aluminum, magnesium, lithium, and titanium.*

*TMS traditionally presents stand-out programming in primary and secondary aluminum processing. The proceedings of the alumina reduction, bauxite and alumina, carbon, and cast shop symposia are published in the annual volume—Light Metals, a book that is widely recognized as the "bible of the aluminum industry." Rapidly attaining similar status, the annual volume Magnesium Technology provides a like reference for scientists and engineers working with this extremely lightweight metal. Many of the presentations delivered in these symposia will appear in the Light Metals 2004 and Magnesium Technology 2004 proceedings volumes. Many papers from other symposia in this track are also planned for publication.*

## Alumina and Bauxite

The Alumina and Bauxite Symposium, along with cast shop technology, aluminum reduction technology, carbon technology, recycling technology, and reactive metals, collectively form the Light Metals Symposium, where experts from the Light Metals Industry and academia from all over the world meet each other and share information. Sessions will cover the following subject areas: Bayer Process: fundamentals, chemistry, operational experiences; Safety and environment with focus on residues; Bauxite mining; Process control; Analytical methods; Design of refineries.

### Light Metals 2004

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Alton Tabereaux, editor

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## Aluminum Can Recycling

The Aluminum Can Recycling symposium will cover all aspects of aluminum can recycling, from collection through processing. Presentations will range from fundamental to applied science.

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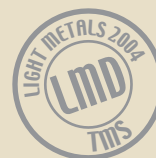
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## Aluminum Reduction - Potroom Improvements

The primary goal of the special TMS session, "Aluminum Reduction - Potroom Improvements", is to promote increased participation by the active professionals who work at international aluminum smelters in making presentations at the annual TMS meetings.

## Aluminum Reduction Technology

The Aluminum Reduction Technology Symposium, along with alumina and bauxite, cast shop technology, carbon technology, recycling technology, reactive metals, and potroom operations - potroom improvements, collectively form the Light Metals Symposium, where experts from the Light Metals Industry and academia from all over the world meet each other and share information. Sessions will cover the following subject areas: Cell design; Cell operation (performance and operating advances); New cell materials; Cell modernization and productivity increase; Process control; Modeling of cell design; Environmental aspects; Fundamentals; Bath chemistry; Inert anodes.

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## Automotive Alloys 2004

Automotive Alloys 2004 symposium captures the ongoing research, development and testing activities for usage of aluminum and magnesium alloys in automotive applications.



PROCEEDINGS OF THIS SYMPOSIUM ARE  
PLANNED FOR POST-CONFERENCE PUBLICATION

## Carbon Technology

The Carbon Technology Symposium, along with aluminum reduction technology, alumina and bauxite, cast shop technology, recycling technology, and reactive metals, collectively form the Light Metals Symposium, where experts from the Light Metals Industry and academia from all over the world meet each other and share information. Sessions will cover the following subject areas: 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 2004

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## Cast Shop Technology

The Cast Shop Technology Symposium, along with carbon technology, aluminum reduction technology, alumina and bauxite, recycling technology, and reactive metals, collectively form the Light Metals Symposium, where experts from the Light Metals Industry and academia from all over the world meet each other and share information. Sessions will cover the following subject areas: Charge materials; Melting; Filtration; Pre-furnace treatment; Casting processes; Fluxing; Environmental issues; Shape casting; Grain refinement; Modeling and control; Automation; Cast structures; Safety.

Light Metals 2004

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## Cost Affordable Titanium Symposium Dedicated to Prof. Harvey Flower

Titanium and titanium alloys are used in many demanding applications in aerospace and terrestrial systems because of their excellent combination of mechanical properties and corrosion resistance. However, titanium alloys are excluded from many applications because of their high cost - a result of an energy intensive extraction process and complex fabrication sequence to mill products. This is particularly true in the cost obsessed automobile industry; albeit some in-roads are now being made even into the family car.

Papers addressing all aspects of cost reduction in titanium and its alloys will be presented. The various segments of titanium technology to be covered will include, but not be limited to: extraction (with emphasis on innovative non-Kroll approaches) of new lower cost alloys, creative melting including cold hearth approaches, near net shape techniques (including powder metallurgy variants such as near net shapes, spraying, laser forming, etc and casting approaches), processing/fabrication advances such as warm drawing, extrusion, superplastic forming (also in combination with diffusion bonding), high speed machining and knowledge based processing with emphasis on computer aided approaches, better process control including enhanced inspection methods, and creative designs such as functionally graded materials, porous alloys and infiltrated concepts.



## Magnesium Technology 2004

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

Magnesium Technology 2004

### BUY THE PROCEEDINGS!

Alan A. Luo, editor

ISBN: 0-87339-568-9

Approx. 436 pp., illus., hardcover & CD-ROM set

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## Phase Transformations and Deformation in Magnesium Alloys

Lightweight magnesium alloys have attracted increasing interest in recent years for applications in the automotive, aircraft and electronic industries. However, their applications, particularly in the automotive industry, remain limited because their strength and creep resistance are relatively low compared to those of aluminium alloys. Attempts to improve mechanical properties of existing magnesium alloys and to develop new alloys with better performance have thus far been restricted by a lack of detailed understanding on phase equilibria in complex alloy systems, precipitation processes, interactions between lattice defects and precipitates, deformation microstructures, and deformation mechanisms at ambient and elevated temperatures. The aims of this symposium are to examine current understanding on phase transformations and roles of phase transformation products in controlling the deformation behavior of commercially and strategically important magnesium alloys and to provide a platform for rational design of microstructures for high strength and creep-resistant service. The emphasis of the symposium will be on presentations from leading researchers in the field, and the Organizer will seek to provide the most coherent presentations possible. This symposium consists exclusively of invited presentations.



## Solidification of Aluminum Alloys

This symposium will address progress in the application of solidification principles to the production of aluminum alloys. Topics will include microstructure evolution, phase formation and solidification path analysis, grain refinement, micro/macro-segregation, mechanical behavior/properties in the mushy state, solidification cracking/tearing, gas/shrinkage porosity formation, effect of impurities/trace elements, and the impact of cast structure on the subsequent fabrication and properties of finished products. Papers on the experimental or theoretical simulation of solidification aspects of casting processes including direct chill (DC) casting, continuous casting, shaped casting, semi-solid processing and other advanced casting technologies are also encouraged. Of particular interest will be examples showing the use of solidification principles to solve industrial problems.

### Solidification of Aluminum Alloys **BUY THE PROCEEDINGS!**

*Men G. Chu, Douglas A. Granger,  
and Qingyou Han, editors*

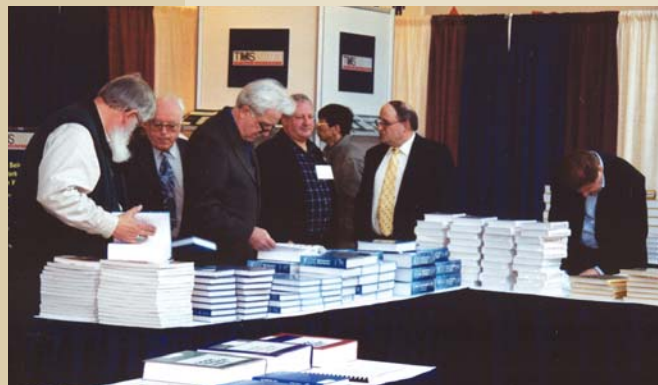
ISBN: 0-87339-569-7

Approx. 440 pp., illus., softcover

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## MICRO-AND NANOSCALE TECHNOLOGIES

*"Nano" has become the prefix of the new millennium, and the TMS Annual Meeting has evolved into one of the world's premier destinations to present developments in the synthesis, analysis, properties, and application of these ultra-small-scale technologies, both in terms of materials and devices. From a structural perspective, this track will consider biomedical applications, surfaces and interfaces, and severe plastic deformation. From a device perspective, the 5th Global Innovations Symposium of the Materials Processing & Manufacturing Division will consider practical fabrication, characterization, and evaluation technologies.*

*Many of the presentations in this track are planned for proceedings publication.*

## 5th Global Innovations Symposium: Trends in LIGA, Miniaturization, and Nano-scale Materials, Devices and Technologies

New low cost techniques for the fabrication of micro-parts with typical features ranging between 1 to 1000 micrometers are being developed as miniaturization technology pushes the frontier to smaller and smaller devices. Using advanced material processing technologies, like LIGA technology, miniaturized parts are fabricated by electroplating or sintering of ceramic or metal nanoparticles shaped into molds. In addition to optimizing the baseline pre-form microfabrication technique, research is underway to develop methods for evaluating the properties of microparts and investigations into the effects of nanoparticle size, fabrication parameters, and sintering schedule on properties of these micro-part materials. This symposium will provide description, insight, challenges, and projections for advances in miniaturized part manufacturing, evaluation and applications. It is intended to bring together those people developing LIGA and LIGA-like technologies to discuss the fundamental materials and engineering challenges to advancing the technology and identify materials processing needs for further development of these technologies.

### *Fifth Global Innovations Symposium on Materials Processing and Manufacturing: Surfaces and Interfaces in Nanostructured Materials and Trends in LIGA, Miniaturization, and Nanoscale Materials* **BUY THE PROCEEDINGS!**

*S. Mukhopadhyay and J. Smugersky, editors*

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## Nanostructured Materials for Biomedical Applications

There are rapid developments in the types of materials used in medical implants and diagnostic equipment. Topics of interest include, but are not limited to, nanostructured materials, bio-derived materials, novel scaffolds, sensor materials, and "smart" materials that are able to respond to the body environment. This symposium will encompass the fields of engineering and medicine, and will provide an ideal environment for discussion of medical device design and development.



**PROCEEDINGS OF THIS SYMPOSIUM ARE PLANNED FOR POST-CONFERENCE PUBLICATION**



### Surfaces and Interfaces in Nanostructured Materials

As feature sizes in modern materials get smaller, the surface/interface to volume ratio increases. For nano-technology-derived structures, it can be argued that the few atomic layers that constitute the interfacial region will dominate most properties. Modification and tailoring of the surface or interface may be the most effective approach of controlling these materials. This mandates a detailed understanding of structural, physical and chemical properties of interfaces. The proposed symposium is expected to bring experts working on different aspects of these studies (fabrication, characterization, modification, modeling etc.) to identify and address some of the important issues. Focus areas will include topics such as, but not limited to, the following:

- Structure-Chemistry-Property Relationships
- Surface engineering approaches in the nano-scale regime
- Chemistry and atomic bonding at interfaces
- Kinetics, Diffusion paths and related effects at Interfaces
- Fabrication of "bulk" nano-structures
- Advances in Interfacial Modification/Engineering Techniques.

**Fifth Global Innovations Symposium on Materials Processing and Manufacturing: Surfaces and Interfaces in Nanostructured Materials and Trends in LIGA, Miniaturization, and Nanoscale Materials**  
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### Third International Symposium on Ultrafine Grained Materials

This is the third international symposium that focuses on all aspects of science and technology of ultrafine-grained (UFG) materials produced by Severe Plastic Deformation (SPD) techniques. It provides a forum on the topics of fundamental issues in SPD processing and SPD-processed materials, processing and microstructures, microstructural evolution, mechanical and physical properties, superplasticity, computational and analytical modeling, new SPD technologies and advances, structural applications, etc.

**Ultrafine Grained Materials III**

**BUY THE PROCEEDINGS!**

*Yuntian T. Zhu, Terence G. Langdon, and Ruslan Z. Valiev, editors*

ISBN: 0-87339-571-9

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### PHYSICAL METALLURGY

*The symposia of this wide-ranging track provide an opportunity to expand our understanding of structure-processing-property-performance relationships as well as the associated physical and mechanical behavior as determined through process analysis, testing, characterization, modeling and simulation, and other evaluative techniques.*

*Core coverage will include mechanical properties (superplasticity, failure, internal stresses, and thermo-mechanical behavior), solidification and microstructures (phase transformations, multiphase phenomena, evolution, interfaces, diffusion, recrystallization, grain boundaries, texture, and crystallography), materials testing and evaluation, microscopy, modeling and simulation (computer and physical modeling, mathematical modeling, design, computational fluid dynamics, computational thermodynamics, validation, and sensors), and microgravity.*

*Many of the presentations in this track are planned for proceedings publication.*

### Advances in Superplasticity and Superplastic Forming

Superplastic forming, already established as an important technology in aerospace manufacturing, has begun infiltrating the automotive industry, where fast cycle time is a key requirement. This symposium addresses the various advances in materials and process technologies required to enable this next step in the mass production applications of superplastic forming. A focus of the symposium is materials and processes of interest to the automotive industry, such as forming of light alloys at more rapid rates and lower forming temperatures. This includes alloy development for aluminum and magnesium, as well as other metallic materials, and novel forming techniques for commercial applications. Basic aspects of research on grain refinement techniques, microstructural evolution, deformation mechanisms, cavitation and process modeling will continue to remain of key interest. Sessions are also planned on superplastic deformation of other materials, such as titanium, steel, stainless steel, and metallic glasses, etc., and papers in these areas are strongly encouraged.

**Advances in Superplasticity and Superplastic Forming**

**BUY THE PROCEEDINGS!**

*Eric M. Taleff, Paul E. Krajewski, and Peter A. Friedman, editors*

ISBN: 0-87339-564-6

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### CFD Modeling and Simulation of Engineering Processes

The symposium will be focused on the computational fluid dynamics (CFD) modeling and simulation of various engineering processes, such as metal processes (e.g., casting, forging, welding, heat treating, VAR/ESR/PAM/EBM remelting processes, etc.), coatings (PVD, CVD, plasma-assisted EBM-PVD technologies, etc.), other surface engineering processes including induction, laser and EB thermal processing). Papers on multi-scale modeling and simulation are considered. Other processes such as power/energy related processes (e.g., fuel cells, Ag-Zn batteries, etc.), electromagnetic processes involving fluid flow phenomena, steel making and processing technologies, and thermal management of electronic systems are also considered. The papers must cover physical phenomena involved in the process, a thorough

description of the mathematical model and the validation and verification of the model. The aim of the conference is to bring together scientists and engineers on the CFD field to discuss applications of CFD to engineering processes and to demonstrate how CFD could help better understand the fundamentals of engineering processes; furthermore, they should how this will lead to a shorten design cycle with an improved performance of the process.

### **Multiphase Phenomena and CFD Modeling and Simulation in Materials Processes**

#### **BUY THE PROCEEDINGS!**

L. Nastac and B. Li, editors

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### **Computational Thermodynamics and Phase Transformations**

By reducing the number of time consuming laboratory experiments required to test a new component design or process, computational modeling and simulation can result in significant cost savings. This symposium is the third in a series of annual TMS symposia focusing on computational thermodynamics and kinetics of phase transformations. It brings together computational and experimental materials scientists to assess the current status of computational models and simulation techniques at different time and length scales. In addition to fundamental understanding of the mechanisms underlying microstructural evolution, attention will also be given to applications practical to microstructural engineering of advanced materials including metals, ceramics and electronic materials in both bulk and thin film forms. Of particular interest are computational models that integrate two or more different approaches, analyses that compare the relative merits of various simulation techniques and validation with experiment of simulation results. Six sessions are anticipated with several invited speakers in each session.

#### **Topics of relevance include, but are not limited to:**

- Classical and first principles atomistic simulation techniques.
- Thermodynamic properties of equilibrium and nonequilibrium phases.
- Fundamental properties of surfaces and interfaces.
- Advances in phase field modeling.
- Kinetics of grain growth, recrystallization and particle coarsening.
- Effect of elastic and plastic strains on the kinetics of microstructural evolution.

### **Dislocations**

Many key material properties arise not from crystal structure, but from structural defects. Dislocations, for example, mediate many mechanical and electrical properties to the extent that much of materials processing focuses on controlling dislocation formation and annihilation. This symposium will survey the current state of dislocation theory, modeling, and experiment. Topics include, but are not limited to, characterization of single dislocations, dislocation interactions and entanglement, pattern formation and evolution, interactions with impurities, precipitates and interfaces, and the connection between dislocation structure and macroscopic phenomena. In each session, invited speakers will provide perspectives in critical areas.

### **Electrochemical Measurements and Processing of Materials**

The symposium will invite and solicit papers on novel measurement and processing techniques that employ electrochemical process fundamentals. The emphasis will be on measurement methods and processes that extend our understanding and application capability of electrochemical techniques. Topics can be broadly classified into the following three categories: Physical and Chemical Property Measurements; Sensors including micro-sensors; and Electrochemically mediated synthesis/processing/refining of materials and value-added products.

EPD Congress 2004

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Mark Schlesinger, editor

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### **Failure of Structural Materials**

This symposium will address the investigation of and root causes for failures of structural materials. Focused areas will include investigation techniques, materials solution & design, and Processing/Joining.

### **Hume Rothery Symposium: Structure and Diffusional Growth Mechanisms of Irrational Interphase Boundaries**

This symposium will focus upon the interphase boundary structure of planar (and curved) interfaces formed during diffusional phase transformations that are characterized by irrational orientation relationships and by conjugate habit planes that are irrational even at the atomic level. Example phase transformations will include precipitation from substitutional and interstitial solid solutions, the massive transformation and the pearlite and cellular reactions.



### **Internal Stresses and Thermo-Mechanical Behavior in Multi-Component Materials Systems**

The purpose of this symposium is to bring together the latest developments in: (1) residual stress measurements, (2) modeling and simulation approaches, and (3) understanding the interaction between thermo-mechanical behavior and internal stresses. Topics of interest include internal stress-related system performance and reliability issues, interaction between internal stresses and fracture/fatigue/creep/thermal cycling, as well as phase changes associated with internal stresses and effect on properties. Areas of interest include composites, nano-materials, thin films and coatings, interconnects in microelectronic devices and packages, and other systems with interfaces between dissimilar materials.

### **Multiphase Phenomena in Materials Processing**

This symposium provides researchers and engineers with a forum to discuss the recent development in modeling of multiscale and multiphase phenomena in material processing systems. The topics include gas-particle flows, liquid-liquid phase flows, bubbly driven flows, granular flows, liquid-solid flows, and multiphase flows in external fields, multiscale heat and mass transfer, and microstructure formation in these multiphase systems. Papers addressing the theory, experiments and computational modeling in the above topic areas are to be presented.



**Multiphase Phenomena and CFD Modeling and Simulation in Materials Processes**

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L. Nastac and B. Li, editors

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**R.J. Arsenault Symposium on Materials Testing and Evaluation**

Advances in instrumentation in existing materials testing and evaluation techniques, as well as new approaches to materials testing and evaluation, are increasingly becoming necessary with the continuously decreasing size of engineering structures and the emergence of new materials in bulk, coating, thin-film, line and dot forms. This symposium seeks to provide a broad forum for examining current research and future directions in materials testing and evaluation. The techniques will assess a range of geometrical and microstructural length scales in various material classes. Aspects of non-destructive and online monitoring techniques will also be addressed. Representative techniques include (but are not limited to): x-ray and neutron diffraction, instrumented indentation, magnetic, electromagnetic, acoustic, optical and thermographic techniques, etc. This symposium is held in honor of Prof. R. J. Arsenault, following his retirement from the University of Maryland.

**PROCEEDINGS OF THIS SYMPOSIUM ARE PLANNED FOR POST-CONFERENCE PUBLICATION**



**Solidification Processes and Microstructures: A Symposium in Honor of Prof. Wilfried Kurz**

Professor Wilfried Kurz, born April 18, 1938, has been active for nearly forty years in the field of solidification, essentially at the Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland. Among many achievements, W. Kurz has carried out experimental and theoretical investigations on microstructural aspects such as dendrite tip kinetics, microsegregation, eutectics and peritectics formation, microstructure selection, banding, and absolute stability at high solidification rate, etc. He has also made significant contributions to processes such as continuous casting of steel and aluminum, directional solidification, and single crystal growth, laser surface treatment, laser welding, laser metal forming, etc. The book *Fundamentals of Solidification*, written with one of his former Ph.D. students (D. Fisher), has been a great help for many students and researchers in the field. As Prof. W. Kurz retires in 2003, a special symposium dedicated to him is organized. It focuses on both theoretical and experimental investigations of solidification processes and microstructures.

**Solidification Processes and Microstructures: A Symposium in Honor of Prof. W. Kurz**  
**BUY THE PROCEEDINGS!**

Michel Rappaz, C. Beckermann, and R. Trivedi, editors

ISBN: 0-87339-572-7

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Member Price \$112 • Student Price \$88 • List Price \$159



**Symposium in Honor of Prof. Roger D. Doherty**

This symposium will address several issues of long standing importance in physical metallurgy that have been highlights of Prof. Doherty's career. These include phase transformations, solidification, recrystallization, texture development, microstructural stability and work hardening.

**The Didier de Fontaine Symposium on the Thermodynamics of Alloys**

This symposium will honor the seminal contributions of Didier de Fontaine to the theory of alloys over the last 40 years. His many contributions are in the areas of crystallography, ordering reactions, and phase separation; using various techniques for the calculation of phase equilibria by combined first principles electronic band structure and statistical mechanical methods. This symposium will address basic issues of thermodynamic equilibrium in alloys that have been the center of Professor De Fontaine's career. Topics and techniques of relevance include: Cluster expansion techniques as well as first principles atomistic techniques for the calculation of equilibrium structures and ordering phenomena in alloys, and the application of advanced X-Ray/neutron scattering and electron-microscopy methods in studies of alloy phase transformations.

**The Role of Grain Boundaries in Material Design**

Recent advances in materials science and engineering provide strategies for incorporating materials chemistry and microstructure parameters as design variables for highly-constrained design problems. These advances are driven by a critical need to reduce the time required to introduce new materials by identifying principles and developing tools by which predictive optimizing of material processing and properties can be done at the conceptual design stage of a new system. This symposium will provide a forum for presentation and discussion of theory, models, and methodology for identifying and obtaining controlled grain boundary characteristics in materials design, and the use of these models and methods in multidisciplinary design.

**General Abstracts**

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 offering general abstract sessions.

**General Poster Session**

A technical, noncommercial poster session will be held in conjunction with the TMS 2004 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 15 and remain in place through Wednesday, March 17.

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*Books purchased via the TMS 2004 Annual Meeting & Exhibition Registration form must be obtained at the meeting. Those not obtaining their ordered books will be required to pay the shipping and handling fees for their order.*

# TECHNICAL GRID

Monday-March 15		Tuesday-March 16		Wednesday-March 17		Thursday-March 18
AM	PM	AM	PM	AM	PM	AM
Dislocations: Modeling and Simulation Fundamentals	Dislocations: Simulation and Observation of Fundamental Mechanisms	Dislocations: Dislocation Structures and Patterning	Dislocations: Novel Experimental Methods	Dislocations: Plasticity, Voids, and Fracture	Dislocations: Dislocations in Complex Materials	
	Advances in Superplasticity and Superplastic Forming: Development of Advanced Superplastic Forming Processes	Advances in Superplasticity and Superplastic Forming: Advances in Superplastic Al-Mg Materials	Advances in Superplasticity and Superplastic Forming: Advances in Superplastic Forming of Light Alloys	Advances in Superplasticity and Superplastic Forming: Advanced Superplastic Mats. & the Science of Superplasticity	Advances in Superplasticity and Superplastic Forming: Modeling of Superplastic Forming Processes and Materials	General Abstracts IX
Computational Thermodynamics and Phase Transformations: Grain Growth and Particle Coarsening	Computational Thermodynamics and Phase Transformations: Interfaces and Grain Boundaries	Computational Thermodynamics and Phase Transformations: Phase Field Modeling I	Computational Thermodynamics and Phase Transformations: Phase Field Modeling II	Computational Thermodynamics and Phase Transformations: Phase Equilibria and Thermodynamic Assessments	Computational Thermodynamics and Phase Transformations: Thermodynamics and Phase Transformation	
General Pyrometallurgy I	5th Global Innovations Symposium: Plenary: Trends: Past, Present, and Future	5th Global Innovations Symposium: Small Volume Deformation	5th Global Innovations Symposium: Properties & Characterization of Mats. for Microsys./LIGA Applications	5th Global Innovations Symposium: Properties, Processes, and Modeling	5th Global Innovations Symposium: Manufacturing and Evaluation of Layered Nano-Scale Materials	
Advanced Materials for Energy Conversion II: Energy Issues & Metal Hydrides I	Advanced Materials for Energy Conversion II: Metal Hydrides II	Advanced Materials for Energy Conversion II: Complex Hydrides I	Advanced Materials for Energy Conversion II: Complex Hydrides II	Advanced Materials for Energy Conversion II: Metal Hydrides III	Advanced Materials for Energy Conversion II: Metal Hydrides IV- Dynamics of Metal Hydrides, and Tritium Gettering	Advanced Materials for Energy Conversion II: Thermoelectrics, Superconductors, and Piezoelectrics Materials
Magnesium Technology 2004: Automotive Applications/Welding	Magnesium Technology 2004: Wrought Magnesium Alloys I	Magnesium Technology 2004: Wrought Magnesium Alloys II/Corrosion and Coatings	Magnesium Technology 2004: Primary Processing and Environmental Issues	Magnesium Technology 2004: Casting Processes and Properties	Magnesium Technology 2004: Fundamental Research	Magnesium Technology 2004: Alloy Development
General Abstracts I	General Abstracts II	General Abstracts IV	General Abstracts V	Advanced Materials for Energy Conversion II: Thermodynamics, Superconductors & Batteries	Advanced Materials for Energy Conversion II: Magnetic Materials & Hydrogen Permeation	Advanced Materials for Energy Conversion II: Metal Hydrides V- Thermal Energy Storage and Containment Materials
Recent Advances in Non-Ferrous Metals Processing: Reactive Metals	Recent Advances in Non-Ferrous Metals Processing: Sustainable Development	Phase Transformations and Deformation in Mg Alloys: Solidification and Precipitation	Phase Transformations and Deformation in Mg Alloys: Plastic Deformation and Texture	Phase Transformations and Deformation in Mg Alloys: Creep Deformation	Phase Transformations and Deformation in Mg Alloys: Deformation and Strengthening	
CFD Modeling and Simulation of Engineering Processes: Advanced Casting and Solidification Processes - I	CFD Modeling and Simulation of Engineering Processes: Remelt Processes	CFD Modeling and Simulation of Engineering Processes: MEMS/ Microfluidics	CFD Modeling and Simulation of Engineering Processes: Advanced Casting and Solidification Processes - II	CFD Modeling and Simulation of Engineering Processes: Process Modeling - I	CFD Modeling and Simulation of Engineering Processes: Process Modeling - II	
Cost-Affordable Titanium Symposium Dedicated to Prof. Harvey Flower: Overview and Innovative Processes	Cost-Affordable Titanium Symposium Dedicated to Prof. Harvey Flower: Break Through Technologies	Cost-Affordable Titanium Symposium Dedicated to Prof. Harvey Flower: Titanium Economics	Cost-Affordable Titanium Symposium Dedicated to Prof. Harvey Flower: Creative Processing	Cost-Affordable Titanium Symposium Dedicated to Prof. Harvey Flower: Creative Fabrication	Cost-Affordable Titanium Symposium Dedicated to Prof. Harvey Flower: Low Cost Titanium	Cost-Affordable Titanium Symposium Dedicated to Prof. Harvey Flower: Property Enhancement
Third International Symposium on Ultrafine Grained Materials: Processing I: Fundamentals and Technology	Third International Symposium on Ultrafine Grained Materials: Processing II: Structural Evolution	Third International Symposium on Ultrafine Grained Materials: UFG Material Fundamentals	Third International Symposium on Ultrafine Grained Materials: Microstructure and Properties	Third International Symposium on Ultrafine Grained Materials: Mechanical Properties	Third International Symposium on Ultrafine Grained Materials: Superplasticity, Creep & Thermal Stability	
		Solidification of Aluminum Alloys: Microstructural Evolution I	Solidification of Aluminum Alloys: Microstructural Evolution II	Solidification of Aluminum Alloys: Solidification Cracking/ Mechanical Properties	Solidification of Aluminum Alloys: Gas Porosity/Micro-Macro Segregation	Solidification of Aluminum Alloys: Special Effects

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203B  
204  
205  
206A  
206B  
207A  
207B/C



# TECHNICAL GRID

		Monday-March 15		Tuesday-March 16		Wednesday-March 17		Thursday-March 18	
		AM	PM	AM	PM	AM	PM	AM	
207D		Solidification Processes and Microstructures: A Symp. in Honor of Prof. W. Kurtz: Processes	Solidification Processes and Microstructures: A Symp. in Honor of Prof. W. Kurtz: Mushy Zone Dynamics	Solidification Processes and Microstructures: A Symp. in Honor of Prof. W. Kurtz: Microstructures	Solidification Processes and Microstructures: A Symp. in Honor of Prof. W. Kurtz: Rapid Solidification	Solidification Processes and Microstructures: A Symp. in Honor of Prof. W. Kurtz: Phase Field	General Abstracts VIII		
	208A	Hume Rothery Symp.: Struct. & Diffusional Growth Mechanisms of Irrational Interphase Boundaries - I	Hume Rothery Symp.: Struct. & Diffusional Growth Mechanisms of Irrational Interphase Boundaries - II	Hume Rothery Symp.: Struct. & Diffusional Growth Mechanisms of Irrational Interphase Boundaries - III	Hume Rothery Symp.: Struct. & Diffusional Growth Mechanisms of Irrational Interphase Boundaries - IV	Hume Rothery Symp.: Struct. & Diffusional Growth Mechanisms of Irrational Interphase Boundaries - V	Hume Rothery Symp.: Struct. & Diffusional Growth Mechanisms of Irrational Interphase Boundaries - VI		
208B			Processing, Microstructure and Properties of Powder-Based Materials - I	Processing, Microstructure and Properties of Powder-Based Materials - II	Processing, Microstructure and Properties of Powder-Based Materials - III	General Abstracts VI	General Abstracts VII		
209A		Bulk Metallic Glasses: Processing I	Bulk Metallic Glasses: Processing II	Bulk Metallic Glasses: Fatigue and Fracture	Bulk Metallic Glasses: Theoretical Modeling and Shear Bands	Bulk Metallic Glasses: Bio, Corrosion, and Fracture Behavior	Bulk Metallic Glasses: Phase Transformation and Alloy Design	Bulk Metallic Glasses: Mechanical Behavior	
209B		Internal Stresses & Thermo-Mech. Behavior in Multi-Component Matls. Sys.: Electronic Thin Films & Pkkg. Matls. - I	Internal Stresses & Thermo-Mech. Behavior in Multi-Component Matls. Sys.: Electronic Thin Films & Pkkg. Matls. - II	Internal Stresses & Thermo-Mech. Behavior in Multi-Component Matls. Sys.: Creep and Plasticity - I	Internal Stresses & Thermo-Mech. Behavior in Multi-Component Matls. Sys.: Creep and Plasticity - II	Internal Stresses & Thermo-Mech. Behavior in Multi-Component Matls. Sys.: Anisotropy and Residual Stresses	Educational Issues in Transport Phenomena in Materials Processing: Presentations and Panel Discussion		
210A		Automotive Alloys 2004 - I	Automotive Alloys 2004 - II	Automotive Alloys 2004 - III	Automotive Alloys 2004 - IV	High Risk Technologies in Metallurgy with Commercial Potential - I	High Risk Technologies in Metallurgy with Commercial Potential - II		
210B		Materials by Design: Atoms to Applications: Materials Chemistry and Alloy Design	Materials by Design: Atoms to Applications: Materials Characterization and Microstructural Modeling	Materials by Design: Atoms to Applications: Computational and Experimental Strategies	Materials by Design: Atoms to Applications: Designing Nanostructures	Materials by Design: Atoms to Applications: Design for Mechanical Functionality I	Materials by Design: Atoms to Applications: Design for Mechanical Functionality II		
211A		R.J. Arsenault Symposium on Materials Testing and Evaluation - I	R.J. Arsenault Symposium on Materials Testing and Evaluation - II	R.J. Arsenault Symposium on Materials Testing and Evaluation - III	R.J. Arsenault Symposium on Materials Testing and Evaluation - IV	Failure of Structural Materials - Fundamentals	Failure of Structural Materials - Fatigue	Failure of Structural Materials - General	
211B		Beyond Ni-Base Superalloys - Superalloys and Niobium Silicides	Beyond Ni-Base Superalloys - Molybdenum Silicides - I	Beyond Ni-Base Superalloys - Precious Metal Alloys	Beyond Ni-Base Superalloys - Molybdenum Silicides - II	Beyond Ni-Base Superalloys - Niobium Silicides	Beyond Ni-Base Superalloys - Other Systems and Physical Properties of Silicides		
212A			General Abstracts III	Electrochemical Measurements and Processing of Materials: Electrodeposition Processes	Electrochemical Measurements and Processing of Materials: Electrochemical Refining	Electrochemical Measurements and Processing of Materials: Electrochemical Metal Production	Electrochemical Measurements and Processing of Materials: Electrochemical Sensors and Measurements		
212B		Materials Processing Fundamentals - Solidification and Casting	Materials Processing Fundamentals - Deformation Processing	Materials Processing Fundamentals - Liquid Metal Processing	Materials Processing Fundamentals - Smelting and Refining	Materials Processing Fundamentals - Aqueous Processing	Materials Processing Fundamentals - Powders, Composites, Coatings and Measurements		
213A		Aluminum Reduction - Potroom Improvements - I	Carbon Technology: Anode Raw Materials	Carbon Technology: Green Anodes and Soderberg Paste	Carbon Technology: Anode Baking	Carbon Technology: Anode Quality and Performance	Carbon Technology: Cathode Material and Corrosion		
213B/C		Cast Shop Technology: Melting and Refractories	Cast Shop Technology: Modeling of Casting Processes	Cast Shop Technology: Casting	Cast Shop Technology: Metal Treatment	Cast Shop Technology: Alloying and Furnace Processing	Cast Shop Technology: Grain Refining	Cast Shop Technology: Foundry	



# TECHNICAL GRID

Monday-March 15		Tuesday-March 16		Wednesday-March 17		Thursday-March 18	
AM	PM	AM	PM	AM	PM	AM	
Aluminum Reduction Technology: Cell Development and Operations	Aluminum Reduction Technology: Pot Control	Aluminum Reduction Technology: Modeling - Industry Trends	Aluminum Reduction Technology: Emerging Technologies	Aluminum Reduction Technology: Environmental	Aluminum Reduction Technology: Materials and Fundamentals	Aluminum Reduction Technology: Modeling	213D
Phase Stability, Phase Transformation, and Reactive Phase Formation in Electronic Materials III - I	Phase Stability, Phase Transformation, and Reactive Phase Formation in Electronic Materials III - II	Phase Stability, Phase Transformation, and Reactive Phase Formation in Electronic Materials III - III	Phase Stability, Phase Transformation, and Reactive Phase Formation in Electronic Materials III - IV	Phase Stability, Phase Transformation, and Reactive Phase Formation in Electronic Materials III - V	Solid and Aqueous Wastes from Non-Ferrous Metals Industry - I	Solid and Aqueous Wastes from Non-Ferrous Metals Industry - II	214
Nanostructured Magnetic Materials: Recent Progress in Magnetic Nanostructures	Nanostructured Magnetic Materials: Synthesis and Characterization of Nanostructured Magnetic Materials	Nanostructured Magnetic Materials: Magnetic Tunnel Junctions and Semiconductor Spintronics	Nanostructured Magnetic Materials: Self Assembly and Patterned Nanostructures	Metals for the Future: Structural Materials	Metals for the Future: Functional Materials	Metals for the Future: Processing and Bio-Materials	215
Symp. on Microstructural Stability in Honor of Prof. Roger D. Doherty: Microstructural Stability: Recrystallization	Symp. on Microstructural Stability in Honor of Prof. Roger D. Doherty: Microstructural Stability: Texture Development	Symp. on Microstructural Stability in Honor of Prof. Roger D. Doherty: Microstructural Stability: Plastic Deformation	Symp. on Microstructural Stability in Honor of Prof. Roger D. Doherty: Microstruct. Stability: Precipitation & Other Topics	Roytburd Symposium on Polydomain Structures: Elastic Domains in Structural Materials	Roytburd Symposium on Polydomain Structures: Domains in Ferroelectrics and Magnetics		216A
The Didier de Fontaine Symp. on the Thermodynamics of Alloys: Fundamentals of Alloy Theory	The Didier de Fontaine Symp. on the Thermodynamics of Alloys: Experimental Techniques	The Didier de Fontaine Symp. on the Thermodynamics of Alloys: First Principle Calculations & Cluster Expansion Techniques	The Didier de Fontaine Symp. on the Thermodynamics of Alloys: Interatomic Potentials and Cluster Expansion Techniques	The Didier de Fontaine Symp. on the Thermodynamics of Alloys: Jt. Session with Computat. Thermodynamics & Phase Transformations	The Didier de Fontaine Symp. on the Thermodynamics of Alloys: Jt. Session with Computat. Thermodynamics & Phase Transformations		216B
		Surfaces and Interfaces in Nanostructured Materials: General Phenomena and Processes	Surfaces and Interfaces in Nanostructured Materials: Grain and Phase Boundaries	Surfaces and Interfaces in Nanostructured Materials: Synthesis & Processing	Surfaces and Interfaces in Nanostructured Materials: Coatings and Surface Modification	Surfaces and Interfaces in Nanostructured Materials: Self-Organized & Biological Materials	217A
International Laterite Nickel Symposium - 2004: Economics and Project Assessment	International Laterite Nickel Symposium - 2004: Mineralogy and Geo-Metallurgy	International Laterite Nickel Symposium - 2004: Process Development for Prospective Projects	International Laterite Nickel Symposium - 2004: Pressure Acid Leaching	International Laterite Nickel Symposium - 2004: Process and Operational Lessons Learned - Part I	International Laterite Nickel Symposium - 2004: Process and Operational Lessons Learned - Part II	International Laterite Nickel Symposium - 2004: Atmospheric Leaching/Slurry Rheology, Solution Extraction and Other	217B/C
Recycling - General Sessions: General Recycling	Recycling - General Sessions: Aluminum and Aluminum Dross Processing	Aluminum Can Recycling - I	International Laterite Nickel Symposium - 2004: Roasting and Smelting	Materials Education to Revitalize the Workforce - I			217D
Alumina and Bauxite: Bayer Plant Operations: Red Side	Alumina and Bauxite: Process Modeling and Control	Alumina and Bauxite: Bayer Plant Operations: White Side	Alumina and Bauxite: Technology and Future Trends	The Role of Grain Boundaries in Material Design: Grain Boundary Character	The Role of Grain Boundaries in Material Design: Grain Boundary Segregation, Diffusion, Damage	The Role of Grain Boundaries in Material Design: Simulation of Grain Boundary Effects of Properties	216A
Challenges in Advd. Thin Films: Microstructures, Interfaces & Reactions: Advances in Photonic & Optoelect. Matls. & Proc.	Challenges in Advd. Thin Films: Microstructures, Interfaces & Reactions: Micro-struct., Prop. & Reliability of Microelec. Devices	Challenges in Advd. Thin Films: Microstructures, Interfaces and Reactions: Modification, Characterization, and Modeling	Challenges in Advd. Thin Films: Microstructures, Interfaces & Reactions: Design, Proc. & Property Control...	Multiphase Phenomena in Materials Processing - I	Multiphase Phenomena in Materials Processing - II	Multiphase Phenomena in Materials Processing - III	218B
Nanostructured Materials for Biomedical Applications - I	Nanostructured Materials for Biomedical Applications - II	Nanostructured Materials for Biomedical Applications - III	Nanostructured Materials for Biomedical Applications - IV	Nanostructured Materials for Biomedical Applications - V	Nanostructured Materials for Biomedical Applications - VI	Nanostructured Materials for Biomedical Applications - VII	219A
Lead-Free Solders & Procg. Issues Relevant to Microelectronic Pkgg.: Fundamentals, Phases, Wetting & Solidification	Lead-Free Solders & Procg. Issues Relevant to Microelect. Pkgg.: Environmental & Matls. Issues for Lead-Free	Lead-Free Solders & Procg. Issues Relevant to Microelect. Pkgg.: Mechanical Properties & Fatigue	Lead-Free Solders & Procg. Issues Relevant to Microelect. Pkgg.: Electro-migration and Creep in Leadfree Solders	Lead-Free Solders & Procg. Issues Relevant to Microelect. Pkgg.: Interfacial Interactions, Intermetallics & Substrates	Lead-Free Solders & Procg. Issues Relevant to Microelect. Pkgg.: Microstructural Characterization & Evolution		219B

# CHARLOTTE, NORTH CAROLINA

**site for the 133<sup>rd</sup> Annual TMS Meeting & Exhibition.**

*Charlotte is a city with history in minerals, metals, and materials. Of the four symbolic statues in the town square, one depicts a goldminer, another a railroad builder, and another a mill-worker.*

*Charlotte is a progressive city.  
It is the second largest financial center in the US.*



PHOTO COURTESY OF THE CHARLOTTE CONVENTION CENTER



PHOTO COURTESY OF THE CHARLOTTE CONVENTION CENTER

*Celebrate the city's differences, yet come together to create an atmosphere conducive to business and recreation while in Charlotte.*

*Individuals from all corners of the US and around the world create the diverse population. Diversity extends into its business, neighborhoods, attractions, and restaurants including more than 100 within walking distance of the Charlotte Convention Center.*

*More than half of the US population can reach Charlotte in only two hours by air travel and one day by vehicle.*

*Contribute to the great things happening in Charlotte.*



**Plan to attend the  
TMS 2004 Annual Meeting & Exhibition.**



# SPECIAL LECTURES/LUNCHEONS/DINNERS

## YOUNG LEADERS EXTRACTIVE METALLURGY TUTORIAL

Date: Monday, March 15, 2004 ■ Time: 12:00 pm to 2:00 pm

Location: Westin Charlotte Hotel

*Optional box lunch for \$25 may be purchased via the TMS 2004 Annual Meeting & Exhibition Registration form.*

## EXTRACTION & PROCESSING DIVISION LUNCHEON LECTURER

Tuesday, March 16, 2004

### Extractive Metallurgy Today and Tomorrow – An Academic's Perspective

Presented by: Patrick R. Taylor, Colorado School of Mines

#### About the topic:

Extractive metallurgy, as an academic discipline in the USA, has changed significantly over the past 25 years. The ability to attract students, faculty and research funding in this area has decreased significantly due primarily to both social and economic considerations. Schools such as the Colorado School of Mines are making an effort to maintain expertise in this field by reaching out to the mining, minerals and metals industries in terms of discussions on current industry needs for research, testing and new trained professionals and how they can work together to help each other. This talk will discuss how the field has changed, from an academic perspective; the constraints that have forced many schools with historically significant mining related extractive metallurgy programs to abandon their programs; and how the field can adapt itself to serve both these industries and academia. Examples of how academic extractive metallurgist (and mineral processors) have been successful by adapting their research and teaching to include related topics such as: recycle, waste minimization, environmental engineering and chemical processing of new materials while maintaining capabilities in extractive metallurgy and mineral processing will be presented. A view of the future of our field will be discussed.



#### About the presenter:

**Patrick R. Taylor** is the George S. Ansell Chair Distinguished Professor of Chemical Metallurgy at the Colorado School of Mines. He received BS degrees in both Metallurgical Engineering and Mathematics and a Ph.D. in Metallurgical Engineering from the Colorado School of Mines. He was previously Professor and Head of the Department of Metallurgical and Mining Engineering at the University of Idaho and the Fred N. Peebles Professor and Head of the Department of Materials Science and Engineering at the University of Tennessee. Professor Taylor is the author of more than 135 technical publications, holds six patents and has supervised research for more than 50 graduate students. He is a registered professional engineer. Prof. Taylor is currently serving TMS as: Chair – Process Fundamentals Committee and Chair – Waste Minimization Committee. He has served TMS as a member of the following committees: Organizing Chair - TMS Fall Meeting for Process and Extractive Metallurgy 1985; Review and Awards Subcommittee; Chair - EPD Science/Technology Best Paper & Lecturer Awards Committee; Chair - Continuing Education Committee; Organized short courses; Chair - Professional Registration Committee; Education Committee; Chair - TMS-EPD Publications; Editor - EPD Congress.

*Luncheon tickets are \$35 and may be purchased via the TMS 2004 Annual Meeting & Exhibition Registration form.*

## LIGHT METALS DIVISION LUNCHEON LECTURER

Wednesday March 17, 2004

### Assuring Continued Recyclability of Light Metals

Presented by: Adam Gesing, Huron Valley Steel Corp.,

#### About the topic:

This is an update on technologies and issues in recycling, both current and future, with a light metals flavor. Discussion includes the existing global recycling system, the role of the light metals in this system and interactions between different types of recyclables and different sections of the global market. A review of current light metal recycling technologies and emerging technologies that are designed to ensure the continued complete recyclability of light metals will be given.



#### About the presenter:

**Adam Jan Gesing** is Director of Research and Development for Huron Valley Steel

Corporation (Belleville, Michigan), one of the world's largest processors of nonferrous scrap. Since joining HVS in 1996, Dr. Gesing and his R&D team have been developing scrap preparation and metal sorting technologies, including aspects such as shredding, sizing, sink-float, magnets, eddy current, color sorting, and OES-based alloy sorting.

From 1973 to 1996, Dr. Gesing worked for Alcan International Limited, Kingston Research and Development Center, in Ontario, Canada, primarily on aluminum and magnesium reduction, ceramic electrode materials, metal-ceramic composites, aluminum recycling and remelting.

He holds a Doctorate in Materials Science from the Pennsylvania State University, and a BSc in Metallurgy and Materials Science from the University of Toronto.

*Luncheon tickets are \$35 and may be purchased via the TMS 2004 Annual Meeting & Exhibition Registration form.*



*In conjunction with the symposium:  
The Didier de Fontaine Symposium on the Thermodynamics of Alloys*

### **DIDIER DE FONTAINE HONORARY DINNER**

Monday, March 15, 2004  
Westin Charlotte Hotel  
*Sponsored by:* Computer Simulation Committee

Honoring the seminal contributions of Didier de Fontaine to the theory of alloys over the last 40 years. His many contributions are in the areas of crystallography, ordering reactions, and phase separation; using various techniques for the calculation of phase equilibria by combined first principles electronic band structure and statistical mechanical methods. The symposium will address basic issues of thermodynamic equilibrium in alloys that have been the

center of Professor De Fontaine's career. Topics and techniques of relevance include: Cluster expansion techniques as well as first principles atomistic techniques for the calculation of equilibrium structures and ordering phenomena in alloys, and the application of advanced X-Ray/neutron scattering and electron-microscopy methods in studies of alloy phase transformations.

*Dinner tickets are \$60 and may be purchased via the TMS 2004 Annual Meeting & Exhibition Registration form.*

*In conjunction with the symposium: R.J. Arsenault Symposium on Materials Testing and Evaluation*

### **R.J. ARSENAULT HONORARY DINNER**

Monday, March 15, 2004  
Westin Charlotte Hotel  
*Sponsored by:* Structural Materials Division  
SMD – Mechanical Behavior of Materials (Jt. ASM-MSCTS)

The symposium and dinner is held in honor of Prof. R.J. Arsenault, following his retirement from the University of Maryland. Advances in instrumentation in existing materials testing and evaluation techniques, as well as new approaches to materials testing and evaluation, are increasingly becoming necessary with the continuously decreasing size of engineering structures and the emergence of new materials in bulk, coating, thin-film, line and dot forms. The symposium will seek to provide a broad forum for

examining current research and future directions in materials testing and evaluation. The techniques will assess a range of geometrical and microstructural length scales in various material classes. Aspects of non-destructive and online monitoring techniques will also be addressed. Representative techniques include (but are not limited to): x-ray and neutron diffraction, instrumented indentation, magnetic, electromagnetic, acoustic, optical and thermographic techniques, etc.

*Dinner tickets are \$60 and may be purchased via the TMS 2004 Annual Meeting & Exhibition Registration form.*

*In conjunction with the symposium:  
Roytburd Symposium on Polydomain Structures*

### **PROF. A.L. ROYTBURD HONORARY DINNER**

Wednesday, March 17, 2004  
Westin Charlotte Hotel  
*Sponsored by:* TMS, MPMD-Phase Transformations Committee  
(Jt. ASM-MSCTS)

The symposium, held in honor of A.L. Roytburd, focuses on the theory, modeling and experimental studies of polydomain structures in materials. Topics include polydomain structures in bulk materials and in constrained films as a result of diffusionless phase transformations (martensitic, ferroelastic, ferroelectric and ordering), thermodynamics of coherent phase transformations, and phase-field modeling of martensitic and ferroelectric phase transformations in bulk materials and films.

*Dinner tickets are \$60 and may be purchased via the TMS 2004 Annual Meeting & Exhibition Registration form.*

*In conjunction with the symposium:  
Symposium in Honor of Professor Roger D. Doherty*

### **PROF. ROGER D. DOHERTY HONORARY DINNER**

Monday, March 15, 2004  
Westin Charlotte Hotel  
*Sponsored by:* Light Metals Division  
Aluminum Association  
MPMD – Solidification Committee  
SMD – Physical Metallurgical Committee  
LMD – Aluminum Committee

The symposium will address several issues of long standing importance in physical metallurgy that have been highlights of Prof. Doherty's career. These include phase transformations, solidification, recrystallization, texture development, microstructural stability and work hardening.

*Dinner tickets are \$60 and may be purchased via the TMS 2004 Annual Meeting & Exhibition Registration form.*

## TMS - AIME DINNER AND AWARDS PRESENTATION

With Installation of 2004 TMS President



Dan J. Thoma  
2003 TMS President



Gregory J. Hildeman  
2004 TMS President



Robert Wagoner  
2003 AIME President



Robert Freas  
2004 AIME President

The combined TMS and AIME Dinner and Awards Presentations will be held at 7:00 PM, Tuesday, March 16, 2004 at the Westin Charlotte Hotel. The highlight of the TMS 2004 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 Institute award recipients will be followed by the annual address to the Society by 2003 President Dan J. Thoma, who will then introduce Gregory J. Hildeman, the 2004 President.

Gregory Hildeman is currently the Manager of the Ingot and Solidification Platform. In this position, Greg is responsible for leading Alcoa's worldwide Ingot Technology activities in the areas of recycling, melting, metal treatment, casting and solidification. His technical interests include spray deposition, aluminum powder metallurgy and rapid solidification, focusing on

processing/microstructure/property relationships and development of dispersion-strengthened elevated temperature alloys and high-strength 7XXX aluminum alloys for commercial aerospace applications. Dr. Hildeman earned his B.S. and M.S. in Metallurgical Engineering from the University of Wisconsin, Milwaukee; and a Sc.D. in Metallurgy from the Massachusetts Institute of Technology.

He has been a member of TMS since 1981. He recently served as the TMS Financial Planning Officer after serving several years on the Financial Planning Committee and as a member of the Public and Governmental Affairs Committee. He has also served as chair of the Powder Metallurgy Committee, as *JOM* advisor, and as a member of the Publications Coordinating Committee.

*Banquet tickets are \$60 and may be purchased via the TMS 2004 Annual Meeting & Exhibition Registration form.*

**TMS**



## 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.

**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**

**2008 – New Orleans, LA ..... March 9–13..... Ernest N. Morial Convention Center**

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

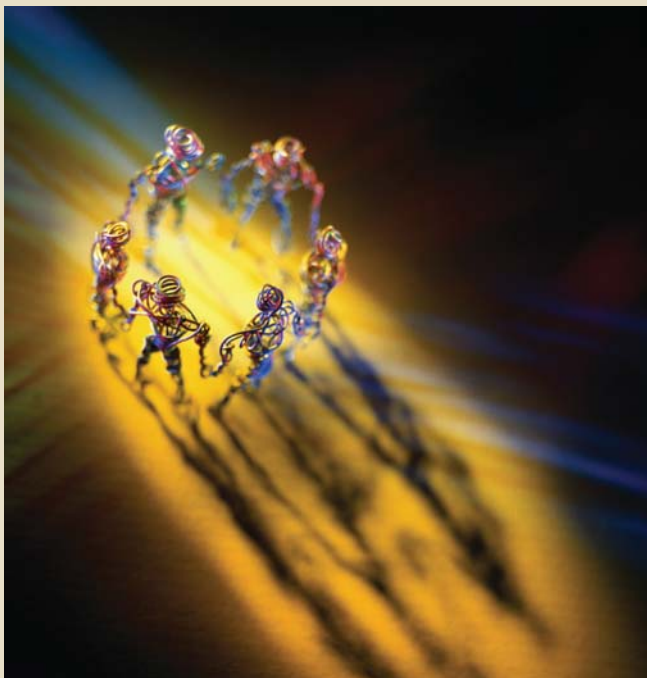
TMS Meeting Services Department  
184 Thorn Hill Road  
Warrendale, PA 15086  
Telephone: (724)776-9000, ext. 243  
Fax: (724)776-3770  
E-mail: [mtgserv@tms.org](mailto:mtgserv@tms.org)  
Web: <http://www.tms.org/Meetings/Meetings.html>

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

*All attendees and authors of the 133rd TMS 2004 Annual Meeting & Exhibition, who register at the non-member or non-member author fee, will automatically receive a one-year, complimentary associate membership for 2004!*

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

Your membership card and new member packet, along with a postal card asking for additional information for our records will be sent to you immediately after the meeting. Your associate membership will be activated upon completion of your registration form and payment of the non-member or non-member author registration fee. Please remember to include your birthday on the registration form to access the Members-Only section of the website. If you have any questions, please contact TMS Member Services at 724-776-9000 ext. 241.



## **\*\*FEATURED EXHIBIT HALL ACTIVITY\*\*** **The NASCAR Racing Simulator**

sponsored by

Casting the future of refractory technology



### *Be a part of Charlotte's NASCAR excitement!*

Experience a totally interactive simulated driving experience—“Drive” a genuine retired NASCAR vehicle....

This full-size, virtual motion, totally interactive NASCAR racing simulator will put you in the driver's seat to experience the thrills of NASCAR racing. TMS' Nascar simulator will “run laps” for 3-4 minutes, with the reaction of the car changing as the tires heat up on the most popular NASCAR tracks. The driver feels the excitement of high speed turns, hears the sounds, and feels the motion while “driving” a genuine, full-size retired NASCAR vehicle.

Visit the Exhibit Hall for all of the excitement. A daily “best driver” contest will take place, with exciting prizes awarded each evening.

The city of Charlotte boasts the Lowe's Motor Speedway, the largest sports facility in the Southeast, and the Queen City is located in the middle of North Carolina's stock car country.

Be a part of the racing excitement.....experience the Racing Simulator..... and see the show!



# THE TMS 2004 ANNUAL MEETING EXHIBITION

The TMS 2004 Annual Meeting Exhibition will feature over 20,000 square feet of exhibits with displays by more than 160 exhibiting companies. A sampling of the expanded diverse and complementary products, services and technologies you'll find at the TMS 2004 Annual Meeting Exhibition include:

- Air Pollution Control Equipment
- Alloy, rare earth, precious metals, minerals & chemical producers and suppliers
- Aluminum production technology and equipment
- Automation
- Carbon Technology and Supplies
- Casting
- Clothing – Protective
- Coatings, Thin Films and Surface Modification
- Combustion/Furnace Technology
- Corrosion/Surface Treatment
- Engineering, Consulting, Contractors
- Grain Refiners/ Hardeners
- HF Measurement Systems – Pot Rooms/Stacks
- Industrial gases
- Industrial Process Control
- Instrumentation, Measurement, Microscopy

#### Equipment:

- Electron Backscatter Diffraction
- Grain Boundary
- Materials Analysis/Characterization
- Metallographic preparation
- Nano-mechanical testing
- Spectroscopy
- Surface Analysis
- Thermophysical properties
- Temperature
- X-ray Fluorescence
- Lithium processing and applications
- Magnesium production, processes and properties
- Molten Metal Filtration, Pumps
- National laboratories
- Publishers
- Recycling/Scrap Processing
  - Dross Handling
  - Secondary Smelting & Refining
- Refractory & Insulating Products
- Research & Development
- Software/Computer:
  - Design
  - Materials Information
  - Modeling
  - Phase diagram
  - Process simulation
  - Thermodynamic calculation
- Titanium production and processing technology and much more!

The TMS 2004 Annual Meeting Exhibition will “bring it all together” by presenting the latest metals and materials innovations in an ideal face-to-face business environment. The TMS 2004 Annual Meeting Exhibition is a primary source for practical, problem-solving solutions for today’s production, processing and research challenges! Expanded technologies will be showcased in the exhibition.

**Location: Charlotte Convention Center, Exhibit Hall B**

#### Show Dates and Hours:

Monday, March 15, 2004 ..... 12:00 Noon – 6:00 PM  
Tuesday, March 16, 2004 ..... 9:30 AM – 5:30 PM  
Wednesday, March 17, 2004 ..... 9:30 AM – 3:00 PM

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



## Be sure to make plans to attend the following special events during the TMS 2004 Annual Meeting Exhibition:

### Hosted Grand Opening Reception—

*An opportunity to visit the booths while enjoying a hosted reception*

Monday ..... 5:00 – 6:00 PM

### Dine-Around Lunch—

*Registrants can enjoy a hosted lunch in the exhibit hall while visiting the booths*

Tuesday ..... 11:45 – 1:15 PM

### Wednesday Snack—

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

Wednesday ..... 12:15 – 2:00 PM

# FLOORPLAN— CHARLOTTE CONVENTION CENTER, HALL B



## Exhibitor List: as of 9/24/03

Company	Booth Number	Company	Booth Number
ABB Inc .....	222	Metal Bulletin LLC .....	606
AISCO Systems, Inc. ....	512	Metallurgical Society of CIM .....	612
Aleastur of America, LLC .....	214	Metaullics Systems Co LP .....	308
Almeq Norway AS .....	110	MEXTRA Eng. Extrativa de Metals .....	608
ALTECH and Partners.....	800	Mid-Mountain Materials.....	715
Aluminium International Journal.....	230	MINTEQ International Inc .....	707
Aluminium International Today .....	503	Mobiquip .....	501
American Metal Market .....	606	Molten Metal Equipment Innovations .....	613
Aluminium Times.....	713	Murlin Chemical Inc .....	407
Anter Corporation.....	502	NKM/Noell .....	622
AUMUND Group .....	338	Norsmelt.....	429
B&P Process Equipment Systems LLC .....	617	North American Mfg Co Ltd.....	124
BDH Industries Inc .....	707	Opsis Inc .....	332
BHA Group, Inc .....	409	Outokumpu Aluminium Technology.....	512
Bloom Engineering Co .....	515	Parker Hannifin .....	231
BMP Bi-Metal Products .....	436	PCE Ltda.....	706
BROCHOT SA .....	539	Pechiney Group .....	422
Buehler Ltd.....	336	Process Engineering Resources Inc.....	712
C.A. Picard International .....	238	Pyrotek Inc .....	314
CSA (Cambridge Scientific Abstracts).....	536	R&D Carbon Ltd.....	522
Canadian Overhead Handling.....	624	Resco Products.....	532
CompuTherm LLC .....	130	Riedhammer GmbH .....	700
Core Furnace Systems Inc .....	919	Saint Gobain Ceramics .....	223
Corus Ceramics Research Centre .....	128	SELEE Corporation.....	402
Davy Process Technology (Switzerland) AG.....	522	SETARAM .....	337
Deutsche Gesellschaft für Materialkunde .....	437	Silver Needle Inc.....	237
DMC Clad Metal.....	739	Skamol Americas Inc .....	329
Dross Engineering .....	709	Solios Group .....	408
ECL Company.....	738	STAS .....	120
EDAX Inc .....	822	Stellar Materials, Inc .....	428
Eirich Machines Inc.....	530	Techmo Car s.p.a. ....	228
GE Advanced Ceramics .....	228	Thermal Ceramics.....	106
GE Water Technologies .....	229	Thermal Systems America .....	722
GLAMA Maschinenbau GmbH.....	623	Thermcon Ovens BV.....	236
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To obtain an exhibit prospectus or inquire about space reservation, please contact **Cindy A. Wilson**, TMS Exhibits Coordinator; telephone (724) 776-9000, ext. 231; fax (724) 776-3770; e-mail [wilson@tms.org](mailto:wilson@tms.org) or **Diane Scheuring**, TMS Member & Marketing Services Coordinator, telephone (724) 776-9000, ext. 220; fax (724) 776-3770; e-mail [dscheuring@tms.org](mailto:dscheuring@tms.org).



# SHORT COURSES

On pages 25–32, TMS offers a selection of learning intensive courses designed to enhance your technical and professional expertise. Programmed in conjunction with the 133<sup>rd</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.

## Registration

To register for a course, please use the TMS 2004 Annual Meeting & Exhibition Registration form in this brochure. All courses will be held on the Sunday prior to the meeting, March 14, 2004, at the Westin Charlotte Hotel.

You may register any time prior to the TMS 2004 Annual Meeting & Exhibition and on site, but if you register by the advanced registration deadline of February 16, 2004 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 16, 2004. A \$50 processing fee will be charged for all cancellations; this processing fee is separate from and in addition to the fee charged for cancellation of meeting registrations. Absolutely no refunds will be issued after the February 16, 2004 deadline.

**Note to USA 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 tax advisor.

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

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

## METAL MATRIX COMPOSITES

Sunday, March 14, 2004 ■ 8:30 AM to 5:00 PM

Sponsored by: TMS Structural Materials Division

Registration Fees: Members \$475.00 ■ Non-Members \$560.00

Presented by:

Dr. Warren Hunt, *Aluminum Consultants Group*

### Who should attend:

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

### Course overview:

Metal matrix composites have been under development for nearly four decades and are now seeing commercial application in a range of applications in the automotive, aerospace and defense, electronics, and consumer and industrial products markets. This course provides both broad background as well as in-depth coverage of metal matrix composite technology. An introduction on MMCs is presented, with a focus on the types of MMCs, characteristics of constituent materials utilized, nomenclature, and comparison to competing materials. This is followed by an extensive review of the processing methods for MMCs. Included are the primary processing routes including liquid metal mixing, liquid metal infiltration, and solid state processes, along with downstream manufacturing processes such as extrusion, forging, joining, and machining. Both current and emerging processing methods will be covered. With an understanding of the constituent materials and processing methods for MMCs, their properties can be discussed and understood. Mechanical and physical properties for both continuous fiber and discontinuously reinforced materials are reviewed, including properties for commercially available MMC products. The course will conclude with a review of past, present, and future applications of MMCs that utilize the wide range of properties possible with these materials. While the course will have a primary emphasis on aluminum-based MMCs, materials with other metal matrices will be discussed as well.



### About the Presenter:

**Warren H. Hunt, Jr.**, is president of the Aluminum Consultants Group and adjunct associate professor at Case Western Reserve University. Previously, Hunt worked at the Alcoa Technical Center, first in various engineering positions and then as core competency leader in materials design. Hunt earned a materials science and engineering degree from Vanderbilt

University, an M.S. in metallurgical engineering and materials science from Carnegie Mellon University, and a Ph.D. in materials science and engineering from Carnegie Mellon University.

Hunt recently served as chair of the TMS Structural Materials Division and has served as chair of the ASM/TMS Composite Materials Committee. He currently serves as the Director of Public & Governmental Affairs for TMS. He is a member of ASTM, Society of Automotive Engineers, American Powder Metallurgy Institute, Society for the Advancement of Material and Process Engineering, North American Die Casting Association, and International Microelectronics and Packaging.

# INTRODUCTION TO NANOMANUFACTURING AND NANOTECHNOLOGY

Sunday, March 14, 2004 ■ 8:30 AM to 5:00 PM

Sponsored by: TMS Materials Processing and Manufacturing Division  
Registration Fees: Members \$475.00 ■ Non-Members \$560.00

Presented by:

Dr. Arvind Agarwal, *Florida International University*  
Dr. Sudipta Seal, *University of Central Florida*

## Who should attend:

To understand the science at nanoscale, it requires merging of sciences from atomic levels (including physicist, chemists and biologists) to micro and macro level (engineers). Nanotechnology is the prominent example of being an interdisciplinary science, which is of great importance to scientific as well as industrial community. This course is designed to supplement the learning needs of engineers, technologists, managers, and technicians from all backgrounds to keep them update about the current advances in the field of Nanomanufacturing. Graduate students and other budding professionals in the field of Nanomanufacturing will also benefit greatly from this course by honing their current skills. This course will also assist in developing acumen for the future challenges offered in the burgeoning Nanotechnology area.

## Course overview:

Nanotechnology is the science to engineer next generation materials, smart functional devices and structures at a nanometer scale, which is a billionth of a meter. Nanosized particles can be arranged in a variety of configuration to obtain extremely useful materials properties. Some of the key applications of nanomaterials include; cosmetics, pigments for paints, cellular antennas, brazing alloys, filters and membranes, magnetic devices, biomedical sensors and drug delivery systems, nanoelectronics – (MEMS/flat panels) and optics, nozzles, wear resistant coatings, weapons, battery and fuel cell electrodes, thermal management, automotive, and aerospace components. The economic impact as estimated by the National Science Foundation is over \$900 billion for different industries in next 10-15 years.

In an effort to harness the advantages offered by nanosize particles, it is extremely essential to understand the assembly or manufacturing techniques at nanoscale. The technology for Nanomanufacturing can be easily termed as adolescent, if not mature. There is a lack of manpower knowledgeable in nanotechnology and Nanomanufacturing. Knowledge in the Universities is also in its fledgling stages as the new courses are being designed and intensive research is being conducted only in last 5 year. Hence, there is an urgent need to fill the vacuum created due to such lack of knowledge. This one-day short course will provide an overview of the nanotechnology and its societal impact, the major Nanomanufacturing processes, and focus on the selection of a suitable manufacturing processes and materials for specific design and applications. This course will bring an understanding of engineering the nanomaterials with an application oriented philosophy without going deep into mathematical and analytical complexities of Nanomanufacturing.

## Learning Objectives:

- Nanotechnology and its societal impact through biomedical, electronic and structural applications.
- How to synthesize nano particles?
- A host of Nanoassembly and Nanomanufacturing techniques, their merits, limitations and selection criterion for different applications.
- Nanoscale Characterization.
- Understanding of future challenges.

## Course Contents:

- Nanotechnology: What and Why?
- Problems associated with Nanomanufacturing
- Nanomaterials:
  - Some important nanomaterials e.g. Carbon Nanotubes, ZnO etc.
  - Nano particles synthesis techniques
- Consolidation of Bulk Nanostructured Materials, Coatings and Composites
  - Sintering
  - Plasma based techniques
  - Laser based techniques
  - Sol-Gel based process
  - Cold spray
  - High rate deformation
- Fabrication of Devices and Nanoarchitecture
  - Electron beam technique
  - Focused Ion beam (FIB)
  - Biotemplating
  - Near net shape manufacturing/Rapid Prototyping
- Nano Characterization techniques and issues
- Some case studies and future insight



## About the Presenters:

**Sudipta Seal** received his Ph.D. degree in 1996 from the University of Wisconsin followed by an MS from University of Sheffield UK. He finished his undergraduate from Indian Institute of Technology (IIT – India) in Metallurgical & Materials Engineering – 1990. He also worked in the TATA Iron Steel Co (TISCO) sector.

After his Ph.D. he joined Advanced Light Source, Lawrence Berkeley National Laboratory, University of California, Berkeley as a post doctoral fellow in Materials science and synchrotron radiation X-ray photoelectron spectroscopy of advanced materials. In 1997 fall, he joined the faculty in AMPAC and the Department of Mechanical, Materials, and Aerospace Engineering, UCF and became an Associate Professor in 2002. He is also an adjunct faculty member in Biomolecular Science Department and serving as a nanoinitiative Coordinator for UCF. Professor Seal's work has been recognized through various awards. He is in the editorial board of nanoscience and nanotechnology, Reviews in Advanced Materials, Chair of the Surface Engineering sector for JOM, in the Review Board of Metallurgical Transactions. In the field of nanoscience and materials processing, he has collaborations with university of New South Wales, Sydney, Queensland, Australia, NIMS – Japan, IIT – India, Polish Academy of Sciences – Poland, University of Groningen – Netherlands.

Professor Seal has six years of teaching and research experience in the field of nanoscience and nanotechnology and almost ten years in



Sudipta Seal



Arvind Agarwal

the area of materials processing and surface engineering. His projects are funded by National Science Foundation (NSF), National Institute of Health (NIH), Office of Naval Research (ONR), NASA and many Industries.

Dr. Seal has published over 135 research papers, books and book chapters in the area of surface science and engineering and nanotechnology. He has also delivered more than 150 invited lectures and research presentations in USA and abroad and is the recipient of the 2002 ONR Young Investigator Award (ONR-YIP) and Distinguished ASM-IIM lecturer Award from ASM 2003. He has received the Exemplary Service Award from the TMS Materials Processing and Manufacturing Division as a Surface Engineering Committee chair and received the best student Research Paper Award from Applied Surface Science Division of AVS- 1996. He is an active member of ASM, TMS, MRS, ECS, and AVS societies.

**Arvind Agarwal** is an Assistant Professor in the Department of Mechanical and Materials Engineering at the Florida International University, Miami. He received his B.S. and M.S. degrees from Indian Institute of Technology (IIT), Kanpur and Ph.D. degree from University of Tennessee, Knoxville. Dr. Agarwal has 10 years of experience in the academic and industrial research environment. His current research interests include: processing of bulk nanostructured materials, near net shape processing and rapid prototyping, thermal Spray techniques and ultrahigh temperature ceramic coatings and composites. His earlier research was focused on laser materials processing and synthesis and pulsed electrode surfacing.

Dr. Agarwal has published more than 40 research papers and co-edited 1 book. He has been very active professionally in organizing TMS and ASM symposium on surface engineering. He is the co-organizer for "Surfaces and Interfaces in Nanostructured Materials" symposium to be held at Annual TMS Meeting, Charlotte, 2004. Also, Dr. Agarwal is the primary organizer and editor of "Surface Engineering in Materials Science-III" during Annual TMS Meeting, San Francisco, February 2005.

## MATERIALS EDUCATION TO REVITALIZE THE WORKFORCE

### A part of the Hot-Topic Track – Building MSE Synergies

*Sponsored by the TMS Public and Governmental Affairs Committee and the TMS Education Committee*

This symposium will feature invited presentations that focus on building synergies in education and outreach to attract the best and brightest to future careers in Materials Science and Engineering. We recognize that the "graying" workforce in Materials Science and Engineering should be revitalized with a fresh crop of highly capable and motivated professionals that can face the new challenges for materials in the future. The presentations will include a series of model educational efforts at all academic levels that are targeted at increasing awareness about and enrollment in materials-related fields at the undergraduate and graduate levels, as well as in continuing education programs. It is hoped that a concentrated interchange of beneficial ideas and practices in materials science and engineering

education among professional educators and policy makers can stimulate more coordinated action at the K-12 and college/university levels. The goals are for several groups involved in materials education to learn about the possibilities for parallel activities and collaboration. Professional educators will become aware of potential sources of support. Funding organizations and policy makers will become acquainted with the needs and opportunities in materials education.

A poster session will be linked with an open reception for all participants and attendees to facilitate extended discussions and to allow more examples of projects in this area to be exhibited



## TECHNOLOGY TRANSFER SEMINAR

Sunday, March 14, 2004 ■ 8:30 AM to 5:00 PM

Sponsored by: TMS Materials Processing  
and Manufacturing Division

Registration Fees: Members \$475.00 ■ Non-Members \$560.00

*Presented by:*

Gene Merrell, *University of Idaho*

Nigel Leavy, *Oxford Corporate Management*

John Dickens, *Dimuba*

Dave Woolstencroft, *Matrice*

### Who should attend:

This 1-day course is intended for managers, engineers, materials engineers, scientists, and any other people who are interested in gaining an understanding of the process and strategies available for successful technology transfer and mechanisms for maximizing commercial exploitation for new developments.

### Course overview:

A wise man, it is said, learns from his experience - a clever man learns from the experience of others! There is a large amount of research and development undertaken, which never sees useful and productive exploitation. The one day course provides an opportunity for experts in modern materials processing and development from around the world to exchange ideas and experiences on the exploitation of intellectual property, commercial ideas, licensing and listen to experts in the field of technology transfer.

In this extremely competitive world the commercial elements can gain from research work already undertaken to improve their product and processes and the academic element can gain from the funds that can be generated by this. A number of successful strategies exist to achieve this ranging from strategic alliances to spin off companies and the purpose of this conference is to consider these issues and learn from successful outcomes.

This one day event is designed to bring the experience of others in protecting and exploiting research & development and raising funds for further work and rewarding the innovators. Aspects such as Transferring Technology, Licensing, Strategic Alliances, and Raising Funds will be examined.

### About the Presenters:

**Gene A. Merrell**, (gmerrell@uidaho.edu) Ph.D., is Assistant Vice President for Research and Chief Technology Transfer Officer for the University of Idaho. Gene joined the university in 1999 after spending twenty (20) years in the chemical industry. Most recently, he was Vice President Research & Development with BetzDearborn, Inc. (now GE Betz). Gene received his Ph.D. in Chemistry from Washington State University in 1979. Gene's responsibilities at the University of Idaho are primarily associated with industry – university research collaborations, technology transfer, and intellectual property. Gene facilitates the transfer of the technology with the Idaho Research Foundation and ultimately to the the public benefit. Technology transfer is a major driver in his management oversight of the University of Idaho Research Park in Post Falls.

**Nigel E. Leavy** (nigelleavy@msn.com) F.C.A, Oxford Corporate Management - His early career was spent in high technology instrumentation businesses mainly in the scientific and medical sectors



**Gene A. Merrell**



**Nigel E. Leavy**



**John N. Dickens**



**Dave Woolstencroft**

on a multinational basis. During this period, he held both general and financial directorships including mergers and acquisition executive positions. In 1987, he formed his own corporate consultancy. Since then he has operated as a consulting interim executive having completed numerous assignments on behalf of venture capitalists and leading multi-nationals both at chief executive, managing and finance director levels. The management of change, restructuring, and corporate recovery have been his specialties together with extensive experience of corporate planning, mergers and acquisitions and post acquisition strategy implementation. He has a broad understanding and knowledge of, UK corporate financial institutions including venture capitalists, merchant banks, and debt/equity partners.

**John N. Dickens** (John@dimuba.com)- John trained as an engineer and spent over 30 years with the COSWORTH group seeing its growth from 32 employees in 1964 at Northampton, England to over 1300 in 1995 with additional facilities at Los Angeles & Novi (USA), Worcester (England), Wellingborough (England). Much of this time was spent developing Quality Systems to suit the fast-changing engineering business, as it moved from exotic racing engines through contract manufacturing and ultimately to become a full service supplier of niche-volume engines to Automotive Manufacturer's.

As the 'non-racing' business evolved, John moved to Commercial Engineering. Later, as facilities grew to match demand, he negotiated many design programs around the world and complete engines were designed and manufactured.

**Dave Woolstencroft** (dave@materials-technology.com) PhD. Dave is publishing Editor of Materials Technology, a journal read in over 30 countries globally. Dave was trained as a physicist and has over 30 years working experience in materials and business development roles. He spent a large part of his working life as an aerospace engineer involved in both materials & manufacturing development and project management on large international aerostructures projects.

He has a number of publications to his name as well as national and international patents in the materials and related field. His latest involvement is with a company that has developed a new form of fire and heat protection for bolted steel framed structures and this has moved from the development to the commercialization stage recently and is now in the process of being exploited on an international basis.

# SMELTER GRADE ALUMINA FROM THE SMELTING PERSPECTIVE

Sunday, March 14, 2004 ■ 8:30 AM to 5:00 PM

Sponsored by: TMS Light Metals Division

Registration Fees: Members \$475.00 ■ Non-Members \$560.00

*Presented by:*

James B Metson, *Light Metals Research Centre,*

*The University of Auckland*

Margaret M. Hyland, *Light Metals Research Centre,*

*The University of Auckland*

Mark P. Taylor, *Light Metals Research Centre,*

*The University of Auckland*

*with contributions by:*

Alton Tabereaux, *Manager Process Technology,*

*Alcoa Primary Metals*

Barry Welch, *Light Metals Research Centre,*

*University of Auckland and University of New South Wales*

Ivan Anich, *General Manager Process Improvement,*

*Comalco Mining and Refining*

Steve Lindsay, *Manager Process Technology,*

*Alcoa Primary Metals*

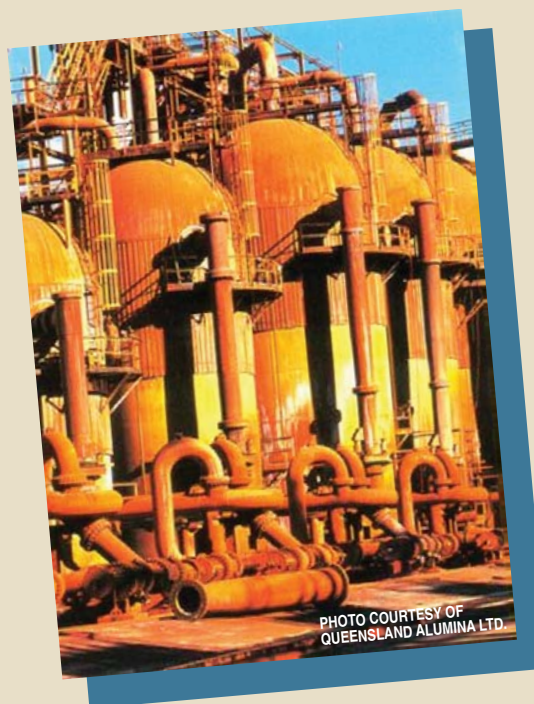
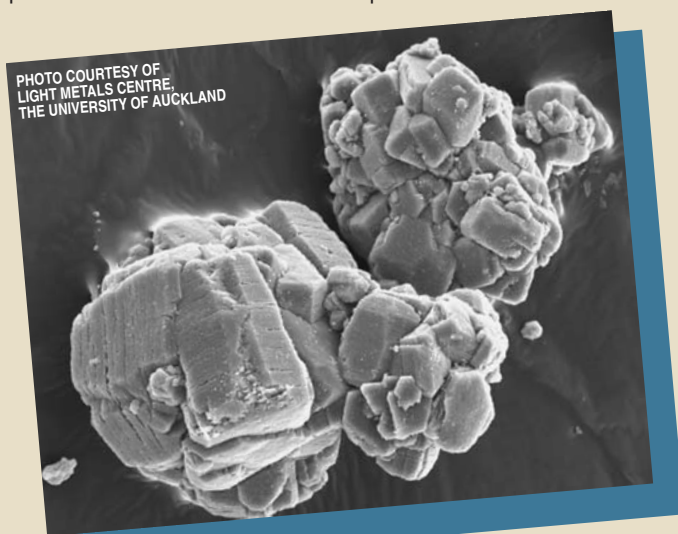
## Who should attend:

This 1 day course is intended for managers, supervisors, engineers and scientists employed in either research or operations associated with aluminum smelting, as well as technical and management personnel in alumina refineries and smelter alumina Purchasing Officers.

## Course overview:

The course seeks to advance the understanding of the structure of smelter grade alumina, how the properties change with calcination and other production techniques. Lectures will examine the importance of various properties on cell operation including solubility, role and transport of impurities, changes in fines content during handling, the role of structure in emissions control, role in anode cover material, the relationship between structure and behavior in handling and in storage hoppers. It will also discuss the balance between the demands of dry scrubbing and smelter requirements.

The course will be a blend of lectures, discussions and brief presentations from invited industrial specialists.



## About the Presenters:

**James Metson** graduated with a PhD in Chemistry from Victoria University of Wellington in 1980 and after a stint in Canada, joined the Department of Chemistry at The University of Auckland in 1985. He has since held positions as Director of the Research Centre for Surface and Materials Science, Acting Director of the Light Metals Research Centre during its formation and Associate Deputy Vice-Chancellor (Research) for the University.

His research work, has involved areas such as dry-scrubbing technology and studies of cell emissions, electrolyte chemistry and electrode reactivity. He was a TMS Light Metals award winner in 1994 and winner of the New Zealand 1995 Shell Prize for Industrial Chemistry. Dr Metson has presented more than 20 plenary or keynote lectures, has over 100 research publications and 60 technical reports, many dealing with applications in the aluminium industry

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

**Mark Taylor** graduated from Auckland University in 1984 with a PhD in Chemical and Materials Engineering. His career with the Comalco organization spanned 18 years in a variety of research, technical and operational roles.

He commenced at the Comalco Research Centre in Melbourne, moving into plant management at New Zealand Aluminium Smelters, Tiwai, Invercargill. During this time, Dr. Taylor was the Implementation Manager for the \$450m smelter upgrade and then Potroom Manager. Following this he managed the smelter for a six month period

before moving into the role of General Manager Technical for the Comalco Group. Dr Taylor directed Comalco's reduction research and development and provided technical support to Comalco's 3 operational smelters. Mark was appointed General Manager Operations in 2000 to Comalco's largest smelting operation, Boyne Smelters Ltd in Central Queensland.

Mark returned to the University of Auckland in January 2003 as the Director, Light Metals Research Centre and is engaged in light metals research and consulting globally. He has over forty publications.

**Ivan Anich** is currently General Manager Process Improvement, with Comalco Mining & Refining. Responsibilities include managing Comalco's interests in the operations of Queensland Alumina and Eurallumina (Sardinia). Other responsibilities include the Mining & Refining research group, planning and processing of Weipa bauxite, technical support for bauxite and alumina sales and process aspects of the new Comalco Alumina Refinery (under construction). Before joining Comalco he spent 28 years with Alcoa in both operating and technology positions including 23 years in refinery roles. During his last five years with Alcoa Mr Anich was in the position of Alcoa World

Alumina Technical Manager based in Perth. He is the inaugural chairman of the Alumina Technology Roadmap Implementation Committee (2001 – 04).

**Barry Welch** is in his 40th year of research and development associated with aluminum smelting technology. He has worked in the industry as well as consulting, directing research programs, and publishing extensively on aspects of smelter technology.

**Alton Tabereaux** is Manager of Process Technology, Alcoa Primary Metals. He graduated with a Ph.D. in Chemistry from the University of Alabama in 1971. He worked in Research and Development at Reynolds Metals Company for 26 years. He has become an acclaimed world leader in cell diagnostics and operations as well as being a regular contributor to TMS Light Metals. He teaches in the TMS Industrial Aluminum Electrolysis course as well as the international course on Process Metallurgy of Aluminum held in Norway each year. He has obtained 15 US patents and published over 50 technical papers.

**Steve Lindsay** is Manager of Process Technology, Alcoa Primary Metals.

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*Sandia National Lab*



## COMPUTATIONAL MODELLING FOR THE MATERIALS PROFESSIONAL

Sunday, March 14, 2004 ■ 8:30 AM to 5:00 PM

Sponsored by: TMS Materials Processing  
and Manufacturing Division

Registration Fee: Members \$475.00 ■ Non-Members \$560.00

Presented by:

Prof. Chris Bailey, University of Greenwich, UK

Prof. Mark Cross, University of Greenwich, UK

### Who Should Attend:

This course will appeal to engineers, materials specialists, managers and students who want to learn more about computational modelling software tools for materials processing and reliability.

### Course Overview:

The aim of this course is to provide attendees with an overview of modelling techniques and associated software for simulating the processing and subsequent reliability of materials.

Processing of materials is governed by phenomena such as fluid flow, heat transfer, phase changes, chemical reactions, electromagnetics, stress and possibly their interactions. Software tools such as Computational Fluid Dynamics (CFD), Finite Element Analysis (FEA), etc, now exist and are used by many professionals in the materials industry. These tools allow engineers to pose "what if" questions at the design stage, where the results from analysis helps reduce the time from conceptual process/product design to implementation and manufacture.

This course will focus on the ability of these modelling tools and demonstrate this with real industrial examples. The mathematical content will be kept to a minimum. The course will detail:

1. Commercial computational modelling tools (CFD, FEA, etc)
2. Modelling across the length scales (Nano-Micro-Macro)
3. Optimisation and its integration with CFD and FEA.
4. Reliability and failure analysis
5. Inverse Analysis – the interaction between modelling and experimental data.
6. Real world applications that illustrate the above. For example Casting, Forging, Refining, Soldering, Product reliability, etc.



Chris Bailey



Mark Cross

### About the Presenters:

**Chris Bailey** is Professor of Computational Mechanics at the University of Greenwich. He holds a PhD in Mathematical Modelling and an MBA in Technology Management. After completing his PhD in 1988 he joined Carnegie Mellon University, Pittsburgh, and worked closely with the Steel industry, applying computational modelling methods to the continuous casting process. On returning to the UK he joined the Centre for Numerical Analysis and Process Analysis at the University of Greenwich. Prof. Bailey has worked closely with a number of materials sectors and has applied computational modelling to processes such as casting, forging, refining, mixing, lead free soldering, polymer extrusions, plus many others. He is a member of TMS, IEEE, IEE and a Fellow of the IMA. Prof. Bailey has published over 100 refereed papers on computational modelling.

**Mark Cross** is Professor of Computational Modelling and Director of the Centre for Numerical Modelling and Process Analysis at the University of Greenwich, London. His main research focus is in the computational modelling and analysis of materials/minerals/metals processing operations and his activities have covered the supporting numerical and software technologies as well as major applications in casting, reduction, smelting, forming and granular materials. In recent years he has focussed upon multi-physics and multi-scale modelling on high performance parallel computers, in a number of contexts, and has been involved in producing a number of industry standard tools, including the PHYSICA multi-physics modelling environment. He is the author of over 300 publications, has supervised over 40 PhD candidates and is the editor of the archival journal, Applied Mathematical Modelling, published by Elsevier.

## EMPLOYMENT REFERRAL BOARD

*An employment referral board will be located  
at the TMS Member Services Booth.*

*Attendees may leave their resumes  
and employers may post job openings.*

*Information and resume forms will be available at the display.*

# **IT'S NOT TOO SOON TO PLAN FORE!**

## **THE SIXTH ANNUAL TMS FOUNDATION GOLF CLASSIC**

### **SUNDAY, MARCH 14, 2004**

**AT THE SITE OF THE 133rd TMS 2004 ANNUAL MEETING & EXHIBITION**

*On Sunday, March 14, 2004 the Highland Creek Golf Club in Charlotte, North Carolina will be the home of the Sixth TMS Foundation Golf Classic. Highland Creek Golf Club offers the perfect golf setting. Designed with extra care to preserve the natural beauty of the area, the 18-hole championship course winds through towering trees, meandering creeks and has bent grass greens and Bermuda fairways. An added benefit is the new GPS Yardage System that will produce a tournament "Leaderboard" scoring summary! Players will be able to see how they stand in relation to the field as they play their round as well as seeing exact measurements from every position on the course. As the cart moves about the course, ProLink automatically displays photo-quality graphics of each hole.*



*Highland Creek Golf Club, Charlotte, North Carolina*  
*"Charlotte's Crown Jewel of Golf"*

**18-Hole 4-Person  
Scramble Format**

**8:00 AM Shotgun Start**

**\$150.00 per golfer -  
\$500.00 per foursome**

**Fee Includes**

- Continental Breakfast and Luncheon Buffet
- Green fees and Cart
- Team Prizes
- Hole-in-One Contest
- Longest Drive & Closest to the Pin Contests
- Transportation To & From Course

**Sponsorships  
Available**

**All proceeds  
benefit the  
TMS Foundation**

# **TMS**

**FOUNDATION**

## ADVANCE REGISTRATION FORM

Advance Registration Deadline: February 16, 2004

Payment must accompany form.

Forms received past this date will be processed at the on-site fee.

**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  AIST  SME  SPE Member Number: \_\_\_\_\_

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

Informal First Name to Appear on Badge: \_\_\_\_\_ Date of Birth: \_\_\_\_\_

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 16, 2004	On-Site Fees after February 16, 2004
<input type="checkbox"/> Member.....	\$400 M	\$500 ML
<input type="checkbox"/> Non-member Author*.....	\$490 NMA	\$590 NMAL
<input type="checkbox"/> Non-member *.....	\$550 NM	\$650 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.....	\$250 RM	\$250 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 2004  
## Students must attach a copy of their school's student identification card.

**4. Tutorial Luncheon Tickets:**

Monday 3/15/04	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 3/15/04</b>			
Didier de Fontaine Honorary Dinner.....	\$60	_____	\$_____ FD
R.J. Arsenal Honorary Dinner.....	\$60	_____	\$_____ JD
Roger Doherty Honorary Dinner.....	\$60	_____	\$_____ DD
TMS-AIME Banquet.....	\$60	_____	\$_____ AD
Tables of 8.....	\$480	_____	\$_____ AD8
<b>Tuesday 3/16/04</b>			
Table Sign to Read.....			
Extraction & Processing Division Luncheon.....	\$35	_____	\$_____ EP
Tables of 8.....	\$280	_____	\$_____ EP8
Table Sign to Read.....			
<b>Wednesday 3/17/04</b>			
Light Metals Division Luncheon.....	\$35	_____	\$_____ LM
Tables of 8.....	\$280	_____	\$_____ LM8
Table Sign to Read.....			
A.L. Roytburd Honorary Dinner.....	\$60	_____	\$_____ RD
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	At-Meeting Price	List Price	Subtotal Price
04-5654-CD	EPD Congress 2004 (CD-ROM)	1	_____	_____	\$71	\$101	\$_____
04-5506	Laterite Nickel 2004	4	_____	_____	\$119	\$170	\$_____
04-5670-G	Light Metals 2004 (Book and CD-ROM Set)	7	_____	_____	\$150	\$225	\$_____
04-5689-G	Magnesium Technology 2004 (Book and CD-ROM Set)	3	_____	_____	\$101	\$144	\$_____
04-5743	Advanced Materials for Energy Conversion II	3	_____	_____	\$112	\$160	\$_____
04-5662	Fifth Global Symposium on Materials Processing and Manufacturing: Surfaces and Interfaces in Nanostructured Materials and Trends in LIGA, Miniaturization, and Nanoscale Materials	4	_____	_____	\$118	\$168	\$_____
04-5719	Ultrafine Grained Materials III	4	_____	_____	\$124	\$177	\$_____
04-5727	Solidification Processes and Microstructures (A Symposium in Honor of Prof. W. Kurz)	2	_____	_____	\$112	\$159	\$_____
04-5697	Solidification of Aluminum Alloys	2	_____	_____	\$118	\$168	\$_____
04-5735	Bulk Metallic Glasses	2	_____	_____	\$125	\$179	\$_____
04-5646	Advances in Superplasticity and Superplastic Forming	2	_____	_____	\$115	\$164	\$_____
04-5700	Multiphase Phenomena and CFD Modeling and Simulation in Materials Processes	4	_____	_____	\$132	\$189	\$_____
						Subtotal \$	_____

**WEIGHT AND ZONE CHART**

Weight	USA	Canada	Mexico	Western Europe	J. A. NZ	EE, C/S Am, Pac. Rim.	Middle East, Africa
1	\$4.50	\$4.00	\$5.00	\$4.50	\$5.00	\$5.50	\$7.50
2	\$5.00	\$7.50	\$9.50	\$8.50	\$9.50	\$10.50	\$14.50
3	\$5.50	\$11.00	\$14.00	\$12.50	\$14.00	\$15.50	\$21.50
4	\$6.00	\$14.50	\$18.50	\$16.50	\$18.50	\$20.50	\$28.50
5	\$6.50	\$18.00	\$23.00	\$20.50	\$23.00	\$25.50	\$35.50
6	\$7.00	\$21.50	\$27.50	\$24.50	\$27.50	\$30.50	\$42.50
7	\$7.50	\$25.00	\$32.00	\$28.50	\$32.00	\$35.50	\$49.50
8	\$8.00	\$28.50	\$36.50	\$32.50	\$36.50	\$40.50	\$56.50
9	\$8.50	\$32.00	\$41.00	\$36.50	\$41.00	\$45.50	\$63.50
10	\$9.00	\$35.50	\$45.50	\$40.50	\$45.50	\$50.50	\$70.50
11	\$9.50	\$39.00	\$50.00	\$44.50	\$50.00	\$55.50	\$77.50
12	\$10.00	\$42.50	\$54.50	\$48.50	\$54.50	\$60.50	\$84.50

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

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

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

NOTE: If your order exceeds 12 pounds, add the amount that it is over from the chart (at the left) to reach the total weight of your order. [Example: 16 lbs. (delivered in U.S.A.) would be 12 lbs. (\$10.00) + 4 lbs (\$6.00) = 16 lbs. (\$16.00)]

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

**6. Continuing Education Short Courses: Sunday, March 14, 2004**

	Advance Fees until February 16, 2004	On-Site Fees after February 16, 2004
	Member Non-member	Member Non-member
<input type="checkbox"/> 1. Metal Matrix Composites.....	\$475 \$560	\$525 \$610
<input type="checkbox"/> 2. Introduction to Nanomanufacturing and Nanotechnology.....	\$475 \$560	\$525 \$610
<input type="checkbox"/> 3. Technology Transfer Seminar.....	\$475 \$560	\$525 \$610
<input type="checkbox"/> 4. Smelter Grade Alumina from the Smelting Perspective.....	\$475 \$560	\$525 \$610
<input type="checkbox"/> 5. Computational Modeling for the Materials Professionals.....	\$475 \$560	\$525 \$610
Short Course TOTAL \$	_____ \$	_____ \$

**7. 2004 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 USA dollars drawn on a USA bank.

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

Card No.: \_\_\_\_\_

Visa  MasterCard  Diners Club  American Express

Cardholder Name: \_\_\_\_\_

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

**9. TOTAL FEES PAID** \_\_\_\_\_ \$

**Refund policy:** Written requests must be mailed to TMS, post-marked no later than February 16, 2004. A \$50 processing fee will be charged for all cancellations. No refunds will be processed after February 16, 2004.



# TMS2004

**133rd Annual International Meeting & Exhibition  
March 14-18, 2004 • Charlotte, North Carolina, USA**

## HOUSING RESERVATION FORM

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

Making your reservation is easier than ever through Travel Planners' real-time Internet reservation system! Just log on to [www.tms.org](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 16, 2004**

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

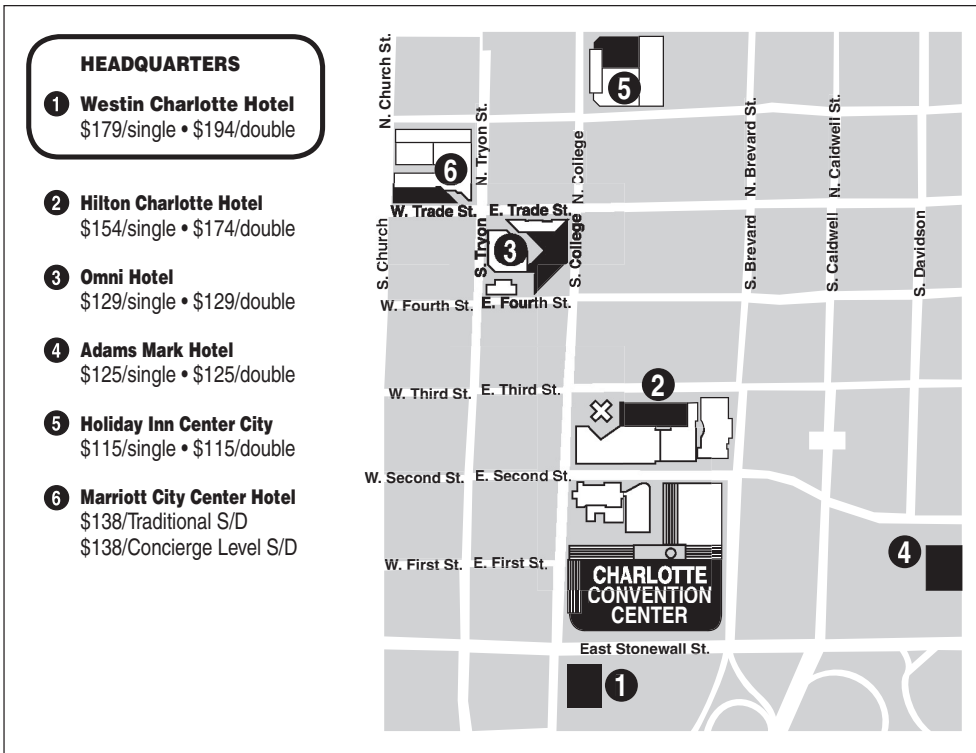
**TMS has contracted a block of rooms at the headquarters hotel, Westin Charlotte Hotel, along with each of the hotels, and therefore has assumed a financial liability for any and all rooms in that block that are not reserved. You are strongly encouraged to reserve your room(s) at the hotels listed to limit our financial liability. Please help TMS achieve overall success with the 133rd TMS Annual Meeting & Exhibition by making your reservation at one of the listed hotels prior to the advance housing deadline. Thank you.**

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

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

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

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



**HEADQUARTERS**

- 1 Westin Charlotte Hotel**  
\$179/single • \$194/double
- 2 Hilton Charlotte Hotel**  
\$154/single • \$174/double
- 3 Omni Hotel**  
\$129/single • \$129/double
- 4 Adams Mark Hotel**  
\$125/single • \$125/double
- 5 Holiday Inn Center City**  
\$115/single • \$115/double
- 6 Marriott City Center Hotel**  
\$138/Traditional S/D  
\$138/Concierge Level S/D

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

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

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

# TMS2004

**133rd Annual Meeting & Exhibition**  
March 14-18, 2004 • Charlotte, North Carolina, USA

## Charlotte Tour Registration Form

Send completed Charlotte Tour Registration Form with payment to:  
America Charters Ltd, 1251 W. Craighead Road, Charlotte, NC 28206  
ATTN: Vicki  
Phone: (704) 596-2222 or (800) 330-3286 • Fax: (704) 865-5382

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

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

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

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ E-mail: \_\_\_\_\_

### TOUR CHOICES

All prices are per person. Please indicate your choice, and number of persons.

<b>Tour</b>	<b>Cost per Person</b>	<b># of Tickets</b>	<b>Sub-Total</b>
Monday, March 15, 2004 <b>Charlotte City Tour</b> 10:00 AM – 2:00 PM	\$25.00	_____	\$ _____
Tuesday, March 16, 2004 <b>NASCAR Tour</b> 9:00 AM – 3:00 PM	\$29.00	_____	\$ _____
Wednesday, March 17, 2004 <b>Biltmore Estates Tour</b> 7:00 AM – 6:00 PM	\$92.00	_____	\$ _____
Thursday, March 18, 2004 <b>Norandal USA Inc. Plant Tour</b> 1:00 PM – 4:00 PM	\$30.00	_____	\$ _____
<b>TOTAL AMOUNT DUE</b>			\$ _____

Method of Payment     Check enclosed     Credit Card (Diners Club not accepted)

Credit Card Type & Number: \_\_\_\_\_ Expiration Date: \_\_\_\_\_

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

Print cardholders name: \_\_\_\_\_

- 1. Register now! On-site registration will be limited in Charlotte. Accommodations are on a space-available basis only.**
- 2. Closing date for receipt of registration is 11:00 AM the day before the tour leaves.**
- 3. Full payment must accompany your registration form, either check or credit card.**
- 4. Tickets may be obtained at the Tour Desk located at the Convention Center.**
- 5. All tours will depart from and return to the Convention Center.**
- 6. America Charters Ltd reserves the right to change itineraries or make substitutions when necessary.**

# TMS2004

133rd Annual Meeting & Exhibition  
March 14-18, 2004 • Charlotte, North Carolina, USA

## TMS Foundation Golf Sponsorship and Registration Form

### SPONSORSHIPS:

**Sponsorships are available for \$100, \$300, \$500 and \$1,000**

I would like to sponsor: (Please check (✓) one)

- \_\_\_\_\_ \$100.00    **(Bronze)** Individual Hole Sponsor (Includes Custom Tee Sign)
- \_\_\_\_\_ \$300.00    **(Silver)** Beverage Cart (Includes 1 Green Fee & Custom Cart Sign)
- \_\_\_\_\_ \$500.00    **(Gold)** Skill Contest(s) - Closest to Pin, Longest Drive, Hole-In-One  
(Includes 1 Green Fee, Custom Sign, and Presentation of Skill Prize to Winner)
- \_\_\_\_\_ \$1,000.00    **(Platinum)** Luncheon Sponsor (Includes 2 Green Fees, Custom Sign & Presentation of Trophies to Overall Winners)

### GIVE-AWAY DONATIONS:

I would like to donate the following give-away item(s).

Item(s) \_\_\_\_\_

Create a sign to include the following: \_\_\_\_\_

### REGISTRATION FORM:

Check One:             Individual Golfer \$150             Foursome \$500

**INDIVIDUAL GOLFER/S:** I/we are not with a foursome, but would like to golf:

Name	Organization	Address	Phone/Email
1.			
2.			

### FOURSOMES:

Name	Organization	Address	Phone/Email
1.			
2.			
3.			
4.			

**Method of Payment:**     Check/Money Order     Visa     MasterCard     American Express     Diners Club

Card Number: \_\_\_\_\_                      Expiration Date: \_\_\_\_\_

Cardholder Name: \_\_\_\_\_                      Signature: \_\_\_\_\_

**Please send your payment with registration to:** TMS Foundation  
184 Thorn Hill Road  
Warrendale, PA 15086  
Fax: (724) 776-2053

*For more information or  
questions, contact Gail Miller  
Tel: (724) 776-9000 ext. 238 or  
Email: gailm@tms.org*



**Deadline for Registration: February 20, 2004**



# HONORS & AWARDS

## CONGRATULATIONS TO THE TMS 2004 AWARD WINNERS!

### TMS FELLOW CLASS OF 2004

Michael Baskes, *Los Alamos National Laboratory*  
Robert Ritchie, *University of California*  
John Perepezko, *University of Wisconsin*  
Ronald Gibala, *University of Michigan*  
Tai-Gang Nieh, *Lawrence Livermore National Laboratory*

### JOHN BARDEEN AWARD

Russell D. Dupuis, *Georgia Institute of Technology*

### BRUCE CHALMERS AWARD

John Campbell, *University of Birmingham*

### DISTINGUISHED SERVICE AWARD

Robert Wagoner, *The Ohio State University*

### EDUCATOR AWARD

Subhash Mahajan, *Arizona State University*

### ROBERT LANSING HARDY AWARD

Christopher Schuh, *Massachusetts Institute of Technology*

### WILLIAM HUME-ROTHERY AWARD

Hubert Aaronson, *Carnegie Mellon University*

### INSTITUTE OF METALS/ ROBERT FRANKLIN MEHL AWARD

William L. Johnson, *California Institute of Technology*

### LEADERSHIP AWARD

Robert Reynik, *National Science Foundation*

### CHAMPION H. MATHEWSON AWARD

Rohit K. Trivedi, *Iowa State University*  
Prantik Maxumder, *Corning Inc.*  
Surendra Tewari, *Cleveland State University*

### SHRI RAM ARORA AWARD

Anish Kumar, *Bhabha Atomic Resesarch Center*

### TECHNICAL DIVISION AWARD WINNERS

#### ALUMINUM DISTINGUISHED SERVICE AWARD

Euel Cutshall, *Alcoa*

#### EXTRACTION & PROCESSING DISTINGUISHED LECTURER

John Floyd, *Ausmelt Limited*

#### EXTRACTION & PROCESSING TECHNOLOGY AWARD

S. Vaisburd, *posthumously, retired from Technion-Israel Institute of Technology*  
D. G. Brandon, *Technion-Israel Institute of Technology*  
S. Kozhakhmetov, *Institute of Metallurgy and Ore Benefication*  
E. Kenzhaliyev, *Institute of Metallurgy and Ore Benefication*

#### EXTRACTION & PROCESSING SCIENCE AWARD

Evgueni Jack, *University of Queensland*  
Peter C. Hayes, *University of Queensland*

#### LIGHT METALS TECHNICAL SERVICE AWARD

Michel Reverdy, *Pechiney Group*

#### LIGHT METALS AWARD

Henrik Gudbrandsen, *SINTEF*  
Nolan Richards, *Richards & Associates*  
Sverre Rolseth, *SINTEF*  
Jomar Thonstad, *Norwegian University of Science and Technology*

#### STRUCTURAL MATERIALS DISTINGUISHED SCIENTIST/ENGINEER AWARD

Gregory B. Olson, *Northwestern University*

## University Alumni Receptions

*Alumni receptions for various  
universities will be scheduled  
at the Westin Charlotte Hotel.*

*Please refer to the final program  
(available onsite) for a detailed listing.*

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

Monday, March 15, 2004 ■ 12:30 PM to 1:30 PM

### Science and Technology of Bulk Amorphous Metals

William L. Johnson, *California Institute of Technology*

#### About the topic:

Over the past 15 years, novel families of metal alloys have been developed which show exceptional resistance to crystallization in the undercooled liquid state. These "bulk" glass forming alloys can be processed and formed into three dimensional net shapes in much the same manner as injection molded plastic. Studies of flow behavior of viscosity effects (shear thinning), and localization of flow into shear bands as strain rate increases or temperature decreases. In the solid amorphous state deformation is controlled by the formation and propagation of highly localized shear bands of sub-micron width. Under unconfined mechanical loading, shear band propagation often results in catastrophic failure and limits the utility of amorphous metals in structural applications. To suppress this instability, bulk metallic glass composites have been developed in which shear bands interact with the alloy microstructure to stabilize the system against global failure. This results in formation of shear band patterns, ability to support global plasticity, and dramatic toughening of the material. Both bulk amorphous metals and composites are being explored for wide range of engineering application. Examples will be given in the talk.



#### About the presenter:

Prof. Johnson has been a member of the Caltech faculty since 1977. He has held the Ruben Mettler Chair in Engineering and Applied Science at Caltech since 1988. He was a visiting professor and Alexander von Humboldt Distinguished Fellow at the University of Goettingen, Germany in 1988. His research accomplishments include the first studies of superconductivity in metallic glasses, pioneering studies of crystal to glass transformations in metals and the discovery, characterization, and development of bulk amorphous metals as engineering materials. Prof. Johnson is a Fellow of TMS and ASM International and was elected to the National Academy of Engineering in 2000.

Prof. Johnson is an inventor on over 20 U.S. Patents and the co-founder of a company, Liquidmetal Technologies Inc., which is currently pioneering the commercialization of bulk amorphous metals in engineering applications.

## HUME-ROTHERY AWARD SYMPOSIUM

Monday, March 15, 2004

### Edge-to-Edge Matching at Irrational Interphase Boundaries and Compliance with Nucleation Theory

Hubert I. Aaronson, *Carnegie Mellon University*

Sponsored by: Jt. EMPMD/SMD Alloy Phases Committee

#### About the topic:

Nucleation theory, as developed by Gibbs (1875-1888) and Cahn-Hilliard III (1959), is shown to have led to predictions that low energy interfacial structures should develop during diffusional growth even under circumstances that appear to be crystallographically unpromising. Observations of repeated faceting during growth under these circumstances have more directly supported this view. Discovery of structural ledges/disconnections, of misfit-compensating ledges/disconnections and more recently of edge-to-edge matching has been expedited by this reliance. After recounting a personal history of the long journey from incoherent (C. S. Smith, 1948 and 1953) to edge-to-edge matched interphase boundaries, the stability and migration mechanisms of the latter boundaries will be considered. The need for experimental proof that edge-to-edge matched planar boundaries do exist will be emphasized.



#### About the presenter:

Prof. Aaronson is the R. F. Mehl University Professor Emeritus at Carnegie Mellon University, visiting professor at Monash University and adjunct professor at the University of Virginia. He was named the R. F. Mehl Professor in 1979 and has consulted and collaborated with numerous individuals in various capacities and locations and held many positions since receiving his Ph.D. at Carnegie Mellon University in 1954.

Prof. Aaronson has served as a member and chair of many TMS and ASM committees, including the Phase Transformations Committee since its inception in 1970. He has worked to ensure a continuing flow of symposia emphasizing fundamental aspects of phase transformations and encouraging open discussion of significant controversies. He has authored or co-authored over 325 publications.

He has received numerous honors and awards including; the TMS C. H. Mathewson Gold Medal, TMS Educator Award, TMS Institute of Metals Lecture and R. F. Mehl Medal, and TMS Fellow. He was elected to the National Academy of Engineering in 1997 and received Honorary Membership of the Japan Institute of Metals in 1996.

## EXTRACTION & PROCESSING DIVISION DISTINGUISHED LECTURER

Tuesday, March 15, 2004 ■ 1:45 PM to 3:00 PM

### Converting an Idea into a Worldwide Business Commercializing Smelting Technology

John Floyd, Ausmelt, Ltd.

#### About the topic:

Pyrometallurgy is an ancient art which has defined significant stages of human development. Today, new opportunities for improvements in the economic, environmental and workplace costs of metal production continue to provide challenges for the profession and industry. Top submerged lancing technology for the high temperature processing of a range of metals and wastes is an example that has been taken up by many companies around the world. The furnace system now marketed under the names of Ausmelt and Isasmelt was, in the early states of its thirty-three years of development, known as Sirosmelt. The voyage from the original idea through theoretical, laboratory, pilot plant, and commercial development to establishment of a worldwide business has been both stimulating and rewarding.



#### About the presenter:

Dr. Floyd is the Non-Executive Deputy Chairman of Ausmelt Limited. He has over 30 years experience in pyrometallurgical process and equipment commercialization through research, development, operations development and training and commissioning. He invented top submerged lancing technology and is responsible for its development in CSIRO and

Ausmelt in the early 1970's. He founded Ausmelt in 1981 and has formed and led many teams for pyrometallurgical process development, implementation and start up in CSIRO, Ausmelt and the University of Melbourne. He has also established with others the G. K. Williams Laboratory (now Cooperative Research Centre) for Extractive Metallurgy at the University of Melbourne. He has given courses on the theory, practice and development in Extraction Metallurgy, and is a professorial associate in the Chemical Engineering Department of the University of Melbourne.

Dr. Floyd has authored or co-authored more than 70 published technical papers and invented or co-invented 15 patented process or equipment inventions in the extractive metallurgy and high temperature processing plant areas.

# TMS LETTERS

*A valuable new resource for members*

*A distinguished publication venue for authors*

Timely, relevant, and rigorously reviewed, *TMS Letters* is a unique technical journal that presents cutting-edge research in succinct, informative technical updates.

The peer-reviewed journal will be available exclusively in on-line format through the TMS Document Center ([doc.tms.org](http://doc.tms.org)) and will be accessible free-of-charge to all TMS members as a benefit of membership. *TMS Letters* will be composed entirely of two-page technical updates, including text and graphics, of research presented at TMS meetings that are not published in any other book or journal.

The first issue of *TMS Letters* will consist exclusively of technical updates presented at the 2004 TMS Annual Meeting, to be held March 14–18, 2004. Presenters at the 2004 TMS Annual Meeting, whose work will not be published in any other book or journal, may submit their work for publication in the inaugural issue of *TMS Letters*.

To learn more about *TMS Letters* or to submit a technical update, contact:

Dan Thoma  
Editor, *TMS Letters*  
c/o TMS  
184 Thorn Hill Road, Warrendale, PA 15086  
E-mail: [tmsletters@tms.org](mailto:tmsletters@tms.org)  
Web: [www.tms.org/tmsletters.html](http://www.tms.org/tmsletters.html)

[www.tms.org/tmsletters.html](http://www.tms.org/tmsletters.html)

Visit this web site often, as more details will be made available throughout the year, including author instructions for submitting papers to the journal and non-member subscription information.



# STUDENT INFORMATION

The TMS 2004 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 other students and professionals in the field.

## Student Attendee Orientation

Date: Sunday, March 14, 2004 ■ Time: 2:00 PM to 3:00 PM  
Location: Westin Charlotte Hotel

Interested in being in the right place at the right time? The Student Attendee Orientation is a great opportunity for students to get their questions answered about TMS and different activities taking place at the TMS 2004 Annual Meeting & Exhibition. This event is a great way to begin the week and meet other students with similar interests.

## Career Tips Session

Date: Sunday, March 14, 2004 ■ Time: 3:30 PM to 4:00 PM  
Location: Westin Charlotte Hotel

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

## Career Forum

Date: Sunday, March 14, 2004 ■ Time: 5:00 PM to 6:30 PM  
Location: Westin Charlotte Hotel

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

## TMS Networking Mixer

Date: Sunday, March 14, 2004 ■ Time: 8:00 PM – 10:30 PM  
Location: Westin Charlotte Hotel ■ Sponsored by: TMS Student Affairs Committee

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

Beer\*, soft drinks, snacks, and music will be provided. Students are encouraged to show their school pride by wearing their school's colors.

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

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

## Student 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 they are scheduled to monitor sessions. Monitor positions are limited and will be assigned on a first-come basis. To obtain work forms and a schedule, e-mail [mboots@tms.org](mailto:mboots@tms.org). The deadline to submit completed work forms is Monday, February 2, 2004.

## Student Chapter School Displays

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

## TMS Student Chapters

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

## 6<sup>th</sup> Annual TMS Student Poster Session

This students-only Poster Session will be held in conjunction with the TMS 2004 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 15 and remain in place through Wednesday, March 17. 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 12, 2003.

## 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 2004 TMS Annual Meeting and Exhibition, by December 12, 2003. 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. 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](mailto:dscheuring@tms.org)

# GENERAL INFORMATION

The TMS 2004 Annual Meeting & Exhibition will take place in Charlotte, North Carolina. The Westin Charlotte Hotel will be the headquarters hotel. All conference events, including registration, technical sessions, and the exhibition will take place at the Charlotte Convention Center.

## Registration Policy

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

## Advance Registration

Take advantage of the discounted advance registration fees. Complete the TMS 2004 Annual Meeting & Exhibition Advance Registration form in this brochure on page 33 and return it to TMS no later than Monday, February 16, 2004. Advance registration is encouraged. For your convenience, you may charge your registration fees on MasterCard, VISA, American Express, or Diner's Club credit cards. Full payment of registration fees and social function tickets must accompany the completed Advanced Registration form. Complete the registration form in this brochure and mail or fax it today.

**Advance Registration Deadline:  
Monday, February 16, 2004**

## Register Via TMS OnLine

You may register any time, day or night, via the TMS 2004 Annual Meeting & Exhibition Home Page at <http://www.tms.org/AnnualMeeting.html>. TMS On-Line provides detailed information on this and all TMS sponsored conferences.

## Advance Registrant Packet Availability

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



## At Meeting Registration

Registration will be held in the lobby of the Charlotte Convention Center during the following hours:

Sunday, March 14.....	11:00 am–6:00 pm
Monday, March 15.....	7:00 am–6:00 pm
Tuesday, March 16.....	7:00 am–5:30 pm
Wednesday, March 17.....	7:00 am–5:00 pm
Thursday, March 18.....	7:00 am–10:00 am

## Americans with Disabilities Act



TMS strongly supports the federal Americans with Disabilities Act (ADA), which prohibits discrimination against, and promotes public accessibility for those with disabilities. In support of and compliance with this Act, we ask that those requiring specific equipment or services as an attendee of the TMS Annual Meeting, contact the TMS Meeting Services department and advise of any specific requirements in advance.

## For Questions on Advance Registration, Please Contact:

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

## Technical Sessions

Technical sessions will begin on Monday, March 15, 2004 and end on Thursday, March 18, 2004. Technical sessions will be held at the Charlotte Convention Center. Abstracts will be printed in the November 2003 issue of JOM and will also be available via TMS OnLine at <http://www.tms.org/AnnualMeeting.html>.

## Audio/Video Recording Policy

TMS reserves the right to any audio and video reproduction of all presentations at every TMS-sponsored meeting. Recording of sessions (audio, video, still-photography, etc.) intended for personal use, distribution, publication, or copyright without the express written consent of TMS and the individual authors is strictly prohibited. Contact the TMS Technical Programming Department to obtain a copy of the waiver release form.

## Are You a Student Member?

**Student members of TMS may attend the technical sessions, exhibits, and lectures held Monday through Thursday on a complimentary basis. Registration for students who are not members is \$25, which will be applied toward a TMS Student Membership in 2004.**

# TRAVEL & DESTINATION DETAILS

## Housing Accommodations

The TMS headquarters hotel will be the Westin Charlotte Hotel. Special conference rates have been contracted at all the hotels listed on the housing form found in this brochure. To receive the special convention rate, please use the enclosed form to make your hotel reservation, found on page 35 or log onto [www.tms.org](http://www.tms.org) and follow the link to Travel Planners Inc.

***Hotel reservations are processed on a first-come, first-served basis until Monday, February 16, 2004.***

## About the Westin Charlotte Hotel

The Westin Charlotte Hotel is the largest hotel in Charlotte. It is located across the street from the Charlotte Convention Center. The hotel offers a premiere Uptown location in the heart of the city's financial district. A convenient trolley stop takes guests to the city's hottest dining and entertainment district. All guest rooms and suites feature the Heavenly Bed, dual-line telephones with voice messaging, large work desk, in-room data port, complimentary gourmet coffee, in-room movies, and minibar. Our full-service concierge and well-equipped business center are available to attend to all those last-minute details. A gourmet restaurant and an outdoor café are guaranteed to satisfy any palate. A number of attractions are within minutes of the hotel including the shops and restaurants of Historic South End, the Charlotte Convention Center, and Ericsson Stadium, home of the Carolina Panthers.

Charlotte Douglas International Airport is only 15 minutes from the convention center and Amtrak rail station is only 2 miles from the center. Public transportation of buses and trolleys, provided by CATS, is managed by the Public Transit Department of the City of Charlotte.

## Shuttle Service

Shuttle service will be provided to the convention center from the following hotels only: Holiday Inn, Adams Mark, Marriott City Center, and the Omni. The shuttle service will be available beginning Sunday, from noon to 6:00 PM. Monday, the shuttle service will be available 7:00 AM through 6:00 PM. Tuesday and Wednesday, the shuttle service will be available 7:00 AM through 6:30 PM. Thursday, service will begin at 7:00 AM and end at 1:00 PM.

## Guest Hospitality

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

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

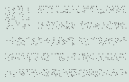
***Note: The conference guest badge is intended for spouses and accompanying persons of registered attendees and for identification only. It does not permit access to technical presentations.***

***TMS has contracted a block of rooms at the headquarters hotel, Westin Charlotte Hotel, along with each of the hotels listed on the housing form in this brochure, and therefore has assumed a financial liability for any and all rooms in the block that are not reserved. You are strongly encouraged to reserve your room(s) at the hotels listed to limit our financial liability. Please help TMS achieve overall success with the 133<sup>rd</sup> TMS Annual Meeting & Exhibition by making your reservation at one of the listed hotels prior to the advance housing deadline. Thank you.***





## SPECIAL AIRFARE



## U·S AIRWAYS

Official carrier for attendees to the TMS 2004 Annual Meeting & Exhibition

US Airways agrees to offer an exclusive low fare for TMS Annual Meeting attendees traveling to Charlotte.

This special fare will offer a 5% discount off First or Envoy Class and any published US Airways promotional round trip fare. A 10% discount off unrestricted "Y" or B8US/B4AUS fares applies 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 March 11 through March 21, 2004.**

To obtain these TMS 2004 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. 78672843

Once your reservations are confirmed, US Airways 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.

## SPECIAL CAR RENTAL



Rent-a-Car System

Has been selected as the Official Car Rental company for the TMS 2004 Annual Meeting & Exhibition, March 14-18, 2004 in Charlotte, North Carolina.

Meeting rates listed below are based on roundtrip rentals, with free unlimited mileage, are guaranteed one week prior through one week after the actual meeting dates and are subject to availability. Rates are available from Charlotte, North Carolina 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 2004 Annual Meeting & Exhibition and reference the following CV number: CV#02QJ0008. You must give the reservations agent the Hertz CV# to receive the special rates. Advance reservations are recommended.

### Terms and Conditions

- UNLIMITED MILEAGE ALLOWANCE ON ABOVE RATES.
- One-way service fee will apply when cars are not returned to renting location.
- 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.

CAR CLASS	DAILY	WEEKEND	WEEKLY
	Per Day	Per Day	5-7 Days
A Economy 2DR	\$38.99	\$22.99	\$149.99
B Compact 4DR	\$43.99	\$25.99	\$164.99
C Midsize 2/4DR	\$47.99	\$27.99	\$179.99
D Sporty 2DR	\$49.99	\$32.99	\$194.99
F Full-size 4DR	\$52.99	\$34.99	\$209.99
G Premium	\$57.99	\$39.99	\$219.99
I Towncar	\$71.99	\$63.99	\$306.99
L 4WD/AWD SUV	\$71.99	\$63.99	\$306.99
R Minivan	\$74.99	\$65.99	\$314.99
U Convertible	\$71.99	\$63.99	\$306.99

## ACCOMPANYING PERSON AND INDUSTRIAL TOUR INFORMATION

*The America Charters, Ltd. has been designated the official tour company for the TMS 2004 Annual Meeting & Exhibition. The following tours are scheduled for your enjoyment. Tours will depart from the Charlotte Convention Center. 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: America Charters Ltd, 1251 W. Craighead Road, Charlotte, NC 28206, ATTN: Vicki or (704) 865-5382. Sign up now till 11:00 AM the day before the tour is to leave. Upon arrival in Charlotte, your tickets will be available at the Tour Desk located near the conference registration desk at the Charlotte Convention Center.*

### **Charlotte City Tour** **Monday, March 15, 2004** **10:00 AM–2:00 PM** **\$25 per person**

Step back in time and focus on some of the finest neighborhoods and suburbs in this "Queen City". You will be taken back to the late 1700's when the city was first founded by Scots-Irish settlers and walk through the development of Charlotte as a major manufacturing and distribution center. Charlotte has been described as "One of America's most livable cities. The 2nd largest banking center in the nation. The best place to start a new business".

The tour starts in the Southpark area and winds around the impressive Southpark Mall and prestigious upscale shopping district on the way to Myers Park. Learn how this massive 1200 acre neighborhood was created from a huge cotton plantation, owned by John Springs Myers, beginning in 1912. Today the view is graced with wide boulevards lined with majestic White Oaks and some of the most beautiful homes in the Queen City as well as the campus of Queen College and the Duke Mansion.

The tour moves into the 450-acre community of Dilworth, in which many of the homes have been restored. Passing the Historic Trolley Barn, you will learn about the history of Charlotte's Trolley System and it's future.

Moving into the uptown area, you will have an opportunity to learn more about the development of the city wards, Historic Fourth Ward to view the only surviving pre-streetcar neighborhood. You will learn how the Fourth Ward fell into ruin in the "1960's", and came back in the late "1970's".

You will visit the banking enter and notice the prominence of the skyline shimmers with the beaming bank towers including the Bank of America Tower, 60 stories and topped with the crown of Queen Charlotte. You will discuss the statues on the four corners and the meaning behind their placement.

You will travel towards the University area and really see the growth of Charlotte. Moving toward Lowes Motorspeedway and circling around Concord Mills returning to the Southpark area. During the trip, stops will be made at Latta Plantation and the Charlotte History Museum.

*Lunch will be on your own during the tour.*

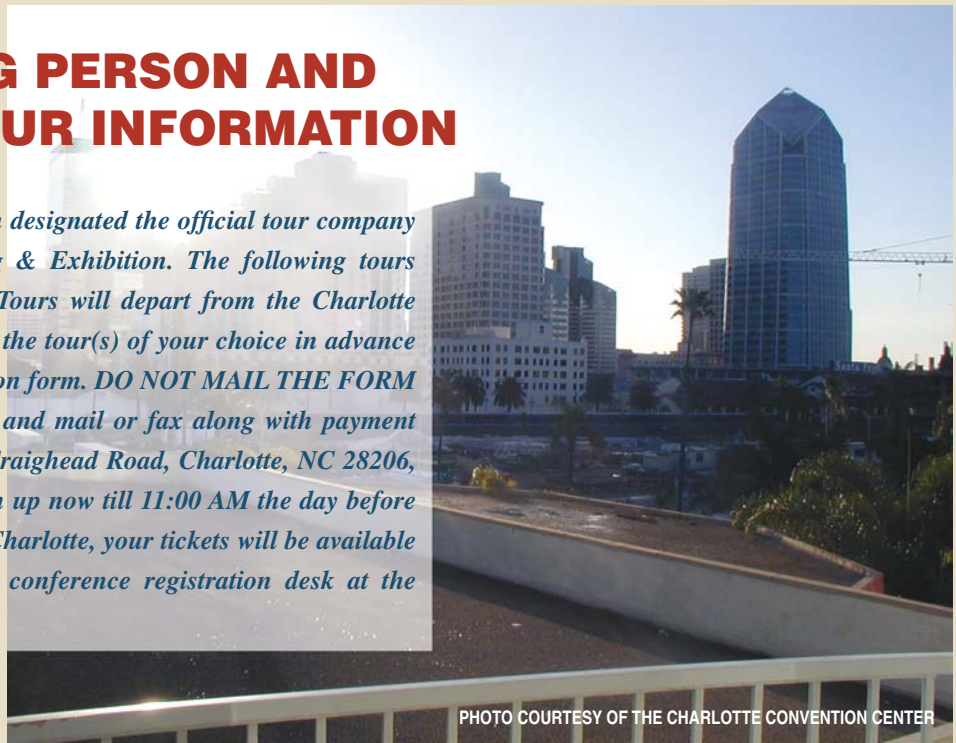


PHOTO COURTESY OF THE CHARLOTTE CONVENTION CENTER



PHOTO COURTESY OF THE CHARLOTTE CONVENTION CENTER



## **NASCAR**

**Tuesday, March 16, 2004**

**9:00 AM-3:00 PM**

**\$29.00 per person**

The sport that has joined the ranks of basketball, football, and baseball, with excitement at every turn, has sky rocketed in the Charlotte area. Men and women alike enjoy the fast cars and bright new stars of the sport. Today you will see some of the new and a little of the old, but the sights will make you appreciate the intensity of this sport.

The first stop will be Hendrick Motorsports; home of Jeff Gordon, Terry Labonte, both Winston Cup Champions. Enjoy the museum; be sure to take in the exercise room and the shop where all the work takes place. The Lowe's Motor Speedway Track tour will make you feel like you are a part of the action. Hang on as you go around the track. Sam Bass, the NASCAR artist will delight you with his work and ability to catch the true heart of the driver.

Leaving the speedway area, you will make your way over to Mooresville, NASCAR City. The North Carolina Museum of Motorsports will be your next stop, allowing you time to enjoy all of the memorabilia, and to remember the first days of racing. When you leave the Museum, many of the race shops are within walking distance. Rusty Wallace's shop is just across the street.

The last stop is Dale Earnhardt Incorporated (DEI), home of the late Dale Earnhardt. This museum is a tribute to the past, yet remarkable teams of this company continue to enjoy the future. You will feel the presence of the real heart of this sport.

Lunch will be on your own during the tour.

## **Biltmore Estates**

**Wednesday, March 17, 2004**

**7:00 AM-6:00 PM**

**\$92.00 per person**

Step back in time as you travel to this mansion surrounded by 8,000 acres, which was begun in 1889 and opened Christmas Eve 1895 by George Washington Vanderbilt, grandson of railroad magnate Cornelius Vanderbilt. Self-guiding tours include four floors of Biltmore House, the gardens, conservatory and the Biltmore Estate Winery.

You will tour through this 250-room French Renaissance-style chateau, where the Vanderbilt family lived and entertained. You will experience the recreation and work areas, including an indoor swimming pool, bowling alley, three kitchens and servants' quarters Vanderbilt provided his guests and servants with many labor-saving devices unavailable to the general public at the end of the 19th century.

The house is surrounded by 75 acres of formal gardens, which has many seasonal plants. The Winery is housed in the restored dairy area. They produce a variety of white, red, rose' and sparkling wines.

Lunch, which is included in the cost of the tour, will be at the restaurant on the grounds.



## **Norandal USA Inc Salisbury Plant**

**Thursday, March 18, 2004**

**1:00 PM-4:00 PM**

**\$30.00 per person**

See first-hand the operations of Norandal's light gauge sheet and foil facility. Located in nearby Salisbury, North Carolina, this tour will take visitors to view the Norandal USA Salisbury plant, which produces light gauge sheet and foil products primarily for the flexible packaging market. Production capacity is approximately 45,000 metric tons per year for the principal markets of consumers of flexible packaging materials, air conditioning, and food containers.

The plant tour to the Norandal Facility will include roundtrip transportation on a private motorcoach and a one and a half hour narrated tour of the facility.





# North America's premier metals and materials event.

**Cutting-edge** programming, courses, conference proceedings, exhibits...with real-world applications.

**A unique fusion** where research comes together with the metals and materials industries.

## Meet the Future of Metals and Materials.

*"Participation in the TMS Annual Meeting & Exhibition has been an integral element to my educational and professional growth over the last ten years. The TMS Annual Meeting & Exhibition provides me with a wealth of information through the outstanding technical programs and terrific networking opportunities with the present and future leaders of the materials field."*

*Edward Yen-Ming Chen, Director,  
Manufacturing & Technology,  
TiTech International, Inc.,  
2003 TMS Young Leader Intern*

**Learn** about production and processing innovations to improve your bottom line.

**Exhibit** to an international audience of metals professionals, including production supervisors, process managers, and engineers.

**Network** with industry professionals who have solved the same challenges you are facing.

**Attend** sessions that include traditional TMS programming plus featured topics, totaling more than 1,800 papers.

### To learn more:

Call us at: (724) 776-9000, ext. 231

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, Warrendale, PA 15086

# TMS2004

## 133rd Annual Meeting & Exhibition

March 14-18, 2004 • Charlotte Convention Center • Charlotte, North Carolina

**Bringing technology into applied perspectives.**

For up-to-date information, visit [www.tms.org/AnnualMeeting.html](http://www.tms.org/AnnualMeeting.html).

Develop your own plan by creating a personal conference schedule at <http://pcs.tms.org>.

Visit the TMS 2004 Annual Meeting website for online housing and registration • <http://www.tms.org/AnnualMeeting.html>

# TMS

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