This article summarizes seven of the more than 40 papers to be presented at this symposium by the Emerging Technologies Awareness Committee of ASM International. Visit www.matscitech.org to see dates and times for each presentation.

AEROSPACE SUPERALLOYS — THE RESPONSE TO GLOBAL INFLUENCES
Richard Kennedy, ATI Allvac

The dynamics affecting the aerospace market for wrought superalloys include strong market growth, new and more efficient engines, raw material price fluctuations, cost pressures, offshore producers/customers, and novel new materials. The industry response to these pressures will take the form of new equipment and increased capacity, new alloys, and process technology development coupled with cost and quality improvements. This presentation will review many of these initiatives from an industry-wide perspective.

LOWERING MATERIAL COST WITH HIGH-PERFORMANCE STAINLESS STEELS
Patrick Ray, Carpenter Technology Corporation

As the cost of raw materials increases, metals customers are increasingly looking at alternative alloys. Rather than focusing on best performance or cheapest initial cost, customers are looking for the best performance per dollar. Cost to the customer must be analyzed over the life of the part. The final cost to the customer can be lowered by de-
Changes facing producers of aluminum products are summarized in this presentation. Forces for change are competition from alternative materials, increases in the price of fuel and power, globalization, and sustainability. Space vehicles face the challenge to increase the size of payloads for access to the moon and Mars. Aerospace aluminum faces the entry of composites. Recently the aluminum content for a mid-size aircraft went from 70% for a 777 aircraft, to 20% for the new 787 airplane. This has catalyzed the development of new products and structural concepts. Automotive markets face competition from steel, magnesium, and plastics to reduce weight due to increases in fuel price and mandated greenhouse gas reductions. Hence new alloys and processes have been developed to remain competitive. Finally, aluminum products must be manufactured with reduced CO2 emissions while the cost of power escalates. Alcoa’s strategy and approach to address these issues will be discussed.

**FUTURE OF MAGNESIUM DEVELOPMENTS IN THE 21ST CENTURY**
*Robert Brown, Magnesium Assistance Group Inc.*

Magnesium as a structural material experienced a wild ride during the 20th Century. This next millennium will be as exciting, but more controlled, like riding a fast race horse compared to a bucking bronco. Magnesium is the only metal on earth that is available in limitless quantities. This fact coupled with its inherent low density and great formability will help boost new interest. As lightweight construction becomes necessary for mobile platforms such as automobiles, trucks, airplanes, trains, and aerospace vehicles, there will be increasing need to review how the properties of magnesium can be used to supply solutions. It will not be easy, but this paper will address what has been done with magnesium in the past century, what is being done today, and what a future development program may hold.

**COPPER: NEW PARADIGM FOR AN OLD METAL**
*Konrad Kundig, Metallurgical Consultant*

No metals have served humanity for so long, or in such a variety of ways, as have copper and its many alloys. This tradition continues in the electrical and water-related components that comprise the largest fractions of copper consumption today. Although copper utilization has reached record levels in recent years, many of its historic applications have eroded in the face of substitution by alternative materials. Nevertheless, copper’s ability to reduce thermal and electrical losses by virtue of unsurpassed conductivity promises new applications at precisely the historic moment when improved efficiency has gained a prominence never seen before. The paper provides examples of recent and expected near-term technological advances that exploit this property. The paper additionally describes copper’s antimicrobial efficacy, and the implications this historically well-known but underutilized property offers in healthcare and other disciplines.

**RECENT TRENDS IN FLAT-ROLLED STAINLESS ALLOYS**
*John Grubb, ATI Allegheny Ludlum*

The prices of raw materials in corrosion-resistant alloys have increased dramatically in recent years. Nickel prices are about five times higher than six years ago. Molybdenum prices are about ten times the 2001 price. Since these elements are needed in many corrosion-resistant alloys, such dramatic rises in costs have a profound impact on materials selection. However, the choice does not have to be between traditional corrosion resistant alloys and non-resistant alloys. Corrosion-resistant alloys with lower alloy content are being developed and the use of older ‘lean’ alloys expanded. Examples include: (1) Substitution of type 201 stainless steel for type 304 stainless steel, (2) Substitution of AL 2003 lean duplex stainless steel for type 316L stainless steel, and (3) Development of modern versions of Type 216 stainless steel. The impact of raw materials price variability data on costs of selected alloys will be presented.

**UTILIZING GLASS FORMING IRON BASED OVERLAYS FOR REPLACEMENT OF HARDMETALS IN HIGH WEAR APPLICATIONS**
*Daniel Branagan, The Nanosteel Company*

In recent years, there has been an unprecedented rise in raw material costs. For high wear applications, hardmetals, generally based on tungsten carbide, have been the materials of choice but have become increasingly expensive. While much lower cost, steel usage has been limited for these applications due to a big gap in wear performance between hardmetals and steels. A new approach to bridging this gap will be presented utilizing glass forming steels. Refined microstructures of the welded deposits leads to high hardness (Re > 70), wear resistance (< 0.10 g ASTM G-65) and significant toughness (Charpy > 60 ft-lb). The structure and properties of these deposits using a range of wire diameters and welding processes will be discussed. The resulting wear resistance surfaces applied as overlay or wear plate offer competitive advantages to existing high wear solutions in terms of attractive property combinations such as hardness, wear resistance, and toughness.
PITTSBURGH WELCOMES

MS&T’08

The Materials Science & Technology 2008 Conference and Exhibition will be presented in Pittsburgh, Pa., October 5 -9. This article highlights the Keynote Presentation, discusses the special lectures, outlines the technical program, and describes the exhibitors and their products and services.

For complete information, visit www.matscitech.org.

C

ome to MS&T’08 to grow your technical knowledge. You will find new information that you can take back and apply to your everyday challenges; new contacts who can become sources of useful technology; and old friends facing the same issues that you do. In addition, Pittsburgh is celebrating its 250th birthday, and welcomes MS&T with a special Festival of Lights and many other events.

KEYNOTE ADDRESS

“The Role of Science and Engineering in U.S. Competitiveness,” Cherry A. Murray, Ph.D., Principal Associate Director for Science and Technology, Lawrence Livermore National Laboratory; Team Member, National Academies: “Rising Above the Gathering Storm.”

Against a background of increasing globalization, a blue ribbon panel was charged with recommending actions policy makers should take to enhance the science and technology enterprise so the United States could compete, prosper and be secure in the global community of the 21st century. The result of that work is the highly acclaimed report “Rising Above the Gathering Storm.” In this keynote address, Dr. Murray, a member of the panel, will discuss the significant findings as well as the response to them that is shaping tomorrow’s science, engineering and technology policy.

NETWORKING OPPORTUNITIES

ASM International: MS&T’08 promises to be a special event for ASM members and guests. ASM is hosting several events to recognize our leaders and visionaries and look toward the future. ASM Leadership Awards Luncheon: In appreciation of the hard work and dedication of our volunteers, awards will be presented to members involved in the ASM Materials Education Foundation, the Committee Council and ASM’s organizational units. Purchase tickets on the registration form. ASM 95th Annual Meeting: Attend our annual meeting where we will elect officers for the 2008-09 term and transact other society business. ASM Awards Dinner: Join us for the recognition of our outstanding award recipients and the 2008 Class of Fellows. Tickets, which include the President’s Reception following dinner, can be purchased on the registration form. ASM Canada Council Suite: Experience Canadian hospitality! For more information about ASM, visit www.asminternational.org.

ACerS: MS&T’08 is home to the 110th annual meeting and anniversary celebration of The American Ceramic Society. ACerS has a variety of annual meeting events to celebrate its 110-year milestone: Celebrate 110 Years! Attend the special 110th anniversary symposium featuring the “Emerging Opportunities” sessions and the unveiling of the 11 best ceramic materials papers since 1898! Don’t Miss It! Join colleagues at the ACerS Annual Honors and Awards Banquet and Afterglow on Monday evening. Back by Popular Demand! See friends and colleagues at ACerS member lounge by day while meeting with members for a drink in the ACerS Pub by night. Expanded Networking! Meet contacts from every area in materials science and stop by the Employment and Career Center to post a job or drop off your resume. For more information on the 110th annual meeting, visit www.ceramics.org/annualmeeting.

AIST: AIST will hold its Steel Properties & Applications Conference as part of MS&T’08. AIST is committed to supporting research and development activities and collaborations as they relate to steel processing, products and application under the broader and more universal umbrella of materials science. By participating in MS&T since its inception in 2003, AIST and the steel industry continue to strengthen opportunities for technological advancement and exposure. MS&T rep-
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TMS: The Minerals, Metals & Materials Society is proud to be an organizing partner in MS&T for the sixth year. After holding the TMS Fall Meeting for many years, TMS responded to the growing needs of materials professionals in 2003 by initiating MS&T with the Iron and Steel Society; now AIST. Professionals were facing constraints on their budgets and time. With MS&T, attendees benefit from four organizations working together to design a comprehensive technical program that covers everything from ceramics and steel to materials characterization and nanotechnology. TMS has also organized some special lectures for MS&T’08: ASM/TMS Distinguished Lecture: “Engineering Material Systems for an Ever Demanding Society” by Dr. Leo Christodoulou, Program Manager, DARPA DSO; and the TMS Young Leaders Tutorial Lecture. Take advantage of this unique materials conference and visit us in Pittsburgh or online at www.tms.org.

**SHORT COURSES**

**Sunday, October 5**

**TMS-AcErS Materials for Nuclear Power Workshop**

Learn about the critical role of materials in the nuclear power industry, from fundamentals of radiation materials science to real-world reactor issues.

**Topics:** materials for nuclear power; material degradation in nuclear reactors; materials and nuclear waste; materials and next generation nuclear reactors; extending current reactor life; utility company perspectives.

**Thursday / Friday, October 9 / 10**

**Computational Materials Design**

An overview will be presented of a systems approach to materials design based in computational thermodynamics. Software tools will be demonstrated and their application illustrated in case studies.

**Failure Analysis Methodology and Case Histories**

Learn about failure types, conducting failure analysis, synthesizing and summarizing data, determining and reporting failure cause, and case histories.

**Meeting the Challenges to the Materials Industries Posed by Materials Supply, Energy, Environmental Constraints, Global Competition and New Technologies**

Delve into challenges and opportunities faced by the worldwide materials industries; develop strategies and see the dynamic interactions these challenges and opportunities represent. This presentation will be dynamic, somewhat controversial and encourage class discussion, input, opinions and viewpoints.

**Powder Metallurgy Materials, Processes and Design**

This course presents a detailed description of the various processes used for converting powdered materials into useful parts. Particular focus is on adaptation of powder metallurgy process benefits and limitations to the design of parts for structural, medical and decorative applications. Examples of applications are given for each process.

**SIXTY SYMPOSIAS COVER EIGHT DIVERSE THEMES**

**Electronic and Magnetic Materials**

Electronice and Magnetic Materials – from copper-based alloys to microelectronics devices Environmental and Energy Issues – from nanoscale design to climate change

**Fundamentals and Characterization**

Fundamentals and Characterization – from ceramic surfaces to structure-property relationships

**Iron and Steel**

Iron and Steel – from zinc-coated sheet steels to refractory innovations

**Materials and Systems**

Materials and Systems – from characterization and modeling to surface coating systems Nanotechnology – from nanoparticle structures to power generation

**Processing and Product Manufacturing**

Processing and Product Manufacturing – from micromanufacturing to composite materials

**Special Topics**

Special Topics – from military systems to emerging technologies Continued
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Electroceramic Technologies: The Past and Future - ACerS  
Electronics Division 50th Anniversary  
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Ferroelectrics and Multiferroics  
Interfaces and Defects in Functional Oxides  
International Symposium on Advanced Dielectric Materials and Electronic Devices  
Low Temperature Processing for Integration of Microelectronics Devices  
Pb-Free, Pb-Bearing Joining and Packaging Materials and Processes for Microelectronics  
Perovskite Oxides: Films, Nanostructures, Properties and Applications |
| ENVIRONMENTAL AND ENERGY ISSUES | Ceramics and Glass for Waste Minimization, Stabilization and Disposition  
Energy Materials  
Frontiers in Materials Science: Closing the Nuclear Fuel Cycle  
Fuel Cells: Materials, Processing, Manufacturing, Balance of Plant and Systems Operation  
Green Technologies for Materials Manufacturing and Processing  
Materials and the Climate Change Challenge  
Nanoscale Design of Materials for Extreme  
Radiation Environments  
Thermoelectric Materials: Science, Technology and Applications |
| FUNDAMENTALS AND CHARACTERIZATION | ACerS Sosman Award Symposium: Kinetic Engineering of Interfacial Transport Processes  
Ceramic Surfaces, Grain Boundaries and Interfaces  
Discovery and Optimization of Materials through Computational Design  
Failure Analysis for Problem Solving  
Fatigue of Materials: Competing Failure Modes and Variability in Fatigue Life  
International Symposium on Defects, Transport and Related Phenomena  
Lifecycle of Engineered Residual Stresses: Processing, Aging and Rejuvenation  
Micro- and Nano-Mechanical Behavior of Low-Dimensional Structures and Materials  
Modeling of Multiscale Phenomena in Materials Processing  
Performance and Growth of Bulk and Thin Film Materials - Role of Surface and Interface Phenomena  
Phase Stability, Diffusion Kinetics and Their Applications (PSDK-III)  
Phase Transformations and Microstructural Changes during Sustained Mechanical Forcing  
Recent Advances in Structural Characterization of Materials  
Structure-Property Relationships in Multifunctional Materials  
The Effect of Electrical Fields and Stress on Diffusion Transport in ceramics and related phenomena. |
| IRON AND STEEL | Advancements in Steel Production through EAF, Ladle Refining and Continuous Casting Technologies and Practices  
International Symposium on Materials Engineering for Structural Applications  
New Developments in Processing and Properties of Zinc-Coated Sheet Steels  
Recent Developments in Steel Processing  
Refactory Innovations and Novel Applications in Iron and Steel Manufacture  
Steel Product Metallurgy and Applications |
| MATERIALS AND SYSTEMS | Advances in Biomedical and Biomimetic Materials  
Advances in Characterization and Modeling of Cementitious Materials (including Della Roy Lecture)  
Amorphous Materials: Common Issues within Science and Technology  
Enabling Surface Coating Systems: Science and Technology  
Glass and Optical Materials (including Alfred R. Cooper Session and Award)  
International Symposium on Innovative Processing and Synthesis of Ceramics, Glasses and Composites |
| NANOTECHNOLOGY | Controlled Processing of Nanoparticle Structures and Composites  
Nanomaterials for Electronic and Multifunctional Applications  
Nanotechnology for Power Generation  
Nanotube-Reinforced Metal Matrix Composites |
| PROCESSING AND PRODUCT MANUFACTURING | International Symposium on Ceramic Matrix Composites  
Joining of Advanced and Specialty Materials X  
Micro-Manufacturing: Material Behavior, Deformation Mechanics, Process Control and Applications  
Paradigm Shift in the Metals Industry  
Processing, Properties and Performance of Composite Materials |
| SPECIAL TOPICS | ACerS 110th Anniversary Symposium and Emerging Technologies Session  
Education and Professional Development Industry Track  
Perspectives from Emerging Materials Professionals: Early Strategies for Career Development  
Richard M. Fulrath Award Lectures  
SBIR Program; Development of Innovative Materials Technologies for Military Systems  
The National Materials Advisory Board Dissemination Series |
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Mechanical testing
Admet, Norwood, Mass. (Booth 325) provides load frames and materials testing systems for tension, compression, and torsion applications. The company says it offers a full range of new systems and can add data collection, analysis, and servo control capabilities to virtually any load frame.
www.admet.com

Alumina and zirconia
AdValue Technology LLC, Tucson, Ariz. (Booth 303) specializes in ceramic products for high-temperature and chemical-resistance applications. Examples include alumina crucibles, tubes, and plates for furnaces. Materials include alumina, zirconia, and fused quartz.
www.advaluetech.com

Metals and materials
Alfa Aesar, a Johnson Matthey company, Ward Hill, Mass. (Booth 221) is a manufacturer and supplier of nearly 30,000 research chemicals, metals, and materials. It offers a line of nanopowders including NanoMetals, NanoAlloys, and nitride and ceramic nanopowders. It also features a line of nanoparticles and dispersions from Nanophase Technologies Inc.
www.alfa.com

Ceramic engineering
Alfred University’s Inamori School of Engineering, Alfred, N.Y. (Booth 525) is a leader in undergraduate and graduate education of ceramic engineers, glass scientists, materials scientists, electrical and mechanical engineers. Professors conduct research focusing on a variety of materials and disciplines including advanced materials, biomaterials, energy and environmental systems, and automotive and manufacturing systems.
http://engineering.alfred.edu

Specialty metals
Allegheny Technologies Inc., Pittsburgh, Pa. (Booth 301) is a large, diversified specialty metals producer. ATI companies include Allegheny Ludlum, Allvac, Engineered Products, and Wah Chang. Products include: titanium and titanium alloys, nickel-base alloys and superalloys, stainless and specialty steels, zirconium, hafnium, niobium, tungsten materials, grain-oriented silicon electrical steel and tool steels, and forgings and castings.
www.alleghenytechnologies.com

Metallographic equipment
Allied High Tech Products Inc., Rancho Dominguez, Calif. (Booth 514) provides a complete line of products for metallographic sample preparation and analysis. Items on display include sectioning, mounting, grinding, polishing, cleaning, and imaging equipment for manual or semiautomatic applications; Zeiss materials microscopes, cameras, and imaging software; and consumables for specimen grinding/polishing.
www.alliedhightech.com

Measuring residual stresses
American Stress Technologies Inc., Cheshire, Pa. (Booth 500) provides equipment to measure residual stress, retained austenite, grinding damage, and heat treat defects. Three technologies are used: X-ray diffractions. Products include: hafnium, niobium, titanium, vanadium, zirconium, silicon tetrachloride, and zirconium and hafnium chemicals.
www.wahchang.com

Thermophysical measurements
Anter Corp, Pittsburgh, Pa. (Booth 412) manufactures a complete line of thermophysical properties measurement instruments for determining thermal conductivity, thermal expansion (dilatometers), and thermal diffusivity/specific heat capacity (laser flash method) of a wide range of materials from ~180 to 2800°C. ISO9001:2000 certified, testing services are also offered.
www.anter.com

Process heating equipment
Applied Test Systems Inc., Butler, Pa. (Booth 414), is a leading manufacturer of process heating and material testing equipment. Our process heating equipment services a wide variety of applications from laboratory through pilot plant and full-scale production processes. We offer an extensive line of standard products and an engineering staff ready to custom design a system for your specific application.
www.appliedtestsystems.com

Ceramic association
The Association of American Ceramic Component Manufacturers (AACCMM), Westerville, Ohio (Booth 416) is an association whose member companies manufacture ceramic components from ceramic powders at U.S. operating facilities. AACCMM’s purpose is to expand the market for U.S.-manufactured components by enhancing processes.
www.aaccmm.org

Specialty materials
ATI Allegheny Ludlum, an Allegheny Technologies company, Na trona Heights, Pa. (Booth 301), produces and markets sheet, plate, and strip specialty metals and supplies for cross-sectional materials analysis for more than a half century. ATI’s Tracer with its patented vacuum system, developed for NASA’s Space Shuttle program, enables light element analysis to quantitatively analyze elements Mg to U. The SI Tracer has been the leading manufacturer of scientific instruments and supplies for cross-sectional materials analysis for more than a century. Buehler products are used throughout the world by metallurgical laboratories, quality control departments, and failure analysis facilities for the analysis of all types of materials including metals, ceramics, composites, and semiconductors.
www.buehler.com
Imaging and analysis

Carl Zeiss SMT, Peabody, Mass., (Booth 309) a leading global provider of electron- and ion-beam imaging and analysis solutions, has opened its new North American headquarters in Peabody, Mass., near Boston. Representing an investment of more than nine million dollars, the new 53,000 square foot facility houses the research, development and production center for the unique ORION helium ion microscope product line. In addition, the facility serves as the North American hub for sales and service for the complete family of particle beam instruments and houses the Carl Zeiss Nano Solutions Center Peabody. www.smt.zeiss.com

Special metals, ceramics

Carpenter Technology Corp., Wyomissing, Pa. (Booth 419) is a manufacturer of specialty alloys and engineered products made from metallic and ceramic materials. Products include stainless, bearing, tool, and die steels; high-strength, corrosion-resistant, and high-temperature alloys; titanium alloys; and magnetic and controlled-expansion alloys. Carpenter also makes ceramics for severe wear and corrosion applications. www.carterch.com

Tribology studies

The Center for Tribology Inc., Camphell, Calif. (Booth 510), is a 15-year old manufacturer of nano, micro, and macro high-precision testers for coatings, thin films, and bulk materials. The universal testers provide comprehensive measurements of all mechanical and tribological properties, such as adhesion and delamination, scratch resistance, and nano- and micro-hardness. www.cetrl.com

Custom vacuum furnaces

Centorr Vacuum Industries, Nashua, N.H. (Booth 524), manufactures custom vacuum furnaces for high-performance sintering, pressure densification, and heat treatment of metals, hardmetals, ceramics, and other advanced materials. Graphite or carbon-free refractory metal hot zones are available with a variety of debinding systems. www.centorr.com

Lab and production furnaces

CM Furnaces Inc., Bloomfield, N.J. (Booth 214), will exhibit its complete line of laboratory and production furnaces. These furnaces operate in temperature ranges of 1000 to 2000°C, on an investment of more than nine million dollars, the new 53,000 square foot facility houses the research, development and production center for the unique ORION helium ion microscope product line. In addition, the facility serves as the North American hub for sales and service for the complete family of particle beam instruments and houses the Carl Zeiss Nano Solutions Center Peabody. www.smt.zeiss.com

Computational software

CompuTherm LLC, Madison, Wis. (Booth 411), develops computational tools for industrial applications in the broad field of materials science and engineering. We provide consulting services to materials industries, and collaborate with other institutions on challenging programs with potential commercial payoffs. Current products include Pandat, a robust, user-friendly software package for multi-component phase diagram calculations. www.computherm.com

Surface analysis

CSM Instruments, Needham, Mass. (Booth 409), offers a wide range of instruments and testing services for surface mechanical properties characterization, including indentation testers, scratch testers, and tribometers of varying load ranges. 3D-imaging options are available with the CorrScan or AFM objective. CSM makes stand-alone instruments as well as testing modules that can be combined. www.csm-instruments.com

Furnace systems

Deltech Inc., Denver, Colo. (Booth 319), manufactures laboratory and production furnaces, including glass melt and positive pressure systems, with maximum operating temperatures from 1500 to 2000°C in air, inert gas, and oxygen atmospheres. www.deltechfurnaces.com

Boron carbide abrasives

Dunhua Zhengxing Abrasive Co. Ltd., London, Ontario (Booth 417), has been a manufacturer of boron carbide since 1987, and now is the biggest producer in China. Zhengxing boron carbide is available not only in narrow ranges of grain sizes according to the FEPA standard, but also components produced according to customer specifications. www.borongcarbide.cn

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Scientific books

Elsevier, New York, N.Y. (Booth 517), is a world-leading publisher of scientific, technical, and medical information products and services. Working in partnership with the global science and health communities, Elsevier’s 7,000 employees in over 70 offices worldwide publish more than 2,000 journals, 1,800 new books per year, in addition to offering a suite of innovative electronic products. www.elsevier.com

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Electron microscopes

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Process equipment

Gasbarre Products Inc., DuBois, Pa. (Booth 601), provides full-service design, manufacturing, and marketing of capital equipment and related services, focusing on primary process equipment for the worldwide particulate materials and thermal processing industries. For example, the Gasbarre Press Division offers mechanical powder compaction and sizing presses. www.gasbarre.com

R&D materials

Goodfellow Corp., Oakdale, Pa. (Booth 219), supplies small quantities of metals, alloys, ceramics and polymers for research, development, and prototyping applications. Our web catalog lists a comprehensive range of materials in many forms, including rods, wires, tubes, and foils. Items are in stock ready for immediate shipment worldwide with no extra shipping charge. www.goodfellow.com

Powder and intermediates

H.C. Starck Inc., Newton, Mass. (Booth 424) produces powders made from refractory metals and intermediates for advanced ceramics. Products include ceramic powders from AlN to ZrC, including nitrides, borides, carbides, amorphous and crystalline boron, metals, and sintering additives like Y2O3. H.C. Starck can also produce tailor-made powders. www.hcstarck.com

Ceramic production equipment

Harrop Industries Inc., Columbus, Ohio (Booth 608) designs and manufactures a complete line of continuous and periodic tape casters, dryers, burn-off ovens, and kilns to produce ceramic products for laboratory, pilot plant, and industrial applications. Heat sources can be electric or gas-fired. Microwave-assisted heating is also available. www.harropusa.com

Materials research

High Temperature Materials Laboratory, Oak Ridge National Laboratory, Oak Ridge, Tenn. (Booth 425), is a DOE User Facility that is a national resource for collaborative materials research. It is dedicated to working with industry, universities, and other research organizations to develop materials-based, energy-efficient, and environmentally friendly highway transportation technologies. www.html.ornl.gov

Electron microscope

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Particle characterization

Horiba Instruments Inc., Irvine, Calif. (Booth 330), exhibits a broad range of particle characterization products. These include surface area, zeta potential, particle size, and particle shape analysis. The surface area offering features use of the rapid flowing gas technique. Zeta potential uses acoustics to measure this value on full-strength samples without dilution. www.horiba.com

Engineering test lab

Innovative Test Solutions, Schene- tady (Scotia), N.Y. (Booth 508), is a world leading mechanical engineering test laboratory, in Scotia, New York, specializing in the mechanical behavior of components and structural material with particular emphasis in the areas of coatings, vibration, fatigue, and friction and wear. www.its-inc.com

Continued
Materials testing
Instron, Norwood, Mass. (Booth 704), is a leading provider of test equipment for the material and structural testing markets. Instron manufactures and services material testing instruments, systems, and accessories, providing comprehensive solutions for all research, quality, and service-life testing requirements. Instron systems evaluate the mechanical properties of materials and components via tension, compression, flexure, fatigue, impact, torsion, and hardness tests.

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Materials research society
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www.mrs.org/benefits

Visualization software
Mercury Computer Systems, Visualization Sciences Group, Chelmsford, Mass. (Booth 609), is the leading provider of 3D visualization software for materials science, geosciences, oil & gas, manufacturing, and engineering. Solutions range from 3D components for application developers to advanced 3D visualization frameworks.

www.mrc.com

Test specimens
Metal Samples, Munford, Ala. (Booth 305), provides mechanical test specimens to evaluate various properties of materials. We machine tensile, fracture mechanics, and many other types of specimens to ASTM, NACE, or customer-defined specifications. Metal Samples has a large inventory of certified material from which to manufacture these specimens.

www.metalamples.com

Structural testing
Metcut Research Inc./Cincinnati Testing Laboratories, Cincinnati, Ohio (Booth 509), offers complete mechanical property and structural testing capabilities, including specimen preparation. Fully equipped metallurgical laboratory includes SEM/EDS facilities. We have extensive experience with high-performance metals, composites, and polymers.

www.metcut.com

Research instrumentation
Micro Photonics Inc., Irvine, Calif. (Booth 505), is a leading source of advanced scientific research instrumentation for mechanical, surface analysis, bio, and in-vivo applications. Clients can depend on us for knowledgeable application assistance and thorough product understanding, as well as competent installation, training, after-sales service, and professional contract laboratory services.

www.microphotronics.com

Calibration services
Micro Precision Calibration Services - Instrument and Test Equipment, Sacramento, Calif., (Booth 1, 2, & 3) is USA’s full-service calibration services center with calibration labs throughout the USA, Mexico, Philippines, and Thailand. We also sell, refurbish, and new test equipment. Micro Precision Calibration Inc has been an industry leader in calibration and repair of Test & Measurement equipment.

www.microprecision.com/ph

Particle size analysis
Microtrac Inc., Largo, Fla. (Booth 337), offers a complete line of particle size instrumentation. Booth highlights our Nanotrac 150, 250, and Ultra laser analyzer using dynamic light scatter for high concentration nanometer sizing from 0.0008 to 6.5 microns with zeta potential options. We also show our S3500 laser-diffraction-based analyzers, utilizing three solid state lasers for easy, accurate particle analysis from 0.02 to 3000 microns.

www.microtrac.com

School of science and technology
Missouri University of Science and Technology, Rolla, Mo. (Booth 624), is known for its engineering programs. It offers M.S. and Ph.D. degree programs in Metallurgical Engineering, Ceramic Engineering, and Materials Science & Technology. About 600 students are currently enrolled, making us big enough to accommodate a diverse population but small enough for individuals to stand out.

www.mst.edu

Nanosteel
The NanoSteel Co., Providence, R.I. (Booth 101) currently has a portfolio of patented iron-based steel alloy coating/overlay solutions for wear and corrosion that are based on its proprietary Super Hard Steel (SHS) technology. SHS alloys feature a refined microstructure or nanoscale microstructure that provides wear and corrosion resistance superior to conventional steels.

www.nanosteelco.com

Standard reference materials
The National Institute of Standards and Technology/Measurement Services Division, Gaithersburg, Md. (Booth 314), supports accurate and compatible measurements by certifying and providing over 1100 Standard Reference Materials with well-characterized composition, or properties, or both. SRMs are used to calibrate instruments as part of overall quality assurance programs and to verify the accuracy of specific measurements.

www.nist.gov

Powder processing
Netzsch Fine Particle Technology LLC, Exton, Pa. (Booth 503), specializes in machinery for grinding and dispersion of powders. We have been an innovative technology leader in batch and continuous process equipment for wet and dry grinding and dispersion. Equipment ranges from lab size to complete custom engineered systems with capacities up to 65 tons per hour.

www.grinding.netzschusa.com

Precision imaging instruments
Nikon Instruments Inc., Melville, N.Y. (Booth 200), is a leading supplier of precision optical and digital imaging products for inspection and noncontact measuring. Featured at this show is Nikon’s newest inverted metallographic microscope and i NexIV multi-sensor vision measuring system with touch probe. Our newest inverted metallographic microscope is ergonomic with optical observation capabilities.

www.nikon.com

Commercial testing lab
NSL Analytical Services Inc.,
Cleveland, Ohio (Booth 431), is an ISO/IEC 17025 and NadCap certified Independent Commercial Testing Laboratory providing reliable and cost-effective materials testing to customers throughout the United States and around the world. Our team of experienced chemists, metallurgists, and technicians are experts in testing metals and alloys, plastics and composites, and ceramic materials, whether in the powdered, solid, or liquid state. www.nslanalytical.com

Confocal metrology instruments
Olympus Industrial America, Micro Imaging Division, Orangeburg, N.Y. (Booth 604), will be showing microscopes and confocal metrology instrumentation for R&D, QC, and inspection departments. Discover software, along with our line of digital cameras, allows a user-friendly, modular approach for image archiving, particle analysis, measurement, rendering, and database management. www.olympusmicroimaging.com

High-tech tools
Oxford Instruments, Elk Grove, Ill. (Booth 502) specializes in the design, manufacture and support of high-technology tools and systems for industry, research, education, space, energy, defence and healthcare. We combine core technologies in areas such as low temperature and high magnetic field environments; X-ray, electron and optical based metrology; nuclear magnetic resonance, advanced growth, deposition and etching. www.oxinst.com

Zirconia products
Pangea International Ltd., Shanghai, China (Booth 105), is a supplier of zirconia-based products, including monoclinic zirconia, cubic or tetragonal stabilized zirconia with multiple stabilizer options, and various densities of zirconia-based micro beads for fine and ultrafine grinding. www.pangea-intl.com

Image analysis software
PAX-it / PAXcam, Villa Park, Ill. (Booth 427), offers PAX-it image analysis software, a full suite of materials analysis tools, including a robust image database/archive, measurement, report generation, grainsizing, particle distribution, nodularity, and thickness analysis of thin films, slice classiﬁcation, and ferrite/pearlite analyses. www.paxit.com

Ferrite powders
Powder Processing and Technology LLC, Valparaiso, Ind. (Booth 519), produces a wide range of ready-to-press ferrite powders for inductive and EMI shielding applications. We also offer an extensive range of low-sintering-temperature ferrite powders for passive component SMD applications and, fully sintered ferrite loading powders for special applications. www.pptechnology.com

125 billion pages
ProQuest, Ann Arbor, Mich. (Booth 515), provides seamless access to and navigation of more than 125 billion digital pages of the world’s scholarship, delivering it to the desktop and into the workflow of serious researchers in multiple ﬁelds, from arts and literature to science, technology and medicine. www.proquest.com

X-ray instruments
Rigaku Americas Corp., The Woodlands, Texas (Booth 436), provides the world’s most complete line of X-ray diffraction and X-ray ﬂuorescence instruments. Instrumentation includes the MiniFlex II benchtop XRD and Primini WDXRF systems, the modular Ultima IV and SmartLab multi-purpose diffractometer systems, and the ZSX Primus WDXRF spectrometers with mapping capabilities. www.rigaku.com

Refurbished SEM
SEMtech Solutions Inc., North Billerica, Mass. (Booth 430), is a leading supplier of refurbished SEMs and analytical SEM systems. In addition, we are also a North American sales and service representation company handling new scientiﬁc instrumentation that specializes in electron beam technology. www.semtechsolutions.com

Modeling software
Sente Software Ltd., Guildford, Surrey, United Kingdom (Booth 511), offers materials-focused software products for modeling the behavior and properties of complex alloys. The thermodynamic databases produced by Thermotech set the standard for the prediction of equilibrium and non-equilibrium structures in multicomponent commercial alloys. Our latest product, JMAtPro, is a unique software program for predicting phase transformations, physical/mechanical properties, and solidiﬁcation properties for complex alloys. www.sentesoftware.co.uk

Thermal analysis
Setaram Inc., Pennsauken, N.J. (Booth 420), introduces a completely new range of Thermal Analysis workstations. These units have been designed to be high performance, to feature the best software yet seen, and above all to look as good as they work. The range includes DSC, TGA, STA, TG-DSC as well as MicroCalorimeter systems. www.setaram.com

Elemental analysis
Spectro Analytical Instruments Inc., a member of the Ametek Materials Analysis Division, Mahwah, N.J. (Booth 205), supplies analytical instruments based on optical emission and X-ray ﬂuorescence spectrometry for the elemental analysis of materials. www.spectro.com

Specimen preparation
Struers Inc., Westlake, Ohio (Booth 619), covers the entire range of equipment and consumables for materialographic specimen preparation, from uncomplicated, manual machines to sophisticated, computerized preparation solutions. In addition, Struers offers a comprehensive line of Microhardness Testers. www.struers.com

Surface hardening
Swagelok Technology Services Co., a wholly owned subsidiary of Swagelok, Solon, Ohio (Booth 437), was formed in 2007 to market and commercialize its SAT12 process into a commercially viable, Ohio-based metals surface enhancement business. The SAT12 process is environmentally friendly and can improve the surface of finished components without distortion or change of dimension. www.swagelok.com

X-ray diffraction
Technology for Energy Corp. (TEC), Knoxville, Tenn. (Booth 404), displays the TEC 4000 X-Ray Diffraction System. TEC provides portable residual stress and retained austenite measurement equipment and laboratory services. Any size part can be measured in house or in the field without the need for destructive sectioning. TEC’s Materials Testing Services are A2LA accredited and ISO 9001 registered. www.tec-usa.com

Engineered coatings
TechMetals Inc., Dayton, Ohio (Booth 620), provides surface-engineered coatings for: release, dry-lubrication, low-temperature alternative ﬂame spray technology, diamond composite coatings, diamond-like, aerospace, automotive, tribology type, medical, codeposition, metal alloy coatings with Teflon, other coatings for metals, and other substrates that enhance performance. Our coatings excel in high wear, corrosive, anti-galling, and harsh environments or applications. www.techmetals.com

Vacuum furnaces
Thermal Technology LLC, Santa Rosa, Calif. (Booth 215), designs and manufactures crystal growing systems and high-temperature furnaces for laboratory and production. The furnaces accommodate metal, ceramics, glass, nanopowders, and emerging materials. Furnaces produce orthodontia, core technology for CT scanners, solar silicon metal, sapphire crystals for LED applications, high-intensity lamps, and aluminum nitride for cell phones. www.thermaltechnology.com

EDS and XRF solutions
ThermoScientific, Scientific Instrument Division Madison, Wis. (Booth 211), displays EDS, XRF and XRF solutions for advanced materials characterization. The NORAN System 7 X-ray microanalysis sys-tem will change the way you use X-ray microanalysis. The system features the ability to process 1,000,000 X-rays per second, and utilizes Direct-to-Phase software that simultaneously acquires and analyzes spectral imaging data. www.thermo.com

Computational thermodynamics
ThermoCalc Software, McMurray, Pa. (Booth 504), is a leading developer of software and databases for calculations involving computational thermodynamics and diffusion-controlled simulations. ThermoCalc is a powerful tool for performing thermodynamic calculations for multicomponent systems. Calculations are based on thermodynamic databases produced by expert evaluation of experimental data. www.thermocalc.com

Nuclear Regulatory Commission
U. S. Nuclear Regulatory Commission, Rockville, Md. (Booth 233), is proud to be ranked as the best place to work in the federal government. We’ve earned our top ratings by creating a work environment rich in opportunity, leadership training, teamwork, and work-life balance. Begin a challenging career with the NRC, where you can be part of a select group of professionals who protect people and the environment with the peaceful use of nuclear power. www.nrc.gov

Testing and research
Westmoreland Mechanical Testing & Research Inc., Latrobe, Pa. (Booth 100), has been the leader in the aerospace, nuclear, medical, and material testing ﬁelds for over 40 years. It continues to grow, expanding facilities every year to provide the most advanced, reliable testing equipment, including full machining capabilities. Westmoreland Testing programs deal with all types of alloys and materials, as well as composites. www.wmtr.com

Scientific publishing
Wiley-Blackwell, Hoboken, N.J. (Booth 109), the scientiﬁc, technical, medical, and scholarly publishing business of John Wiley & Sons, is the world’s leading society publisher, and offers peer-reviewed primary research and evidence-based medicine across thousands of online journals, books, reference works, and databases. www.wiley.com/wiley-blackwell