



# Call for Papers

Abstracts Due July 20, 2011

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## 36<sup>TH</sup> INTERNATIONAL CONFERENCE AND EXPOSITION ON **ADVANCED CERAMICS AND COMPOSITES**

January 22-27, 2012

Hilton Daytona Beach Resort and Ocean Center

Daytona Beach Florida, USA



Organized by The American Ceramic Society and The American Ceramic Society's Engineering Ceramics Division

# CALL FOR PAPERS

ABSTRACT DUE JULY 20, 2011

January 22-27, 2012 | Hilton Daytona Beach Resort and Ocean Center | Daytona Beach, Fla., USA



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## INTRODUCTION

The 36th International Conference & Exposition on Advanced Ceramics & Composites, hosted January 22-27, 2012, in Daytona Beach, Florida, will continue its successful tradition as the globally acclaimed meeting on science, technology and engineering of advanced multifunctional ceramics. The American Ceramic Society's Engineering Ceramics Division and ACerS have been organizing this prestigious conference since 1977.

Topical areas at ICACC'12 will include advanced structural and functional ceramics, composites, and emerging ceramic materials and technologies for energy and environmental applications. The technical program consisting of fourteen symposia, three focused sessions, an EU-USA Ceramics Summit and Expo will provide an open forum for scientists, researchers and engineers from around the world to present and exchange recent advances on various aspects related to ceramic science and technology.

The scope of each symposia and focused session encompasses the diverse areas of ceramic science and technology, with the particular attention and aim to address the current trends in research, engineering, and applications of advanced ceramics in the proposed topics.

The well-established symposia at this conference include Mechanical Properties and Performance of Engineering Ceramics and Composites, Advanced Ceramic Coatings, Solid Oxide Fuel Cells, Armor Ceramics, Bioceramics, Nanostructured Materials & Nanotechnology, Advanced Processing & Manufacturing Technologies (APMT), and Porous Ceramics. The 2012 APMT symposium will be held in honor of Professor R.J. Diefendorf of Clemson Univ. for his innumerable contributions to the field. For the third year in row, three key symposia: Ceramics for Electric Energy Generation, Storage, and Distribution; Thermal Management Materials and Technologies; and Advanced Sensor Technology will be held addressing the current energy and environmental challenges. Two new symposia launched at ICACC'11 - Materials for Extreme Environments: Ultrahigh Temperature Ceramics and Nanolaminated Ternary Carbides and Nitrides, and Advanced Materials and Technologies for Rechargeable Batteries - will again form part of the technical program.

A new symposium on Advanced Materials for Photonics and Energy Applications will be held at ICACC'12. ICACC'12 will include two focused sessions that have attracted considerable attention in the past: Geopolymers and Other Inorganic Polymers, and Computational Design, Modeling, Simulation and Characterization of Ceramics and Composites. In addition, a new focused session on Next Generation Technologies for Innovative Surface Coatings will be introduced as part of the technical program.

We are extremely pleased to announce that at ICACC'12, the first European Union – USA Ceramics Summit will occur. This summit will bring together representatives from ECD and experts from the two continents to foster information exchange on current status and emerging trends in innovative ceramic technologies.

The ECD Executive Committee and volunteer organizers sincerely hope you will join us at ICACC'12 for a stimulating and enjoyable conference.

### ACERS ENGINEERING CERAMICS DIVISION LEADERSHIP

- Trustee: **Mrityunjay Singh**, Ohio Aerospace Institute, NASA Glenn Research Center, USA  
E-mail: mrityunjay.singh-1@nasa.gov
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E-mail: widjaja5@corning.com

## Symposium 1: Mechanical Behavior and Performance of Ceramics & Composites

Structural ceramics and composites have applications in areas including energy generation, environment, space, transportation and microelectronics. Long-term mechanical reliability is a key issue in their ultimate use for a specific application. Correlations between processing and service conditions/environment to failure of ceramics by fracture, fatigue or deformation are key aspects. Extreme environments and challenging applications of ceramic materials have necessitated new approaches for characterization. This symposium solicits abstracts related to the diverse aspects of mechanical behavior of ceramics and composites and their correlations to processing and component performance and reliability.

### Proposed Session Topics

- Processing - microstructure - mechanical properties correlation
- Ceramics and composites for energy generation and environment
- Functionally graded materials and systems with multi-functional properties
- Mechanics, characterization techniques and equipment
- Design, reliability and life prediction modeling of devices and components
- Micro-scale testing and applications
- Fiber, matrices and interfaces
- Environmental effects on mechanical performance
- In situ characterization using x-rays and neutrons
- Testing of joined and integrated components and structures
- NDE of ceramic components
- Tribological performance of ceramics and composites



### Symposium Organizers:

- Dileep Singh, Argonne National Lab, USA
- Jonathan A. Salem, NASA Glenn Research Center, USA
- Jon Almer, Argonne National Lab, USA
- Shaoming Dong, Shanghai Institute of Ceramics, China
- Monica Ferraris, Politecnico di Torino, Italy
- Y. Zhou, Harbin Institute of Technology, China
- Michael Halbig, NASA Glenn Research Center, USA
- Greg Hilmas, Missouri Science & Technology Institute, USA
- Juergen Heinrich, Clausthal Univ. of Technology, Germany
- Keyu Li, Oakland Univ., USA
- Andrew Wereszczak, Oak Ridge National Lab, USA
- J. G. Sun, Argonne National Lab, USA

### Points of Contact:

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- Jonathan Salem: +1 (216) 433-3313; jonathan.a.salem@nasa.gov

## Tentative Schedule of Events

### Sunday – January 22

Welcome Reception 5 p.m. – 7 p.m.

### Monday – January 23

Opening Awards Ceremony and 8:30 a.m. – Noon

Plenary Session

Concurrent Technical Sessions 1:30 p.m. – 6 p.m.

### Tuesday – January 24

Concurrent Technical Sessions 8 a.m. – 5:20 p.m.

Exposition and Reception 5 p.m. – 8 p.m.

Poster Session A 5 p.m. – 8 p.m.

### Wednesday – January 25

Concurrent Technical Sessions 8 a.m. – 5 p.m.

Exposition and Reception 5 p.m. – 7:30 p.m.

Poster Session B 5 p.m. – 7:30 p.m.

### Thursday – January 26

Concurrent Technical Sessions 8 a.m. – 6 p.m.

### Friday – January 27

Concurrent Technical Sessions 8 a.m. – Noon

### Abstract Submission Instructions

Visit [www.ceramics.org/daytona2012](http://www.ceramics.org/daytona2012) to review the session topics and select the "Submit Abstract" hyperlink to be directed to the Abstract Central website.

If you have questions, please contact Marilyn Stoltz at [mstoltz@ceramics.org](mailto:mstoltz@ceramics.org) or 614-794-5868.

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## Symposium 2: Advanced Ceramic Coatings for Structural, Environmental and Functional Applications

This symposium will provide an open forum for researchers from around the world to discuss recent advances in coating sciences and technologies, processing, microstructure and property characterization, and life prediction. Special sessions will be dedicated to advanced ceramic coating and component developments for aerospace, automotive, and energy applications. Integrated structural, environmental properties and functionality through advanced coating processing and structural design are particularly emphasized.

### Proposed Session Topics

- Thermal barrier coatings
- Environmental barrier coatings
- Coatings to resist wear, erosion and tribological loadings
- Protective coating and component systems for extreme environments
- Vibration damping coatings
- Functionally graded coatings and materials
- Nanostructured coating systems
- Thin-film photovoltaic device systems
- Advanced coating processing methods and modeling
- Advanced testing and non-destructive evaluation
- Multifunctional coating system integration and durability
- Interface phenomena, adhesion and coating properties
- Modeling of coating degradation and life prediction

### Symposium Organizers:

- Dongming Zhu, NASA Glenn Research Center, USA
- H. T. Lin, Oak Ridge National Lab, USA
- Uwe Schulz, German Aerospace Center, Germany
- Yutaka Kagawa, Univ. of Tokyo, Japan
- Rishi Raj, Univ. of Colorado at Boulder, USA
- David Marshall, Teledyne Scientific and Imaging Company, USA
- Douglas E. Wolfe, Pennsylvania State Univ., USA
- Irene T. Spitsberg, Kennametal Inc., USA
- Layo Ajayi, Argonne National Lab, USA
- Yong-Ho Sohn, Univ. of Central Florida, USA
- Robert Vaßen, Forschungszentrum Jülich GmbH, Germany
- Rodney W. Trice, Purdue Univ., USA
- Ping Xiao, Univ. of Manchester, UK
- Jow-Lay Huang, National Cheng Kung Univ., Taiwan
- Kyoung Il Moon, Korea Institute of Industrial Technology, Korea

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## Symposium 3: 9th International Symposium on Solid Oxide Fuel Cells: Materials, Science and Technology

SOFC systems offer potential for clean and efficient power generation from a wide variety of fuels ranging from hydrocarbons to renewables and coal-derived fuels. Advanced systems configurations are currently being developed for applications in centralized and distributed stationary generation, automotive auxiliary power, man portable and unmanned operation. With demonstrated advantages of high electrical efficiency, lower emissions (greenhouse gas, SO<sub>x</sub>, NO<sub>x</sub>, VOC and particulate matters) and ease of products configurability, major focus of interest continues to be on systems research and development, products engineering and cost effective manufacturing under the sponsorship of both private industries and government agencies. Although significant progress has been made in the areas of cell and stack materials, component fabrication, stack and systems simulation and design, fuel processing and systems operation on a wide variety of liquid and gaseous hydrocarbons, technology development continues towards the identification of bulk and interfacial modifications for performance enhancement, degradation minimization and cost reduction at both materials and process levels. Significant challenges exist in the areas of stacking cells, thermal management and BOP component development at both sub-kWe and large multi-kWe levels.

The primary purpose of this symposium is to provide an international forum for scientists and engineers to present recent technical progress, and to exchange ideas and technical information, on various aspects of solid oxide fuel cells. The participants will gather state-of-the-art knowledge in the fields of SOFC component materials, processing, cell/stack fabrication and design, electrochemical performance and performance stability, bulk, interface and surface interactions, microstructural and interface engineering, computational simulation and modeling, test procedures and performance analysis, gaseous and liquid fuel processing, etc.

### Proposed Session Topics

- Oxygen ion, proton and mixed conductors; conduction mechanisms, materials limitations, electrolytes for 400-1000°C applications
- Electrode materials and microstructural engineering; tailored structure, electrode processes and limitations including defect chemistry modifications, analytical techniques
- Ceramic and metallic interconnects; degradation mechanisms, coatings, accelerated testing and life prediction, large scale manufacturing and cost reduction
- Sealing materials, designs and approaches; seal materials compatibility and interactions
- Novel processing approaches for cell and stack materials
- Mechanical and thermal properties of component materials and fabricated structures
- Electrochemical performance, performance enhancement and stability of cells and stacks
- Reliability and degradation: electrical and structural reliability, long term prediction
- Surface and interfacial reactions; materials transport and electrode poisoning; catalytic degradation, carbon fouling

- Degradation modeling and computational simulation of cells and stacks; design for manufacturing
- Novel cell and stack designs (for example LT-SOFC, DC-SOFC, Air independent operation etc.), utilization of bio-derived fuels
- High temperature electrolysis – Water and CO<sub>2</sub>, CO<sub>2</sub> utilization, dry reforming
- Fuel processing; supported/unsupported catalysts; carbon and sulfur fouling, gas separation membranes
- Applications—Centralized and distributed generation, CHP and  $\mu$ -CHP, Hydrogen production, portable and unmanned operations

### Symposium Organizers:

- Prabhakar Singh, Center for Clean Energy Engineering, Univ. of Connecticut, USA
- Narottam P. Bansal, NASA Glenn Research Center, USA
- J. S. Chung, POSTECH, Korea
- Tatsumi Ishihara, Kyushu Univ., Japan
- Mihails Kusnezoff, Fraunhofer IKTS, Germany
- Nguyen Q. Minh, Consultant, USA
- Mogens Mogensen, Risoe National Lab, Denmark
- J. O'Brien, INL, USA
- Jeffrey W. Stevenson, Pacific Northwest National Lab, USA
- A. K. Suri, BARC, India
- Toshio Suzuki, AIST, Japan
- Eric D. Wachsman, Univ. of Maryland, USA

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## Symposium 4: Armor Ceramics

U.S. military forces face an ever changing array of threats on the battlefield that continually requires the development of new materials to provide improved protection. Ceramic materials are, and will continue to be, an integral component of the armor systems developed to provide protection for air and ground vehicles as well as the individual soldier. This symposium will bring together researchers from industry, academia, and government organizations to address leading areas including:

### Proposed Session Topics

- Opaque materials
  - Synthesis & processing
  - Characterization
  - Novel materials
  - Commercial materials
- Transparent materials
  - Transparent armor systems
  - Missile windows and radome applications
  - Impact resistant glass systems
  - Cost effective surface treatments
  - Adhesives
- Dynamic behavior
  - Damage characterization
  - Inelasticity and failure mechanisms
  - Static and dynamic property testing
  - Shock wave/blast effects
  - Surface effects
- Impact, penetration, and material modeling
  - Particle mechanics
  - Multi-scale
  - Micro- and meso-structural
  - Incorporation of flaws and inelasticity mechanisms

### Symposium Organizers

- James Campbell, U.S. Army Research Lab, USA
- Lisa Prokurat Franks, U.S. Army TARDEC, USA
- Todd Jessen, U.S. Army Research Lab, USA
- Jerry LaSalvia, U.S. Army Research Lab, USA
- Brian Leavy, U.S. Army Research Lab, USA
- James McCauley, U.S. Army Research Lab, USA
- David Stepp, U.S. Army Research Office, USA
- Jeffrey J. Swab, U.S. Army Research Lab, USA
- Andrew Wereszczak, Oak Ridge National Lab, USA

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## Symposium 5: Next Generation Bioceramics and Biocomposites

Novel bioceramic materials are being developed that will provide improvements in diagnosis and treatment of medical and dental conditions. In addition, the development and use of nanostructured materials, bioinspired materials, biomimetic materials, and inorganic-organic structures has generated considerable scientific interest. This symposium will allow for discussion among the many groups involved in the development and use of bioceramics and biocomposites, including ceramic researchers, medical device manufacturers, and clinicians.

### Proposed Session Topics

- Advanced Processing of Bioceramics
- Biomineralization and Tissue-Material Interactions
- Bioactive and Resorbable Ceramics
- Bioinspired and Biomimetic Ceramics
- Self-Assembled Bioceramics
- Ceramics for Drug and Gene Delivery
- In Vitro and In Vivo Characterization of Bioceramics
- Inorganic-organic composite structures
- Mechanical Properties of Bioceramics
- Medical and Dental Applications of Bioceramics
- Nanostructured Bioceramics (joint with Symposium 7)
- Porous Bioceramics (joint with Symposium 9)
- Ceramic Biosensors

### Symposium Organizers:

- Roger J. Narayan, Univ. of North Carolina, USA
- Chikara Ohtsuki, Nagoya Univ., Japan
- Markus Reiterer, Medtronic, Inc., USA
- Bikramjit Basu, Indian Institute of Technology, India
- Akiyoshi Osaka, Okayama Univ., Japan

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### HILTON DAYTONA BEACH RESORT

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Fax: 1-386-253-8841

#### Rates:

One to Four Occupants \$149  
Students: \$123  
Government: Prevailing Rate

Mention The American Ceramic Society to obtain the special rate. Room rates are effective until December 22, 2011 and are based on availability.

## Symposium 6: International Symposium on Ceramics for Electric Energy Generation, Storage, and Distribution

The significant increases in demand of world energy consumption as well as clean and efficient energy resources have prompted the imperative searches of new materials and technologies. The technologies aiming for efficient electric energy generation with zero-emission will require advances not only in the existing gas turbine systems and renewable energy resources, but also efficient energy storages and reliable electric power transmission systems. This symposium will focus on the advanced engineering ceramics and technologies that could help the global community to achieve the stated goals. A broad perspective is desired including advanced materials for energy harvesting and renewable energy generation; high-temperature ceramics and composites for energy efficiency and zero emission; high-temperature superconductor technologies for efficient electric power transmission; materials development and technologies for reliable and efficient electric and advanced thermal energy storage.

### Proposed Symposium Topics

- Thermoelectric materials for energy harvesting
- Materials for thermionic and thermovoltic applications
- Materials of capacitive energy storage (ultracapacitors and hybrid ultracapacitors)
- Materials for solar-thermal applications
- Novel design and strategies for energy storage
- Smart materials design through theory and modeling
- Ceramics and composites for stationary and distributed power generation systems
- High-temperature superconductors

### Symposium Organizers:

- H. T. Lin, Oak Ridge National Lab, USA
- Terry Tritt, Clemson Univ., USA
- Franziska Scheffler, Otto-von-Guericke-Universität, Germany
- Anke Weidenkaff, EMPA, Switzerland
- Tohru Sekino, Tohoku Univ., Japan
- Kuan-Zong Fung, National Cheng Kung Univ., Taiwan
- Kunihito Koumoto, Nagoya Univ., Japan
- Lidong Chen, Shanghai Institute of Ceramics, China
- Tseung-Yuen Tseng, National Chiao-Tung Univ., Taiwan
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## Symposium 7: 6th International Symposium on Nanostructured Materials and Nanocomposites

This symposium will focus on science and engineering of nanostructured materials, with a strong focus on the elaboration of the practical side of nanotechnology. Special emphasis will be given to novel synthesis, functionalization, processing, and characterization of nanoparticles, nanowires and their heterostructures. Application of nanostructures in drug-delivery, catalysis, energy and sensing applications, nanocomposites in structural light weight materials, nanostructured coatings for photovoltaic, bio-medical and optical applications will form the major thrust areas. Contributions related to fabrication of nanomaterials-based products and challenges related to the large-scale production and integration of functional and structural nanomaterials will be given particular attention.

### Proposed Session Topics

- Industrial development and application of nanomaterials
- Nanostructured membranes, thin films, functional coatings
- Synthesis, functionalization, processing and self-assembly of nanoparticles
- Nanotubes, nanorods, nanowires and other one-dimensional structures

- Bio-active nanomaterials and nanostructured materials for bio medical applications
- Nanotoxicity and health aspects of engineered nanostructures
- Polymer nanocomposite technology and nanoporous materials
- Nanomaterials for photocatalysis, solar hydrogen and thermo-electrics
- Nanodevices: fabrication and large-scale integration
- Characterization and manipulation techniques for nanostructures

### Symposium Organizers:

- Sanjay Mathur, Univ. of Cologne, Germany
- Suprakas Sinha Ray, DST/CSIR- National Centre for Nanomaterials, South Africa
- Yoon-Bong (Y.B.) Hahn, Chonbuk National Univ., Korea
- Yasuhiro Tachibana, Osaka Univ., Japan
- Alberto Vomiero
- Yoshitake Masuda

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## Symposium 8: 6th International Symposium on Advanced Processing and Manufacturing Technologies for Structural and Multifunctional Materials and Systems (APMT) in honor of Professor R. Judd Diefendorf

The properties and performance of structural and multifunctional materials largely depend on their processing and manufacturing routes. Manufacturing processes carefully designed with sufficient understanding of forming/sintering behaviors lead to reliable performance of components and products of large size and complex shapes. On the other hand, recently developed new processing and fabrication techniques of ceramic materials and systems give us unique properties which cannot be achieved from the conventional routes.

The aim of this international symposium is to discuss global advances in the research and development of advanced processing and manufacturing technologies for a wide variety of fiber reinforced and particulate composites, non-oxide and oxide based structural ceramics, and multifunctional materials, as well as their components and devices. Current advances and state-of-the-art in various eco-friendly processing approaches will be covered. Advances in various processing and manufacturing technologies for fine scale MLCCs and transparent or electronic ceramic devices will also be presented.

This international symposium is being held in honor of Professor R. Judd Diefendorf, Clemson Univ., USA, recognizing his outstanding contributions to science and technology of advanced ceramic fibers, carbon-carbon, and ceramic matrix composites and his tireless efforts in promoting their wide scale industrial applications.

### Proposed Symposium Topics

- Advanced composite manufacturing technologies, hybrid processes
- Nano-reinforcement processing (CNT, grapheme, etc.)
- Advanced fiber fabrication
- Novel forming/sintering technologies
- Microwave or microwave assisted processing, SPS

- Aqueous synthesis and processing, colloidal processing
- Polymer-based processing
- Rapid prototyping, patterning, templates and self assembly
- Micro-electronics devices and systems
- Design-oriented manufacturing and processing
- Large scale/complicated shape processing
- Joining, integration, machining, repair, and refurbishment technologies
- Green manufacturing; global environmental issues and standards
- Global mineral resources issues; geopolitics, and supply chain management
- Life cycle assessment, recycling, and reuse technologies

### Symposium Organizers:

- Tatsuki Ohji, AIST, Japan
- Mrityunjay Singh, Ohio Aerospace Institute, NASA Glenn Research Center, USA
- Walter Krenkel, Univ. of Bayreuth, Germany
- Soshu Kirihaara, Osaka Univ., Japan
- Tomaz Kosmac, Josef Stefan Institute, Slovenia
- Hejun Li, Northwestern Polytechnical Univ., P. R. China
- Kun-Lin Lin, National Nano Device Labs (NDL), Taiwan
- Eugene Medvedovski, Umicore Indium Products, USA
- Robert J. Shinavski, Hyper-Therm High-Temperature Composites, USA
- Richard D. Sisson, Jr., Worcester Polytechnic Institute, USA
- Roland Weiss, Schunk Kohlenstofftechnik GmbH, Germany

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- Mrityunjay Singh: +1 (216) 433-8883; mrityunjay.singh-1@nasa.gov

## Exhibition Information



Reserve your booth space today for the premier advanced ceramics & composites event.

This event offers an exceptional opportunity to present your company's latest products, services and technology to a sophisticated audience sharply focused on this market.

### Exhibits Open:

Tuesday, January 24, 2012, 5:00-8:00 p.m.

Wednesday, January 25, 2012, 5:00-7:30 p.m.

### Exposition Location:

Ocean Center Exhibit Hall, 101 North Atlantic Avenue, Daytona Beach, Fla.

Visit [www.ceramics.org/daytona2012](http://www.ceramics.org/daytona2012) for more details or contact Patricia Janeway at [pjaneway@ceramics.org](mailto:pjaneway@ceramics.org) or at 614-794-5826.

## Symposium 9: Porous Ceramics: Novel Developments And Applications

This symposium aims to bring together engineers, technologists and scientists in the area of ceramic (and glass-ceramics) materials containing high volume fractions of porosity, with porosity ranging from nano- to milli-meters. Such structures commonly exhibit cellular and high surface area architectures, and they include foams, honeycombs, fiber networks, connected rods, connected hollow bodies, syntactic foams, bio-inspired structures, micro- & meso-porous materials and aero-gels.

Porous ceramics components are an essential and critical part of numerous structures and devices in various enabling engineering applications. Applications of considerable recent interest include hydrogen and energy-related technologies, environmental technologies, sensors, catalysis supports (photo-catalysis, etc.), water purification, mass separation, and porous matrix fiber composites as well as hot gas filtration. Furthermore, research fields and advancement in emission control applications such as Diesel Particulate Filters (DPFs) and sorbent for mercury abatement continue to be of particular interests.

Papers are solicited on fundamental and novel aspects of processing, synthesis, characterization, modeling, properties evaluation and applications of wide range of porous ceramics. In addition, advancement in next generation porous ceramics, characterization tools and methods applicable to the understanding of materials and structures are also of interest. A specific session is devoted to Porous Bioceramics, and will be co-organized in conjunction with Symposium 5.

### Proposed Session Topics:

- Innovations in processing methods & synthesis of porous ceramics
- Structure and properties of porous ceramics
- Modeling and characterization of porous structures
- Mechanical behaviors of porous ceramics
- Novel characterization tools of porous structures
- Micro-porous and meso-porous ceramics
- Porous ceramics for environmental applications
- Porous ceramics for energy applications
- Porous ceramics for biological applications
- Porous ceramics for functional applications
- Porous ceramics for emission control

### Symposium Organizers

- Paolo Colombo, Univ. of Padova, Italy
- Sujanto Widjaja, Corning Incorporated, USA
- Yuji Iwamoto, Nagoya Institute of Technology, Japan
- Aldo Boccaccini, Univ. of Erlangen-Nuremberg, Germany
- Thomas R. Watkins, Oak Ridge National Lab, USA

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## Symposium 10: Thermal Management Materials and Technologies

Due to increased performance in a wide range of engineered products ranging from computer processors to advanced aerospace vehicles, there is a critical need for improved thermal management systems for transferring and storing thermal energy. The required enhancements include increased thermal conductivity, increased surface area, reduced weight/volume, as well as operability in harsh environments. For example, improved thermal management is needed to increase the power density of electronics and more effectively cool electronic enclosures that are envisioned for future aircraft, spacecraft and surface ships. Typically, heat exchangers must increase in size in order to more effectively dissipate any increased heat loads. This is impossible in many cases, thus new materials and concepts for heat exchanger cores/systems are required. Another high profile application involves thermal protection systems (TPS) for aerospace vehicles (e.g., the reinforced carbon composite leading edge of the Space Shuttle). Future TPS systems will include a systematic approach where a temperature resistant, durable exterior composite skin is coupled with a combination of conductive and insulating core materials both of which will need to be capable of withstanding extreme environments. Furthermore, thermal energy storage devices (TESD) are seeing greater utilization in engineered products. TESD research associated with enhancing phase change materials (PCM) is of great interest (e.g., PCMs doped with nanoparticles for increased conductivity).

The aim of this symposium is to discuss and highlight new materials and the associated technologies related to thermal management. Examples of these new enabling technologies include advanced materials such as high conductivity/large surface area core materials (e.g., graphite foams); light weight ultra-high conductivity sheet materials that perform structurally (e.g., 2D carbon/carbon or ceramic composites) or as heat sinks/spreaders (e.g., natural graphite/epoxy materials); heat transfer nanofluids; insulating core materials (e.g., ceramic aerogels); joining technologies; thermal energy storage devices; phase change materials; and lastly, a slew of technologies that are required for system implementation.

### Proposed Session Topics

- Design, development, and testing of aerospace thermal protection systems (TPS)
- Advanced composites for thermal protection systems (e.g., carbon/carbon and ceramic matrix composites, ablative materials, etc.)
- Harsh environment, light weight insulating materials (aerogels, foams, etc.)
- Light weight, high conductivity materials for thermal management (graphite and diamond, carbon and metallic foams, C/C and CNT composites, Al/SiC, BeO, Cu-based systems, etc.)
- Heat transfer nanofluids
- Thermal energy storage devices
- Phase change materials and associated technologies
- Design, development, and testing of advanced heat exchangers, recuperators, etc.
- Bonding and integration technologies, thermal contact materials
- Nondestructive evaluation, quality assessment, structural health monitoring, sensors, etc.

### Symposium Organizers:

- Andrew L. Gyekenyesi, Ohio Aerospace Institute, NASA Glenn Research Center, USA
- Mrityunjay Singh, Ohio Aerospace Institute, NASA Glenn Research Center, USA
- Dileep Singh, Argonne National Lab, USA
- Michiko Kusunoki, Nagoya Univ., Japan
- Rajiv Asthana, Univ. of Wisconsin-Stout, USA
- Ajit K. Roy, Air Force Research Lab, WPAFB, USA
- Walter Krenkel, Univ. of Bayreuth, Germany
- Tatsuki Ohji, AIST, Japan

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## Symposium 11: Nanomaterials for Sensing Applications: From Fundamentals to Device Integration

Nanomaterials exhibit new properties with significant potential for sensing applications. Nevertheless, for such nanostructures to realize their full potential they must be integrated in complex and large scale architectures as well as their fundamental properties need to be well-known and fully controlled. Thus, advances in nanoscience and nanotechnology are required to attain better sensors in the future.

This symposium will focus on science and technology of nanostructured materials with interesting and promising properties for sensing applications. Beside approaches towards novel synthesis, processing and modeling of their structure-property correlations at the nanometer length scales, their practical application in different sensing technologies will make up the major thrust areas. Integration of nanostructured materials in proof-of-concept devices close to the industry requirements will be given particular attention.

### Symposium Organizers :

- Francisco Hernandez-Ramirez, Catalonia Institute for Energy Research and Univ. of Barcelona Barcelona, Spain
- Jia Grace Lu, Univ. of Southern California, USA
- Alexander Gaskov, Moscow State Univ., Russia
- Gerhard Müller, EADS Deutschland GmbH – Innovation Works, Munich, Germany
- Ignasi Vilajosana, Worldsensing, Spain

### Point of Contact:

- Francisco Hernandez-Ramirez: fhernandez@irec.cat

## Symposium 12: Materials for Extreme Environments: Ultrahigh Temperature Ceramics (UHTCs) and Nanolaminated Ternary Carbides and Nitrides (MAX Phases)

Ultrahigh temperature ceramics and nanolaminated ternary carbides and nitrides (MAX phases) are potential materials for use in extreme environments such as hot turbine engine components, leading edges and thermal protection systems for hypersonic vehicles, and cladding materials in generation IV nuclear reactors. However, their thermal/chemical stability at high temperatures, the ability to be formed into complex shapes/sharp edges, thermal shock resistance, irradiation resistance, and damage tolerance are all critical issues limiting the near-term applications of these materials. Consequently, further research is needed to understand the multi-scale structure-property relationships of existing systems; design new compositions/composites; investigate new approaches for improving the thermal shock resistance, thermochemical stability, damage tolerance and machinability; and develop novel processing methods for bulk ceramics and coatings. This symposium will focus on design, processing, structure-property relationships, thermal and mechanical properties, oxidation resistance, machining and joining, and stability of UHTCs and MAX phases both from fundamental and application-oriented perspectives.

### Proposed Session Topics:

- Fundamental understanding of the structure-property relationships for UHTCs and MAX phases
- Design of MAX phase and UHTCs compositions/composites with fascinating properties
- Novel processing methods for UHTCs and MAX phases (bulk, coatings and thin films)
- Novel characterization methods to investigate the behavior of UHTCs and MAX phases
- Methods for improving damage tolerance, oxidation and thermal shock resistance
- New methods for joining and machining of components
- Structural stability under extreme environments (irradiation, ultra-high temperature, etc.)

### Symposium Organizers:

- Yanchun Zhou, Institute of Metal Research Chinese Academy of Sciences, China
- Erica L. Corral, Univ. of Arizona, USA
- Joyce Deaver, NASA Glenn Research Center, USA
- Per Eklund, Linköping Univ., Sweden
- William G. Fahrenholtz, Missouri Univ. of Science and Technology, USA
- Frederic Monteverde, Institute of Science and Technology of Ceramics-CNR, Italy
- Miladin Radovic, Texas A&M Univ., USA
- Jochen Schneider, Materials Chemistry, RWTH Aachen, Germany

- Luc J. Vandeperre, Imperial College London, UK
- Guo-Jun Zhang, Shanghai Institute of Ceramics, Chinese Academy of Sciences, China

### Point of Contact:

- Yanchun Zhou: +86(01) 6838-2478; yczhou714@gmail.com

## Symposium 13: Advanced Ceramics and Composites for Nuclear Applications

Ceramics and ceramic composites are considered indispensable for various advanced energy systems to operate efficiently, safely, cost-effectively, and in an environment-friendly manner. Nuclear reactors and fusion energy systems are not exceptions. This symposium provides a venue for materials scientists and nuclear engineers to discuss the opportunities and needs of advanced ceramics and composites in such energy systems, and the current state of the art for science and technology of these materials ranging from materials design, processing, and properties to qualification and licensing. This symposium is co-sponsored by the ACerS Nuclear and Environmental Technology Division.

### Proposed session topics:

- Ceramic and carbon composites for high temperature reactors
- SiC ceramics and composites for fusion energy
- Ceramic for fuel coating and inert fuel matrix
- ZrC and other alternative fuel coatings
- Graphite and carbon materials
- Crystalline, amorphous and composite materials for waste immobilization
- Waste forms for challenging isotopes
- Radiation and environmental effects
- Fuel reprocessing and management of fission product elements
- Stress, operating temperature, and lifetime-limiting issues
- Material/composite design
- Test standards and design codes
- Joining and coating

### Organizers:

- Kevin M. Fox, Savannah River National Lab, USA
- Yutai Katoh, Oak Ridge National Lab, USA
- Josef Matyas, Pacific Northwest National Lab, USA
- S.K. Sundaram, Alfred Univ., USA

### Points of Contact:

- Kevin M. Fox: +1 (803) 819-8462; kevin.fox@srnl.doe.gov
- Yutai Katoh: +1 (865) 576-5996; katohy@ornl.gov

# CALL FOR PAPERS

ABSTRACT DUE JULY 20, 2011

January 22-27, 2012 | Hilton Daytona Beach Resort and Ocean Center | Daytona Beach, Fla., USA

## Symposium 14: Advanced Materials and Technologies for Rechargeable Batteries

Improvements in materials design, electrodes architecture, and cell chemistry are required to extend the life, enhance the safety, and lower the cost of rechargeable lithium batteries that are regarded nowadays as the most efficient energy storage systems for portable electronics, medical, military, renewable energy storage, smart grid, and transportation applications. A deeper understanding of the battery materials/property relationship, electrode/electrolyte interface phenomena, and cell failure mechanisms is also needed to face these challenges. The search for advanced high capacity electrode materials and the implementation of the very challenging lithium-air batteries will be necessary to overcome the energy density shortfall in current lithium batteries. Abstracts are solicited on the fundamental and applied aspects of rechargeable lithium batteries, lithium-air batteries, and beyond lithium battery technologies. This symposium will allow for discussion amongst the many groups involved in the development and use on these technologies.

### Proposed Session Topics

- Advanced anode and cathode materials for lithium batteries
- Materials design, screening, and electrode architectures for lithium batteries
- Diagnostics and materials characterization for lithium batteries
- Electrode/electrolyte interface characterization for lithium batteries
- Applications focused lithium batteries
- Lithium metal-air battery technology
- Beyond lithium batteries
- Sodium batteries

### Symposium Organizers:

- Ilias Belharouak, Argonne National Lab, USA
- Mickael Badding, Corning, Inc, USA
- Marca Doeff, Lawrence Berkeley National Lab, USA
- Dominique Guyomard, Institut des Matériaux Jean Rouxel, France
- Shirley Meng, Univ. of California San Diego, USA
- Jai Prakash, Illinois Institute of Technology, USA
- Dileep Singh, Argonne National Lab, USA
- Yang-Kook Sun, Hanyang Univ., Republic of Korea

### Point of Contact:

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## FOCUSED SESSION 1: GEOPOLYMERS, INORGANIC POLYMERS, HYBRID ORGANIC-INORGANIC POLYMER MATERIALS

Geopolymers are a class of totally inorganic, alumino-silicate based ceramics that are charge balanced by group I oxides. They are rigid gels which are made under relatively ambient conditions of temperature and pressure into near-net dimension bodies, and which can subsequently be converted to crystalline or glass-ceramic materials.

This focused session also welcomes papers on other inorganic polymers including phosphates or borates, as well as organic-inorganic molecular level hybrid materials. Decreasing the size of the inorganic units to the same level as organic building blocks can lead to more homogeneous materials that allow a further fine tuning of material properties on the molecular and nanoscale level, generating novel materials that either show characteristics in between the two original phases or even new properties.

### Proposed Session Topics

- Geopolymers
- Inorganic polymers
- Inorganic-organic hybrid polymers
- Synthesis and processing
- Microstructure
- Properties
- Novel applications

### Symposium Organizers:

- Waltraud M. Kriven, Univ. of Illinois at Urbana, USA
- Kenneth J.D. MacKenzie, Victoria Univ. of Wellington, New Zealand

### Point of Contact:

- Waltraud M. Kriven: +1 (217) 333-5258; kriven@illinois.edu



## FOCUSED SESSION 2: COMPUTATIONAL DESIGN, MODELING, AND SIMULATION OF CERAMICS AND COMPOSITES

Recent progresses in the computational material science have significantly enhanced the efficiency in understanding of fundamentals of phenomena, improvement of material performance, optimization of processing, and design of new materials and devices. To facilitate the understanding and further optimizing the behavior of ceramics and composites, and designing new ceramics or composites with tailored properties, this symposium will focus on design, modeling, simulation and characterization of ceramics and composites. A broad perspective is desired including prediction of crystal structure and properties of new ceramics, materials design for extreme/harsh environments, virtual material design for new innovative materials, application of novel simulation methods for material processing and performance, and Characterization and modeling of surfaces, interfaces and grain boundaries at multiple scales.

### Proposed Session Topics

- Novel simulation methods for materials processing and performance
- Prediction/simulation of crystal structure and properties of advanced ceramics
- Materials design for extreme environments, including applications for ultrahigh temperature, environmental and thermal barrier coatings
- Prediction of new interface materials for ceramic matrix composites
- Virtual material design for new innovative materials
- Simulation/characterization of material behavior at high-temperatures
- Characterization and modeling of surfaces, interfaces and grain boundaries at multiple scales

### Organizers

- Jingyang Wang, Institute of Metal Research, Chinese Academy of Sciences, China
- Wai-Yim Ching, Univ. of Missouri-Kansas City, USA
- Brian Good, NASA Glenn Research Center, USA
- Jan Hamaekers, Fraunhofer Institute for Algorithms and Scientific Computing SCAI, Germany
- Michael J. Hoffmann, Univ. of Karlsruhe, Germany
- Jian Luo, Clemson Univ., USA
- Katsuyuki Matsunaga, Kyoto Univ., Japan
- Hans J. Seifert, Technical Univ. of Freiberg, Germany
- Yanchun Zhou, Institute of Metal Research, Chinese Academy of Sciences, China

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## FOCUSED SESSION 3: NEXT GENERATION TECHNOLOGIES FOR INNOVATIVE SURFACE COATINGS

Recently, we see solid demands from industries for new surface coatings with more than one special property from a single material system. Those properties are sometimes complementary or sometimes almost opposite. Longer operation life, lower friction for energy efficiency, lesser corrosion and wear, and etc. are the key technological demands from automobile, heavy duty, and power generation industries. For these technological demands the surface coating technologies are advantageous especially in terms of economy, because they would gain the optimum properties with only a small consumption of materials. It has been frequently proved that the noble surface coatings with optical, magnetic, electronic, catalytic, mechanical, chemical, and tribological functionalities can be realized by the high-tech nanocomposite coatings. In this respect, there has been a worldwide competition to develop various kinds of composite coatings which could possibly facilitate the multi-functionality. We also understood that a technological merge or fusion of both dry vacuum and wet chemical methods would give even more improved coatings.

This symposium will focus on the technology developments answering the industrial demands, the examples of successful industrialization, the new applications with newly developed technologies, and the future trends of the nanocomposite coatings with multi-functionalities.

### Proposed Session Topics

- Next generation production methods for surface engineering
- Fusion of wet and dry process
- Technology for innovative surfaces in automobiles, electronic devices, mechanical parts, etc.
- Lower friction coating, longer operation life solutions, improved corrosion protection, etc.
- Industrialization of developed technologies facilitating the mass production
- Technical problems and corresponding solutions of surface related properties and processes in industry

### Organizers:

- Taejin Hwang, Korea Institute of Industrial Technology, Korea
- Kyoung Il Moon, Korea Institute of Industrial Technology, Korea
- Kostya Ostrikov, CSIRO Materials Science and Engineering, Australia
- Alan W. Weimer, Univ. of Colorado, USA
- Dileep Singh, Argonne National Lab, USA
- Peter Oliveira, Leibniz-Institute for New Materials, Germany
- Sang Sub Kim, Inha Univ., Korea
- Se Hoon Kwon, Pusan National Univ., Korea
- Seong-Gi Kim, LG Innotek, Korea
- Tadachika Nakayama, Nagaoka Univ. of Technology, Japan
- Jun Akedo, AIST, Japan
- Tim Hosenfeldt, Schaeffler Group, Germany

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# CALL FOR PAPERS

ABSTRACT DUE JULY 20, 2011

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## EUROPEAN UNION – USA ENGINEERING CERAMICS SUMMIT

This transatlantic EU-USA Ceramics Summit on “Innovative engineering for functional and value-added materials – towards green and sustainable solutions” will bring together a wide class of experts from academia, industries and research institutes/laboratories to discuss the current state of the art and existing technical challenges in research, development, engineering, manufacturing, and application of ceramic and novel functional materials.

During the last 50 years, a wide ranging ground breaking research, technology development, and commercialization in the field of engineering and functional ceramics took place on the European and American continents. These seminal contributions enabling design and engineering of ceramics for multifunctional properties, led to their wide scale applications in energy, aerospace, healthcare, communication, infrastructure, transportation, environmental, and other industries. These break-through ceramic technologies and systems led to significant improvements in living standards and quality of life for people from all over the world. The goal of this summit is to provide a forum for the information exchange on current status and emerging trends in innovative ceramic technologies and to identify strategic elements and new materials technology pathways for a sustainable future.

The technical program of the summit will cover wide ranging topics to capture the breadth of the on-going ceramics research and identify:

- Current trend and future directions for materials research and technology
- Challenges and prospects for various ceramic technologies
- Energy and environmental issues and role of ceramics
- Ceramic education, training and knowledge management
- Overview of major ceramics efforts in the region
- New strategies and technologies for sustainable and self-sufficient solutions
- Reducing environmental footprint
- EU-USA collaborative efforts
- Open Innovation and industrial R & D

The technical program of the summit will consist of invited and contributed presentations. We hope that this forum will serve as a global stage for the information exchange on the latest emerging ceramic technologies and facilitate open dialogue and discussion with leading experts.

### Organizers:

- S. Mathur, Univ. of Cologne, Germany
- M. Singh, NASA Glenn Research Center, USA
- Alex Michaelis, Fraunhofer Institute for Ceramic Technologies and Systems
- Juan Ramon Morante, IREC, Spain
- Pavol Sajgalik, Slovak Academy of Sciences, Slovakia
- Giorgio Sberveglieri, Univ. of Brescia, Italy
- George Kiriakidis, FORTH, Greece
- Danilo Suvarov, Institut “Jožef Stefan,” Slovenia
- Jacques Lamon, Univ. of Bordeaux, France

## GLOBAL YOUNG INVESTIGATORS FORUM

The first Global Young Investigators Forum is meant to facilitate scientific discussions among young researchers and the exchange of ideas essential to identify emerging global challenges at the interface of physics, chemistry, biology, medicine, material research and engineering. Young researchers below 35 years of age are invited to join this event to share and discuss their recent results in form of brief presentation, which will be followed by discussions. This forum will help to establish global cooperations and networks among young scientists to approach future challenges in ceramic science and technology. This interdisciplinary workshop will cover, but is not limited to the following thematic areas:

### Proposed Session Topics

- Frontiers in ceramic chemistry
  - New precursors for functional ceramics
  - Chemical and physical functionalisation of ceramics
  - Ceramics and catalysis
- Frontiers in hybrid materials and composites
  - Hybrid sensors and actuators
  - Biological and medical applications
  - Energy generation and storage, photocatalysis
  - Novel electronic and piezoelectronic materials. Printable electronics
  - Graphene-based materials and devices
  - TCO, LED and LCD materials and technologies
  - Innovative surfaces and display technologies
  - NEMS and MEMS devices
- Young researchers’ mobility and networks

### Organizers

- Thomas Fischer, Institute of Inorganic Chemistry, Univ. of Cologne, Germany
- K.R.G. Karthik, NTU, Singapore
- Sanyucta Kumari, Banaras Hindu Univ., India
- Artem Marikutsa, Moscow State Univ., Russia
- Andrea Ponzoni, Univ. of Brescia, Italy
- J. Daniel Prades, Univ. of Barcelona, Spain
- Sven Rank, Institute of Physical Chemistry, Univ. of Tübingen, Germany
- Diptiranjana Sahu, University of Witwatersrand, South Africa
- Kai Zhang, Institute of Physical Chemistry, Univ. of Cologne, Germany
- Elena Timofeeva, Argonne National Lab, USA
- Joaquin Ramirez Rico; Univ. of Seville, Spain
- Satoko Tasaki; Joining and Welding Research Institute Osaka Univ., Japan

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## Call for Papers

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36<sup>TH</sup> INTERNATIONAL CONFERENCE AND EXPOSITION ON

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