CALL FOR PAPERS

Abstracts due July 17, 2015

Jubilee Celebration!

40TH

INTERNATIONAL CONFERENCE AND EXPOSITION ON

ADVANCED CERAMICS AND COMPOSITES

Hilton Daytona Beach Resort and Ocean Center
Daytona Beach, Florida, USA

January 24–29, 2016

The American Ceramic Society
www.ceramics.org

Engineering Ceramics Division

Organized by the Engineering Ceramics Division of The American Ceramic Society

ceramics.org/icacc2016

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INTRODUCTION

The 40th International Conference & Exposition on Advanced Ceramics & Composites (ICACC) continues its strong tradition as the leading international meeting on advanced structural and functional ceramics, composites, and other emerging ceramic materials and technologies.

Since its inception in 1977, this prestigious conference has been organized by the Engineering Ceramics Division (ECD) of The American Ceramic Society (ACerS). Over the years, the conference has experienced tremendous growth in interest and participation from ceramic researchers and developers from national, regional, and global technical communities. This year's meeting continues the tradition and adds a few grand celebrations to mark this, its 40th year.

The technical program consists of 14 symposia, six focused sessions, the 5th Global Young Investigator Forum, a new Emerging Technologies Symposium, and a special 40th anniversary Jubilee Symposium. These technical sessions, consisting of both oral and poster presentations, will provide an open forum for scientists, researchers, and engineers from around the world to present and exchange findings on recent advances on various aspects related to ceramic science and technology.

The technical program, described in the pages that follow, encompasses diverse areas of ceramics and advanced composites, with particular attention to include topics that address current trends in the research, development, engineering, and application of advanced ceramics. The core symposia at this conference include Mechanical Behavior and Performance of Ceramics & Composites, Advanced Ceramic Coatings, Solid Oxide Fuel Cells, Armor Ceramics, Bioceramics, Advanced Materials and Technologies for Energy Conversion and Rechargeable Energy Storage, Nanostructured Materials and Nanocomposites, Advanced Processing & Manufacturing Technologies (APMT), Porous Ceramics, Virtual Material Design, Industrial Root Technologies, Materials for Extreme Environments, and Ceramics for Sustainable Nuclear Energy and Fusion Energy. Due to its success as a focused session, the Crystalline Materials for Electrical, Optical, and Medical Applications topic has been promoted to one of the meeting's 14 core symposia.

Additionally, there will be six focused sessions, including a new topic concerning Hybrid Materials and Processing Technologies as well as topics carried over from 2015 on Geopolymers and Eco-Friendly/Sustainable Materials, Ceramics for Photonics and Energy, Materials Diagnostics and Structural Health Monitoring, Additive Manufacturing and 3D Printing, and Field Assisted Sintering.

Building on successful interactions and excitement generated in the first four years, the 5th Global Young Investigator Forum (GYIF) will again be organized and facilitated by a group of our young researchers.

The 2016 ICACC also will feature a new event in the form of an annual Emerging Technologies Symposium. This year's topic will be Carbon Nanostructures and 2-D Materials and Composites.

Finally, as a celebration of the 40th anniversary and to recognize the ongoing success of the conference, a special Jubilee Symposium is being organized. *Engineered Ceramics—Current Status and Future Prospects* will feature previous ECD Mueller and Bridge Building Award winners, past and current ECD officers, and past ICACC plenary speakers. The presentations will focus on the current status and future prospects of various technical topics related to advanced ceramics and composites as well as the 40-year journey of ceramics and composites from Cocoa Beach to Daytona.

The ECD Executive Committee and volunteer organizers sincerely hope you will join us at this special anniversary conference for a stimulating and enjoyable ICACC'16.

We look forward to seeing you in Daytona Beach, Florida in January 2016!

Andrew Gyekenyesi
2016 ICACC Program Chair
Ohio Aerospace Institute/NASA Glenn Research Center
21000 Brookpark Road, MS 6-1
Cleveland, Ohio 44135
216-433-8155
Andrew.L.Gyekenyesi@nasa.gov

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Abstract Submission Instructions

- Visit **www.ceramics.org/icacc2016** to review session topics.
- Select "Submit Abstract" to be directed to the Abstract Central website.

If you have questions, please contact **Marilyn Stoltz** at mstoltz@ceramics.org or +1 614-794-5868.

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ACerS Engineering Ceramics Division Leadership

- Trustee: **Tatsuki Ohji**, National Institute of Advanced Industrial Science and Technology (AIST); Japan; t-ohji@aist.go.jp
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- Secretary: **Jingyang Wang**, Institute of Metal Research, China; jywang@imr.ac.cn

Tentative Schedule of Events

Sunday – January 23

Welcome Reception	5 p.m. – 7 p.m.

Monday – January 25

Opening Awards Ceremony and Plenary Session	8:30 a.m. – Noon
Concurrent Technical Sessions	1:30 p.m. – 6 p.m.

Tuesday – January 26

Concurrent Technical Sessions	8 a.m. – 6:00 p.m.
Exposition and Reception	5 p.m. – 8 p.m.
Poster Session A	5 p.m. – 8 p.m.

Wednesday – January 27

Concurrent Technical Sessions	8 a.m. – 5:30 p.m.
Exposition and Reception	5 p.m. – 7:30 p.m.
Poster Session B	5 p.m. – 7:30 p.m.

Thursday – January 28

Concurrent Technical Sessions	8 a.m. – 6 p.m.
40th Jubilee Celebratory Dinner	7 p.m. – 10 p.m.

Friday – January 29

Concurrent Technical Sessions	8 a.m. – Noon

Technical Symposia

S1: 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
- Small-scale testing and applications
- Fiber, matrices, coatings, and interfaces
- Environmental effects and thermo-mechanical performance
- In situ characterization using X-rays and neutrons
- Testing of joined and integrated components and structures
- Failure analysis
- Mechanical applications of transparent ceramics
- Manufacturing of composite structures for gas turbine applications
- Tribological performance of ceramics and composites

Symposium Organizers

- **Dileep Singh**, Argonne National Laboratory, USA; dsingh@anl.gov
- **Jonathan A. Salem**, NASA Glenn Research Center, USA; jonathan.a.salem@nasa.gov
- **Dietmar Koch**, German Aerospace Center, Germany; dietmar.koch@dlr.de
- Laifei Cheng, Northwestern Polytechnical University, China
- Shaoming Dong, Shanghai Institute of Ceramics, China
- Monica Ferraris, Politecnico di Torino, Italy
- Michael Halbig, NASA Glenn Research Center, USA
- Juergen Heinrich, TU Clausthal, Clausthal University of Technology, Germany
- Yutaka Kagawa, University of Tokyo, Japan
- Walter Krenkel, Unversity of Bayreuth, Germany
- J. G. Sun, Argonne National Laboratory, USA
- Andrew Wereszcak, Oak Ridge National Laboratory, USA
- Y. Zhou, Harbin Institute of Technology, Harbin, China
- Oleksandr G. Kravchenko, Case Western Reserve University, USA

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S2: Advanced Ceramic Coatings for Structural, Environmental, and Functional Applications

Ceramic coatings are a key technology for the application of many materials and components in thermally, chemically, or mechanically demanding environments. This symposium will provide an open forum for material scientists and engineers to discuss recent advances in coating sciences and technologies. The symposium addresses innovative processing, microstructure and property characterization, performance, and durability of advanced ceramic coatings. Special sessions will be dedicated to coating and component developments for aerospace, automotive, and energy applications. Integrated structural, environmental properties and functionality through advanced coating composition development, innovative processing, and structural design are particularly emphasized.

Proposed Session Topics

- Thermal and environmental barrier coatings
- Coatings to resist CMAS, oxidation, corrosion, wear, and erosion
- Advanced coating component systems for extreme environments
- Vibration damping coatings
- Functionally graded coatings and materials
- Advanced coating processing methods and modeling
- Advanced testing and nondestructive evaluation methodologies
- Nanostructured and multifunctional coating system integration and durability
- Interface phenomena, adhesion and fundamental coating properties
- Multi-scale modeling of coating properties and life prediction

Symposium Organizers

- **Peter Mechnich**, German Aerospace Center, Germany; peter.mechnich@dlr.de
- **Douglas E. Wolfe**, The Pennsylvania State University, USA; dew125@arl.psu.edu
- Dongming Zhu, NASA Glenn Research Center, USA
- Marie-Hélène Vidal-Sétif, ONERA, France
- Robert Vaßen, Forschungszentrum Jülich GmbH, Germany
- Yutaka Kagawa, University of Tokyo, Japan
- Soumendra N. Basu, Boston University, USA
- Satoshi Kitaoka, Japan Fine Ceramics Center, Japan
- Rodney W. Trice, Purdue University, USA
- Bryan Harder, NASA Glenn Research Center, USA
- Kang N. Lee, Rolls-Royce Corporation, USA
- Eric H. Jordan, The University of Connecticut, USA
- Kevin Plucknett, Dalhousie University, Canada
- Eugene Medvedovski, Endurance Technologies Inc., Canada
- Uwe Schulz, German Aerospace Center, Germany
- Ping Xiao, University of Manchester, UK
- Federico Cernuschi, Ricerca sul Sistema Energetico, Italy
- Yiguang Wang, Northwestern Polytechnical University, China

S3: 13th International Symposium on Solid Oxide Fuel Cells (SOFC): Materials, Science and Technology

Solid oxide fuel cells (SOFC) 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 using SOFCs. Considerable progress has been made in SOFC-based systems for automotive auxiliary power generation as well as in man portable and unmanned operation. With demonstrated advantages of high electrical efficiency, lower emissions (greenhouse gas, SO_x, NO_x, 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 government agencies and private industries. 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, understanding of ageing phenomena, accelerated testing and minimization of degradation as well as cost reduction at both materials and process levels. Significant challenges still exist in the areas of durability enhancement, stacking cells, fracture mechanics of ceramic components, thermal management, and BOP component development at both sub-kWe and large multi-kWe levels.

Electrochemical energy conversion in SOFC is reversible, allowing power generation and fuel production. An essential goal of the modern energy supply is the transition from fossil to renewable energy sources like wind and sun. A disadvantage of these sustainable sources is their fluctuating nature. This necessitates development of appropriate technologies for the storage of excess energy. High-temperature electrolysis can solve this problem providing highest efficiency for generation of chemicals and products from excessive power. In electrolysis, the regenerative energy is directly converted into hydrogen or/and into a synthesis gas, which can be processed into any fuel. The production of methane, synthetic oils or diesel, in particular, provides promising synergies. So, it will be possible to couple electricity grid, natural gas grid and chemicals production. For this reason the research on solid oxide electrolysis is important task which helps to understand the opportunities and limitations of this new technology for future energy systems.

Proposed Session Topics

- Electrolytes; oxygen ion, proton and mixed conductors; conduction mechanisms
- Electrode materials and microstructural engineering; electrode processes, defect chemistry, analytical techniques
- Ceramic and metallic interconnects; degradation mechanisms, coatings, accelerated testing and life prediction
- Sealing materials, designs and approaches; compatibility and interactions
- Novel processing and design of cell and stack materials
- Mechanical and thermal properties, electrochemical performance and stability

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- Electrical and structural reliability
- Surface and interfacial reactions; materials transport and electrode poisoning; catalytic degradation, carbon fouling
- Degradation modeling and computational simulation of cells and stacks
- High temperature electrolysis: steam, steam and CO_2, chemical process engineering utilizing solid oxide electrolyte ceramics
- Fuel processing; reforming using supported/unsupported catalysts; carbon and sulfur fouling, gas separation membranes
- System design and demonstration
- Applications: Centralized and distributed generation, CHP and μ-CHP, hydrogen production, portable and unmanned operations

Symposium Organizers

- **Mihails Kusnezoff,** Fraunhofer IKTS, Germany; mihails.kusnezoff@ikts.fraunhofer.de
- **Narottam P. Bansal**, NASA Glenn Research Center, USA; Narottam.P.Bansal@nasa.gov
- Vincenzo Esposito, DTU Energy Conversion, Denmark
- Tatsumi Ishihara, Kyushu University, Japan
- Ruey-Yi Lee, Institute of Nuclear Energy Research, Taiwan
- Nguyen Q. Minh, Consultant, USA
- Prabhakar Singh, University of Connecticut, USA
- Federico Smeacetto, Politecnico di Torino, Italy
- Jeffrey W. Stevenson, Pacific Northwest National Laboratory, USA
- Toshio Suzuki, National Institute of Advanced Industrial Science and Technology (AIST), Japan
- Sascha Kühn, Ezelleron, Germany
- Scott A. Barnett, Northwestern University, USA
- Kristen H. Brosnan, General Electric Global Research, USA

S4: Armor Ceramics

When properly combined with other materials, ceramic and glass materials can exhibit ballistic penetration resistances significantly higher than conventional monolithic armor materials. Not surprisingly therefore, lightweight armor technologies based on ceramic and glass materials have been developed providing levels of protection against a wide array of ballistic threats. Despite this situation, current knowledge and understanding is limited with respect to the effects of a ceramic body's physical, chemical, structural, and mechanical characteristics on its local and global response to dynamic contact loading conditions that are characterized by locally large transient stresses, deformations, and temperatures.

This deficiency in understanding of processing-structure-properties-performance relationships has been a hindrance to the development of new materials through conventional and advanced processes as well as materials-by-design strategies.

This symposium is an opportunity for attendees from industry, academia, and government organizations to meet and participate in open discussions on relevant fundamental and applied research that supports the advancement of knowledge and understanding of the processing-structure-properties-performance relationships for ceramic and glass materials.

In addition, special sessions on glass materials (effect of processing, stress, and deformation on the structure) and small-scale mechanical characterization are planned.

Proposed Session Topics

- Ballistic behavior
- Synthesis and processing
- Materials characterization
- Quasi-static and dynamic behavior
- Materials and process modeling
- Bonding of materials

Symposium Organizers

- **Jerry LaSalvia**, ARL, USA; jerry.c.lasalvia.civ@mail.mil
- **Jeffrey Swab**, ARL, USA; jeffrey.j.swab.civ@mail.mil
- David Stepp, ARO, USA
- Andrew Wereszczak, ORNL, USA
- Michael Golt, ARL, USA
- Steve Kilczewski, ARL, USA
- Robert Pavlacka, ARL, USA
- Kristopher Behler, ARL, USA

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One to four occupants	$157
Students:	$129
US government employee:	Prevailing rate

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S5: Next Generation Bioceramics and Biocomposites

Novel bioceramic materials being developed 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, including ceramic researchers, medical device manufacturers, and clinicians.

Proposed Session Topics

- Porous bioceramics (joint with S9)
- Advanced processing of bioceramics
- Bio-synthetic interfaces
- Biomineralization and tissue-material interactions
- Bioactive and resorbable ceramics
- Bio-inspired and biomimetic ceramics
- Self-assembled bioceramics
- Ceramics for drug and gene delivery
- Antibacterial surfaces
- In vitro and In vivo characterization of bioceramics
- Mechanical properties of bioceramics
- Medical and dental applications of bioceramics
- Nanostructured bioceramics (joint with S7)
- Magnetic nanoceramics for biomedical applications
- Light-emitting nanoceramics for bioimaging, sensing and therapy

Symposium Organizers

- **Roger Narayan**, University of North Carolina, USA; roger_narayan@unc.edu
- Markus Reiterer, Medtronic, Inc., USA
- Marta Cerruti, McGill University, Canada
- Eva Hemmer, Institut National de la Recherche Scientifique (INRS), Canada
- Chikara Ohtsuki, Nagoya University, Japan
- Kohei Soga, Tokyo University of Science
- Bikramjit Basu, Indian Institute of Science, India
- Akiyoshi Osaka, Okayama University, Japan
- Enrica Verné, Politecnico di Torino, Italy

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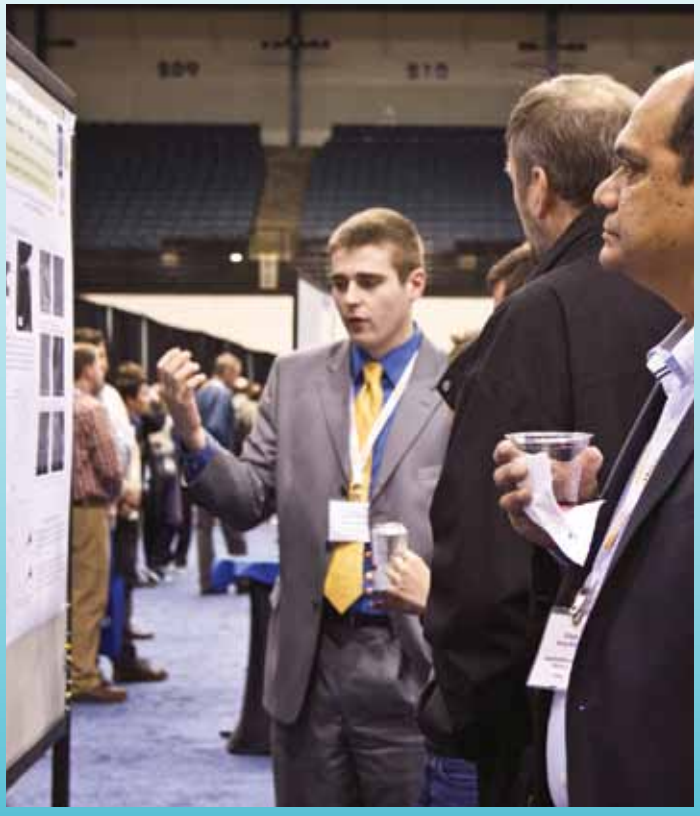

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S6: Advanced Materials and Technologies for Direct Thermal Energy Conversion and Rechargeable Energy Storage

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 clean energy generation with zero-emission will require advances in materials development for electricity generation as well as efficient and reliable energy storage. This symposium will focus on the advanced engineering ceramics and technologies that could help the global community to achieve the stated goals. As for the electric energy generation focuses will be on materials for energy harvesting and renewable energy generation. On the other hand, energy storage improvements in materials design, electrodes architecture, electrolytes, separators and cell chemistry are key factors to extend the life, enhance the safety, and lower the cost of rechargeable batteries that are regarded as the most efficient energy storage systems for portable electronics, renewable energy storage, smart grid, and transportation applications. A deeper understanding of the battery materials and property relationship, electrode and electrolyte interface phenomena, and cell failure mechanisms is critically needed to face these challenges. The search for advanced high capacity electrode materials and the implementation of the very challenging lithium sulfur, lithium-air and sodium-air batteries will be necessary to overcome the energy density shortfall in currently commercial batteries.

Proposed Session Topics

- Thermoelectric materials for energy harvesting
- Materials for thermionic and thermovoltaic applications
- Materials for solar-thermal applications
- Stationary rechargeable batteries for grid, solar, and wind technologies
- 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 and lithium-sulphur battery technologies
- Sodium batteries and beyond lithium batteries
- All-solid-state batteries
- Solid electrolytes for batteries
- Materials of capacitive energy storage (supercapacitors)

Symposium Organizers

- **Palani Balaya**, National University of Singapore, Singapore; mpepb@nus.edu.sg
- **H. T. Lin, Guangdong** University of Technology, China; huataylin@comcast.net
- **Olivier Guillon**, Forschungszentrum Jülich, Germany; o.guillon@fz-juelich.de
- Shirley Meng, UC San Diego, USA
- Valerie Pralong, CNRS CRISMAT, France
- Do Kyung Kim, Korea Advanced Institute of Science and Technology, Korea
- Tohru Sekino, Osaka University, Japan
- Terry Tritt, Clemson University, USA
- Anke Weidenkaff, Stuttgart University, Germany
- Naoaki Yabuuchi, Tokyo Denki University, Japan
- Chi-Chang Hu, National Tsing Hua University, Taiwan

S7: 10th International Symposium on Nanostructured Materials: Functional Nanomaterials and Thin Films for Sustainable Energy Harvesting, Environmental and Health Applications

This symposium will focus on the functional inorganic and composite materials and techniques that offer advanced processing, superior properties, and energy-efficient synthesis with particular emphasis on novel synthesis approaches, surface functionalization, and heterostructuring of nanoparticles, nanowires, nanoscopic films. Application of nanostructures in photocatalysis, energy and sensing applications, nanostructured coatings for photovoltaic, and bio-medical applications will form the major thrust areas. Contributions related to energy applications such batteries, fuel cells, water splitting, as well as transparent conductors and challenges related to the large-scale production and integration of functional and structural nanomaterials are welcome to submit their abstracts.

Proposed Session Topics

- Synthesis, functionalization and assembly of metal oxide nanomaterials
- Metal oxide nanostructures for chemical and biological sensors
- One-dimensional nanostructures for energy applications
- Nanotoxicity, drug-delivery and health aspects of engineered nanostructures
- Transparent conducting oxides for energy harvesting
- Nanomaterials for photocatalysis, solar hydrogen and thermoelectrics
- Integration of functional metal oxide nanostructures in devices
- Nanodevices: Fabrication and large-scale integration
- Innovative techniques for characterization and manipulation of nanostructures
- Industrial development and application of nanomaterials

Symposium Organizers

- **Sanjay Mathur**, University of Cologne, Germany; sanjay.mathur@uni-koeln.de
- Suprakas Sinha Ray, DST/CSIR- National Centre for Nanomaterials, South Africa
- Hidehiro Kamiya, Tokyo University of Agriculture and Technology, Japan
- Marlies van Bael, Hasselt University, Belgium
- Yoon-Bong Hahn, Chonbuk National University, Korea
- Menka Jain, University of Connecticut, USA
- Ru-Shi Liu, National Taiwan University, Taiwan
- Gunnar Westin, Uppsala University, Sweden
- Shiping Song, SINAP, Shanghai, China
- Jih-Jen Wu, National Cheng Kung University, Taiwan
- Emanuel Ionescu, Technical University Darmstadt, Germany

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S8: 10th International Symposium on Advanced Processing and Manufacturing Technologies for Structural and Multifunctional Materials and Systems (APMT10)

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 also will be covered.

Proposed Session Topics

- Rapid prototyping, patterning, templates and self assembly
- Microelectronics devices and systems
- Advanced composite manufacturing technologies, hybrid processes
- Advanced fiber fabrication
- Nano-reinforcement processing (CNT, graphene, BN, etc.)
- Novel forming/sintering technologies
- Microwave or microwave-assisted processing, SPS
- Advanced powder synthesis and processing
- Aqueous synthesis and processing, colloidal processing
- Polymer-based processing
- Design-oriented manufacturing and processing
- Large scale/complicated shape processing
- Joining, integration, machining, repair, and refurbishment technologies
- Green manufacturing; global environmental issues and standards
- Life cycle assessment, recycling, and reuse technologies

Symposium Organizers

- **Tatsuki Ohji**, National Institute of Advanced Industrial Science and Technology (AIST), Japan, t-ohji@aist.go.jp
- **Mrityunjay Singh**, Ohio Aerospace Institute, NASA Glenn Research Center, USA, mrityunjay.singh-1@nasa.gov
- Surojit Gupta, University of North Dakota, USA
- Jerzy Lis, AGH University of Science and Technology, Poland
- Valerie Wiesner, NASA Glenn Research Center, USA
- Eugene Medvedovski, Endurance Technologies Inc., Canada
- Richard D. Sisson, Jr., Worcester Polytechnic Institute, USA
- Tohru S. Suzuki, National Institute for Materials Science (NIMS), Japan
- Satoshi Tanaka, Nagaoka University of Technology, Japan
- Yiquan Wu, Alfred University, USA

S9: Porous Ceramics: Novel Developments and Applications

Porous materials are utilized in many applications including but not limited to thermal insulation, catalysts, catalyst supports, filters, adsorbers and sensors. This symposium aims to bring together the technical community to share recent advances in the formation, characterization, properties and modeling of porous ceramic, carbon, glass and glass-ceramic components for any application.

These materials contain pore sizes from the nanometers to millimeters, and can have textured to random porosity or hierarchical porosity and be based on various pore architectures, such as foams, honeycombs, fiber networks, bio-inspired structures.

This symposium will be the ideal showcase for the research activities of many groups involved in the development and use of porous materials including but not limited to the areas of ceramics, chemistry, mechanics, fluid dynamics, modeling and simulation and application engineering.

Proposed Session Topics

- Innovations in processing methods and synthesis of porous ceramics
- Structure and properties of porous ceramics
- Modeling of porous structures and properties
- Novel characterization tools of porous structures
- Mechanical behavior of porous ceramics
- Micro-porous and meso-porous ceramics
- Ceramic membranes
- Ceramics with hierarchical porosity
- Engineered porous architectures enabled by automated manufacturing technologies
- Porous ceramics for environmental applications
- Porous ceramics for energy applications
- Porous ceramics for biological applications
- Porous ceramics for functional applications
- Porous ceramics for water filtration

Symposium Organizers

- **Paolo Colombo**, University of Padova, Italy; paolo.colombo@unipd.it
- **James W. Zimmermann**, Corning Incorporated, USA ; ZimmermaJW@corning.com
- Tobias Fey, University of Erlangen-Nuremberg, Germany
- Fabrice Rossignol, CNRS Limoges, France
- Manabu Fukushima, AIST, Japan
- Yuji Iwamoto, Nagoya Institute of Technology, Japan
- Alek Pyzik, The Dow Chemical Company, USA
- Hutha Sarma, Corning Environmental Technologies, USA
- Yuping Zheng, Shanghai Institute of Ceramics, Chinese Academy of Sciences, China

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S10: Virtual Materials (Computational) Design and Ceramic Genome

Recent progress in computational materials science has significantly enhanced the efficiency with which the understanding of fundamental phenomena, the improvement of materials performance, the optimization of processing, the discovery of new materials, and the design of structural components can be achieved. This symposium will focus on the design, modeling and simulation of ceramics and composites so as to further optimize their behavior and facilitate the design of new ceramics and composites with tailored properties. A broader perspective is desired including the interest related to ceramic genome, virtual materials design for new innovative materials and thermo-structure, integrated materials computational engineering, prediction of the structure and properties of crystals and defects, modeling materials behavior under extreme/harsh environments, application of novel simulation methods for materials processing and performance, simulation of novel ceramics for functional applications, and the modeling of surfaces, interfaces and grain boundaries at multiple scales.

Proposed Session Topics

- Ceramic genome
- Integrated materials computational engineering
- Novel simulation methods for materials processing and performance
- Multi-scale modeling approaches
- Modeling materials behavior under extreme/harsh environments (ultra-high temperature, radiation, environmental damages, and severe mechanical load and stresses)
- Model-aided design of thermal insulating and thermo-structural materials
- Modeling and design of new innovative ceramics for functional applications
- Prediction of the crystal structure and properties of new ceramics
- Modeling defects and amorphous matter
- Modeling of surfaces, interfaces, and grain boundaries at multiple scales

Symposium Organizers

- **Jingyang Wang**, Institute of Metal Research, Chinese Academy of Sciences, China; jywang@imr.ac.cn
- William J. Weber, University of Tennessee, USA
- Gerard L. Vignoles, University of Bordeaux, France
- Paul Rulis, University of Missouri-Kansas City, USA
- Katsuyuki Matsunaga, Nagoya University, Japan
- Liping Huang, Rensselaer Polytechnic Institute, USA
- Hans J. Seifert, University of Karlsruhe, Germany
- Jian Luo, University of California, San Diego, USA

S11: Advanced Materials and Innovative Processing Ideas for the Production Root Technology

"Production Root Technology" symbolically refers to an integration of six production technology groups including casting, molding, forming, welding, heat treatment, and surface treatment. The Production Root Technology entails both materials and process technologies. These are hidden behind products and do not frequently appear outward. However, they are very important fundamentally and greatly influence the material features. As the functions of products become more complex and robust, the importance of this Production Root Technology is concurrently growing.

Unlike other technology fields, Production Root Technology has an interdisciplinary nature. It inevitably includes a broad spectrum of skills from material synthesis all the way up to parts and modules manufacturing. Also, when development of industrial components with improved features is demanded, especially by employing novel materials and ceramics and composites or by employing functional (low-friction, protective or decorative) coating methods, the interdisciplinary approach plays a greater role. Therefore, this symposium is designated to properly serve and to provide an opportunity for the exchange of ideas and to build up new collaborations in the field of Production Root Technology. Many successful stories and noteworthy examples of transforming 3D (dangerous, dirty, and difficult) aspects of Production Root Technology into the ACE (automatic, clean and easy) form also will be recognized and shared.

Proposed Session Topics

- Shaping processes
- Thermal processes for advanced materials
- Recycling and reuse processes
- Coating processes for low friction and energy solutions
- New concepts and emerging technologies
- Innovative process technologies with enhanced product performance

Symposium Organizers

- **Sangmok Lee**, Korea Institute of Industrial Technology, Korea
- **Tadachika Nakayama**, Nagaoka University of Technology, Japan; nky15@vos.nagaokaut.ac.jp
- **Kyoung Il Moon**, Korea Institute of Industrial Technology, Korea; kimoon@kitech.re.kr
- Ali Erdemir, Argonne National Laboratory, USA
- Tim Hosenfeldt, Schaeffler Group, German
- Jun Akedo, AIST Japan
- Rajiv Asthana, University of Wisconsin-Stout, USA
- L. K. Sharma, CSIR, India
- Byungkoog Jang, NIMS, Japan
- Kouichi Yasuda, Tokyo Institute of Technology, Japan
- Natalie Sobczak, Foundry Research Institute, Poland

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S12: Materials for Extreme Environments: Ultrahigh Temperature Ceramics (UHTCs) and Nano-laminated Ternary Carbides and Nitrides (MAX Phases)

Ultrahigh temperature ceramics (UHTCs) and nano-laminated ternary carbides and nitrides (MAX phases) are potential materials for use in extreme environments such as scramjet engine components, leading edges and thermal protection systems for hypersonic vehicles, and cladding materials in generation IV nuclear reactors. However, their thermal/chemical stability in extreme environments, the ability to be formed into complex shapes/sharp edges, thermal shock resistance, irradiation resistance, and damage tolerance are all critical challenges limiting near-term industrial applications of these materials. For such extreme environment applications, new advances in understanding structure-property relations and improved performance are needed. These will require development of new approaches for improving thermal shock resistance, thermochemical stability, damage tolerance and machinability, as well as discovery of new materials to ensure an enormous leap forward in performance. 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

- New precursors for powders, coatings, and matrix or fibers of composites
- Structure-property relationships of existing systems
- Materials design, new composition and composites
- Novel processing methods (bulk, coatings, and thin films)
- Novel characterization methods and lifetime assessment
- 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)

Symposium Organizers

- **Yanchun Zhou**, Aerospace Research Institute of Material & Processing Technology, China; yczhou@imr.ac.cn, yczhou714@gmail.com
- Jon Binner, University of Birmingham, UK
- Erica L. Corral, University of Arizona, USA
- Per Eklund, Linköping University, Sweden
- William G. Fahrenholtz, Missouri University of Science and Technology, USA
- Greg Hilmas, Missouri University of Science and Technology, USA
- Sea-Hoon Lee, KoreaInstituteof MaterialsScience, Korea
- Frederic. Monteverde, Institute of Science and Technology of Ceramics-CNR, Italy
- Miladin Radovic, Texas A&M University, USA
- Jochen Schneider, Materials Chemistry, RWTH Aachen, Aachen, Germany
- Luc J Vandeperre, Imperial College London, UK
- Guo-Jun Zhang, Shanghai Institute of Ceramics, CAS, China

S13: Advanced Materials for Sustainable Nuclear Fission and Fusion Energy

Development of advanced materials and their application for the safer and sustainable nuclear energy and for future fusion energy systems continues to attract growing attention. This symposium provides a venue for material scientists and nuclear engineers to discuss the opportunities and needs for key enabling materials in such energy systems, and the current state-of-the-art science and technology of these materials ranging from materials design, processing and properties to their performance in harsh nuclear environments. We also will debate prospects of their commercial development, and qualification and licensing requirements. This symposium is cosponsored by ACerS Nuclear and Environmental Technology Division.

Proposed Session Topics

- Ceramics and composites technology for accident-tolerant LWR fuels and core
- Materials for advanced fission reactors and fusion energy
- Ceramics and composites for detection of nuclear radiation
- Joining and coating for reactor components
- Graphite and carbon materials
- Crystalline, amorphous and composite materials for waste immobilization
- Long-term behavior of waste forms thorough experiments and modeling
- Container corrosion in geological disposal conditions
- Novel techniques for characterization and processing of solid and liquid samples
- Fuel reprocessing and management of fission product elements
- Fundamental science of radiation damage, defect production, evolutions, and interactions
- Theory, modeling, and simulation of radiation effects in ceramics and composites
- Fuel and cladding evolution and performance modeling
- Codes and standards, design methodology

Symposium Organizers

- **Yutai Katoh**, Oak Ridge National Laboratory, USA; katohy@ornl.gov
- **Josef Matyáš**, Pacific Northwest National Laboratory, USA; Josef.Matyas@pnnl.gov
- Christina Back, General Atomics, USA
- William Ebert, Argonne National Laboratory
- Monica Ferraris, Politecnico di Torino, Italy
- Weon-Ju Kim, Korea Atomic Energy Research Institute, Korea
- Stefan Neumeier, Forschungszentrum Jülich GmbH, Germany
- Takashi Nozawa, Japan Atomic Energy Agency, Japan
- David Shoesmith, Western University, Canada
- Koroush Shirvan, Massachusetts Institute of Technology, USA
- Kumar Sridharan, University of Wisconsin, USA
- William Weber, University of Tennessee, USA

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S14: Crystalline Materials for Electrical, Optical, and Medical Applications

This symposium will provide a forum for presentation and discussion of recent research and development activities on crystalline materials. The session will cover all aspects, from basic research and material characterization, through physicochemical aspects of growth, synthesis and deposition techniques, to technological development of industrialized materials. Worldwide experts in the different topics will be invited to introduce their most recent activities. The broad scope of the session assures a wide overview of state-of-the-art issues on crystalline materials, aiming to stimulate interdisciplinary discussions and collaborations in a wide range of fields.

Proposed Session Topics

- Semiconductors for LED/LD, power device, and sensor
- Optical materials for laser, nonlinear optics, optical isolator, and phosphors
- Scintillators for X-, gamma-, and neutron detection
- Piezo-, ferro-, and magneto-electric materials
- Transparent ceramics and nanocrystals
- Phase diagrams, defect chemistry, and crystalline quality

Symposium Organizers

- **Kiyoshi Shimamura**, National Institute for Materials Science (NIMS), Japan; SHIMAMURA.Kiyoshi@nims.go.jp
- Noboru Ichinose, Waseda University, Japan
- Didier Chaussende, National Center for Scientific Research (CNRS), Grenoble, France
- Edith Bournet, Lawrence Berkeley National Laboratory, USA
- Gisele Maxwell, Shasta Crystals Inc., USA
- Qiang Li, Tsinghua University, China
- Alain Largeteau, The Institute for Solid State Chemistry Bordeaux, France
- Toru Ujihara, Nagoya University, Japan

Focused Sessions

FS1: Geopolymers, Chemically Bonded Ceramics, Eco-friendly and Sustainable Materials

Ceramic-like inorganic polymers can be made under low energy conditions such as ambient temperatures and pressures. These materials include aluminosilicates or "geopolymers," phosphates and other chemically bonded inorganic compounds. The use of waste products or components derived from biological materials as starting compounds or as reinforcements in composites demonstrates the eco-friendly and sustainable nature of these materials. Novel potential applications of such composites include hydrogen storage, water purification, porous materials for CO_2 sequestration, thermal insulation, fire resistant building materials, structural ceramic composites reinforced with ceramic, metal or biological reinforcements.

Proposed Session Topics

- Synthesis, processing microstructure
- Porosity (nano-, meso-, micro-)
- Mechanical properties, thermal shock resistance
- Other inorganic analogues
- Composites
- Conversion to ceramics
- Waste encapsulation
- Construction materials
- Coatings (fire-resistant, acid-resistant)
- Novel applications
- Sustainable materials

Symposium Organizers

- **Waltraud M. Kriven**, University of Illinois at Urbana-Champaign, USA; kriven@illinois.edu
- Kenneth MacKenzie, Victoria University of Wellington, New Zealand
- John L. Provis, University of Sheffield, UK
- Claus H. Rüscher, Leibniz University of Hannover, Germany
- Sylvie Rossignol, GEMH-ENSCI, Limoges, France
- Kwesi Sagoe-Crentsil, CSIRO Melbourne, Australia
- Hubert Rahier, Vrije Universiteit, Brussel, Belgium
- Cengiz Bagci, Hitit University, Turkey
- Flavio de Andrade Silva, Pontificia Catolica do Rio de Janeiro, Brazil

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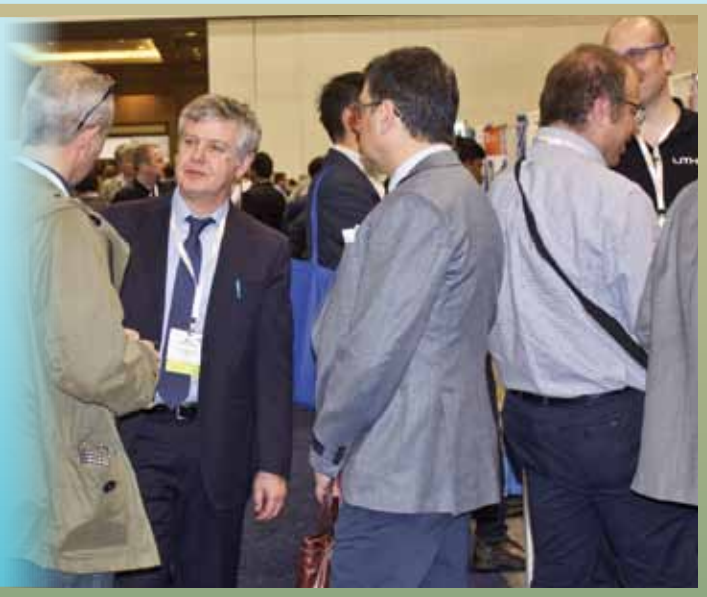

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FS2: Advanced Ceramic Materials and Processing for Photonics and Energy

In the past few years significant progress has been reported on synthesis as well as on structural, physical, and chemical characterization of ceramic nanostructures that exhibit size-dependent properties and on novel glass-based materials for optical lasers and amplifiers. The field of nanomaterials (e.g. nanowires, nanorods, nanotetrapods) has become one of the most active research areas within the nano-science community. Such materials are leading to fundamental new discoveries as well as applications in photovoltaics, optical sources, electroceramics, multiferroic materials, catalysis, and solar hydrogen. Optical glasses have been employed in the fabrication of high power fiber lasers with unprecedented performance and for optical waveguide based devices with multiple functionalities.

This session focuses on all ceramic materials with application potentials as functional materials, with particular consideration given to the capability to tailor and control material properties via surface and structural modifications. The session also includes novel optical glass-based materials with new functionalities, new emission wavelengths and with an overview toward integration with other classes of materials (polymers, metals). New nanotechnology tools and technological procedures for the development of new functional devices integrating bottom-up and top-down technologies also will be considered.

Proposed Session Topics

- Multifunctional materials
- Advanced and nanostructured materials for photonics, electronics, and sensing
- Advanced and nanostructured materials for photovoltaics and solar fuels
- Advanced glass based materials for laser sources and nonlinear applications

Symposium Organizers

- **Alberto Vomiero**, Luleå University of Technology, Sweden; alberto.vomiero@ltu.se
- Federico Rosei, University du Quebec, Canada
- Yasuhiro Tachibana, RMIT University, Australia
- Daniel Milanese, Politecnico di Torino, Italy

FS3: Materials Diagnostics, Nondestructive Evaluation, and Structural Health Monitoring of Ceramic Components and Systems

Advanced ceramics, composite materials and ceramic structures are utilized in critical components for many modern systems, such as batteries, fuel cells, sensors, high-temperature electronics, membranes, and high-end medical devices as well as for traditional applications like seals, valves, implants, high-temperature components and others. Furthermore, ceramic components while being subjected to increasingly extreme conditions are being pushed to their performance limits. The dependable performance of these ceramic components is often the crucial basis for the reliability of the entire system. The properties and performance of structural and multifunctional materials largely depends on the processing and manufacturing procedure. Through careful design and fabrication experience, a general reliability has been achieved for ceramic components of various sizes and complexities. On the other hand, with the development of new processing and fabrication techniques, unique properties, which cannot be achieved via the conventional routes, can now be attained. These novel processes and materials require new methods for process control, materials diagnostics, inspection and structural health monitoring in order to assure functional reliability.

The aim of this international symposium is to discuss global advances in research and development of sophisticated and novel characterization technologies for structural ceramics, particulate and fiber reinforced ceramics composites, and multifunctional materials, as well as their components. Current advances and state-of-the-art in various optical, X-ray, ultrasound- and acoustic-based, nanoparticle-based, and ultra-high resolution technologies will be covered.

Proposed Session Topics

- Novel ceramic characterization technologies
- Materials diagnostics for ceramics and composites
- Structural health monitoring including diagnostic/prognostic schemes
- Fatigue and creep damage evaluation
- Emerging optical characterization technologies
- Characterization by high resolution X-ray technique
- Ultrasound and acoustic characterization
- Electrical resistivity for damage state assessment
- Thermographic techniques
- Nanoparticle-based monitoring
- Ultra-high resolution technologies
- Modeling and simulation

Symposium Organizers

- **Joerg Opitz**, Fraunhofer Institute for Ceramic Technologies and Systems, Germany; joerg.opitz@ikts-md.fraunhofer.de
- **Andrew L. Gyekenyesi**, Ohio Aerospace Institute, NASA Glenn Research Center, USA; Andrew.L.Gyekenyesi@nasa.gov
- Klaus-Juergen Wolter, Georgia Institute of Technology PRC; USA
- Peter Czurratis, PVA TePla Analytical Systems GmbH, Germany
- Gregory Morscher, University of Akron, USA
- Ben Dutton, MTC Limited, UK
- Steven M. Shepard, Thermal Wave Imaging, Inc.; USA
- Cerasela Dinu, West Virginia University, USA
- Andreas Buchsbaum, RECENDT, Austria
- Igor Meglinski, University of Otago, New Zealand
- Viktoriya Lapina, Academy of Science, Belarus

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FS4: Additive Manufacturing and 3-D Printing Technologies

Additive manufacturing and 3-D printing are novel fabrication processes of ceramic components with functional structures. The processes allow for innovative complex part fabrication, client customization, rapid prototyping, and distributed manufacturing. Three-dimensional models are designed minutely according to theoretical concepts in computer graphic applications, and two-dimensional cross sections are created by slicing operations automatically. High-resolution laser beams are scanned on a spread ceramic powder bed with or without resin binders to form solid planes of two-dimensional cross sections. Through layer stacking, ceramic precursors or components with the three-dimensional models are fabricated rapidly and exactly. In other processes, paste materials with ceramic particles dispersed are fused from nozzles moving freely in three dimensions to create composite precursors. Various functional components of dielectric lattices to control electromagnetic waves, biomaterials components for medical applications and ceramics electrode with large surface area will be newly developed. Large scale structural components for aerospace and other high-temperature applications can be fabricated with internal cooling path networks formed without casting molds. This symposium focuses on superiority of design, efficient processing, and perspicuous evaluations in the additive manufacturing and 3-D printing processes.

Proposed Session Topics

- Selective laser sintering
- Stereolithography
- Direct writing technologies
- Fused deposition modeling
- Laminated object manufacturing/green tape stacking
- Ink jet printing technologies
- Powder bed fusion process
- Emerging additive manufacturing technologies

Symposium Organizers

- **Soshu Kirihara**, Osaka University, Japan; kirihara@jwri.oska-u.ac.jp
- **Mrityunjay Singh**, Ohio Aerospace Institute, NASA Glenn Research Center, USA; mrityunjay.singh-1@nasa.gov
- **Michael Halbig**, NASA Glenn Research Center, USA; michael.c.halbig@nasa.gov
- Cesar R. Foschini, Universidae Estadual Paulista, Bauru, Brazil
- Johannes Homa, Lithoz GmbH, Austria
- Miranda Fateri, FH Aachen, Germany
- Cynthia Gomes, BAM, Germany
- Nahum Travitzky, Friedrich-Alexander University, Germany

FS5: Field Assisted Sintering and Related Phenomena at High Temperatures

The influence of electrical fields on various phenomena in ceramic science is an emerging area. This focused session seeks to bring together investigators from various points of view for instilling discussion and new ideas in this interdisciplinary field of research.

Proposed Session Topics

- Spark plasma sintering
- Flash sintering
- Microwave sintering
- Grain growth
- Phase transformations
- Creep and superplasticity
- Joule heating
- Defect chemistry and diffusion
- Electrical conductivity and photoemission

Symposium Organizers

- **Rishi Raj**, University of Colorado at Boulder, USA; rishi.raj@colorado.edu
- **Olivier Guillon**, Forschungszentrum Jülich, Germany; o.guillon@fz-juelich.de

FS6: Hybrid Materials and Processing Technologies

New and hybrid materials that unify multiple properties are key for improved functional performance and device applications. Understanding the complexity of heterogeneous matter has triggered tremendous research activity exploring novel building blocks fundamental to the overall responsive performance, which can be enhanced through hierarchical organization of the structural constituents at various length scales and dimensionality. Hybrid-functional or multifunctional properties represent one of the important future directions for the advancements of materials and for future industries of the world. Hybrid materials can be classified based on multiple bonding characteristics (metallic/ionic/covalent) or differential scales (nano/micro/macro) as well as phase and microstructure (crystalline/amorphous/voids). Especially, thin volume of hybrid interface having characteristic atomic or electronic structures will be one of important issues for developing new materials. Nanoscopic volume of hybrid interface can be predicted by materials computation technique that enables new design for exploring new materials. Advanced structural, electronic, and energy materials based on new interface morphology or composition as well as innovative processing techniques will be in the focus of this symposium. Also, new processes adapted to conventional processes, which are defined as hybrid processing, to obtain new microstructure and advanced materials and component fabrication will be covered. New design-characterization-application of nano/hybrid materials system in the field of biotechnology (tissue engineering, drug delivery, nanomedicine), energy, and catalysis are in the focus of the symposium.

Proposed Session Topics

- Hybrid interfaces for creating new materials
- Nano-composite materials and hybrid architectures
- Design/synthesis/evaluation for hybrid-function of materials
- Self-assembled, organic-inorganic hybrid materials
- Analytical techniques for characterization of hybrid materials
- Nano-mechanics and evaluation technique for hybrid materials
- Manufacturing of hybrid materials and components
- Energy/environmental applications of nano/hybrid structure
- Biomedical and textile applications
- Biomimetic/bioinspired hybrid materials
- Anisotropic/heterogeneous hybrid materials

Symposium Organizers

- **Kwang Ho Kim**, Pusan National University, Korea; kwhokim@pusan.ac.kr
- **Sanjay Mathur**, University of Cologne, Germany; sanjay.mathur@uni-koeln.de
- Oden L. Warren, Hysitron, USA
- Francois Ribot, University of Paris, France
- Tohru Sekino, Osaka University, Japan
- Daniel Chua, National University of Singapore, Singapore
- Zorica Orel, National Institute of Ljubljana, Slovenia
- Mohamed Siaj, UQAM, Canada

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EMERGING TECHNOLOGIES SYMPOSIUM: Carbon Nanostructures and 2-D Materials, and Composites

This symposium focuses on progress on the frontiers of fundamental and applied science of carbon nanostructures (CNS), including carbon nanomaterials and other two-dimensional (2-D) nanomaterials and their related composites. Examples of carbon nanostructures can include carbon nanotubes, nanodiamonds, graphene and fullerenes. Graphene has received worldwide attention as result of the 2010 Nobel Prize for Physics and the exceptional properties and growing number of applications of graphene. Some examples of 2-D nanomaterials presenting a tantalizing prospect of scaling all semiconductor science and technology down to a truly atomic scale are chalcogenide (sulfide, selenide, and telluride) materials with bandgaps comparable to conventional group IV or group III-V semiconductors, and MXenes (transition metal carbides and carbonitrides with 2-D Mn+1Xn layers). In all cases, the preparation of composites by the combination of carbon nanostructures and 2-D materials with inorganic or organic compounds can lead to development of new functional materials with unique properties. These composite materials will have important roles in nanotechnology engineering as well their application in different technological areas. Applications in areas of energy, electronic devices, the environment, nanomedicine and sensing are welcomed.

Proposed Session Topics

- Synthesis of carbon nanostructures and 2-D materials by chemical vapor deposition and others
- Creation of atomic layers from 2-D materials by exfoliation and unzipping
- Surface chemistry, surface functionalization
- Inorganic-organic hybrid composites
- Structural, electrical, mechanical and optical characterization of CNS and 2-D materials
- Green carbon production
- Electronic and optical properties
- Carbon and 2-D materials based devices
- Electronics applications
- Biomedical applications
- Energy production and storage
- Sensing applications
- Computational methods in the design of tailored nanostructured materials
- Electronic band structure, and transport theory and modeling of 2-D crystals
- General properties of 2-D-layered oxides, nitrides and sulfides
- New physical and chemical properties of 2-D materials

Symposium Organizers

- **Gustavo Costa**, NASA Glenn Research Center, USA; gustavo.costa@nasa.gov
- Michael Naguib, Oak Ridge National Laboratory, USA
- Talita Mazon, CTI - Centro de Tecnologia da Informação Renato Archer, Brazil
- S. Ravi P. Silva, Advanced Technology Institute (ATI), University of Surrey, U.K.
- Jilian N. Freitas, Center for Information of Technology Renato Archer, Brazil
- Maria A. Zaghete, Sao Paulo State University, Brazil

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40TH JUBILEE SYMPOSIUM

ENGINEERED CERAMICS—CURRENT STATUS AND FUTURE PROSPECTS

As one of several events for the celebration of this anniversary, a special 40th Jubilee Symposium is being organized. This all-invited presentation symposium will feature previous ECD Mueller and Bridge Building Award winners, past and current ECD officers, and past ICACC plenary speakers.

Speakers will deliver presentations on current status and future prospects of various technical topics related to advanced ceramics and composites as well as the 40-year journey of ceramics and composites from Cocoa Beach to Daytona Beach.

We hope this symposium will serve as a global stage for exchange of information on the latest technologies of engineered ceramics and facilitate open dialogue and discussion with leading experts for the next generation.

Proposed Session Topics

- Current trends and future directions for research and technology on engineering ceramics
- Challenges and prospects for various ceramic technologies
- Energy and environmental issues and role of ceramics
- New strategies and technologies for sustainable and self-sufficient solutions
- Engineered ceramics for sustainable development
- Global environmental issues and standards
- Ceramic education, training and knowledge management

Symposium Organizers

- **Tatsuki Ohji**, AIST, Japan; t-ohji@aist.go.jp
- **Mrityunjay Singh**, Ohio Aerospace Institute, USA; mrityunjay.singh-1@nasa.gov
- James W. McCauley, ARL/Johns Hopkins University, USA
- Alexander Michaelis, Fraunhofer IKTS, Germany
- Donald J. Bray, Morgan Advanced Materials Composites and Defense Systems, USA
- Stuart Hampshire, University of Limerick, Ireland
- Glenn N. Pfendt, A.O. Smith Protective Coatings Div., USA
- Sujanto Widjaja, Corning Incorporated, USA
- Jose Arana Varela, Sao Paulo Research Foundation, Brazil

5TH GLOBAL YOUNG INVESTIGATOR FORUM

The Global Young Investigators Forum (GYIF) aims to bring together young researchers from around the world by facilitating scientific discussions to promote the exchange of ideas essential to identifying emerging global challenges at the forefront of ceramic science and engineering research. Young researchers, including students, postdoctoral researchers, young professionals and faculty, below 35 years of age are invited to join this event. The GYIF symposium will help establish global cooperation and networking among young scientists and engineers to approach current and future challenges in ceramic science and technology as well as provide GYIF participants a unique forum at which to showcase their research.

In addition to connecting with young researchers, all GYIF participants will be invited to attend a private luncheon hosted by the president of the American Ceramic Society. The American Ceramic Society will also provide complimentary student registration for a select number of eligible student GYIF presenters. The Global Young Investigator Award laureate will deliver the opening keynote lecture.

Proposed Session Topics

This interdisciplinary symposium will feature research from a variety of thematic areas, including, but not limited to:

- Frontiers in ceramic chemistry and physics: New precursors for functional ceramics, ceramics and catalysis, functional surfaces
- Ceramic hybrid materials and composites for aerospace, armor, biological and medical applications
- Advanced ceramics and coatings for structural, environmental and functional applications
- Novel ceramic processing methods and synthesis routes
- Nanocomposites and nanostructured materials
- Computational materials prediction and design
- Novel characterization tools of ceramics and composites
- Applications: Ceramic sensors and actuators, energy generation, saving and storage, photo-catalysisand biomedical applications
- Young researchers' funding, mobility and networks

Symposium Organizers

- **Valerie Wiesner**, NASA Glenn Research Center, USA; valerie.l.wiesner@nasa.gov
- **Eva Hemmer**, Institut National de la Recherche Scientifique (INRS), Canada; eva.hemmer@emt.inrs.ca
- Yakup Gönüllü, University of Cologne, Germany
- Manabu Fukushima, National Institute of Advanced Industrial Science and Technology (AIST), Japan
- Alex C. Lee, National Cheng Kung University, Taiwan
- Gustavo Costa, NASA Glenn Research Center, USA
- Mahmood Shirooyeh, University of Southern California, USA
- Thomas Fischer, University of Cologne, Germany
- Hutha K. Sarma, Corning, USA
- Lisong Xiao, University Duisburg-Essen, Germany
- David Poerschke, University of California, Santa Barbara, USA
- Kathleen Shugart, UES at Air Force Research Lab, USA
- Takashi Shirai, Nagoya Institute of Technology, Japan
- Ziqi Sun, University of Wollongong, Australia
- Jesse Angle, University of Illinois, Urbana-Champaign, USA
- Diana Santiago, NASA Glenn Research Center, USA

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