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The American Ceramic Society
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Vancouver
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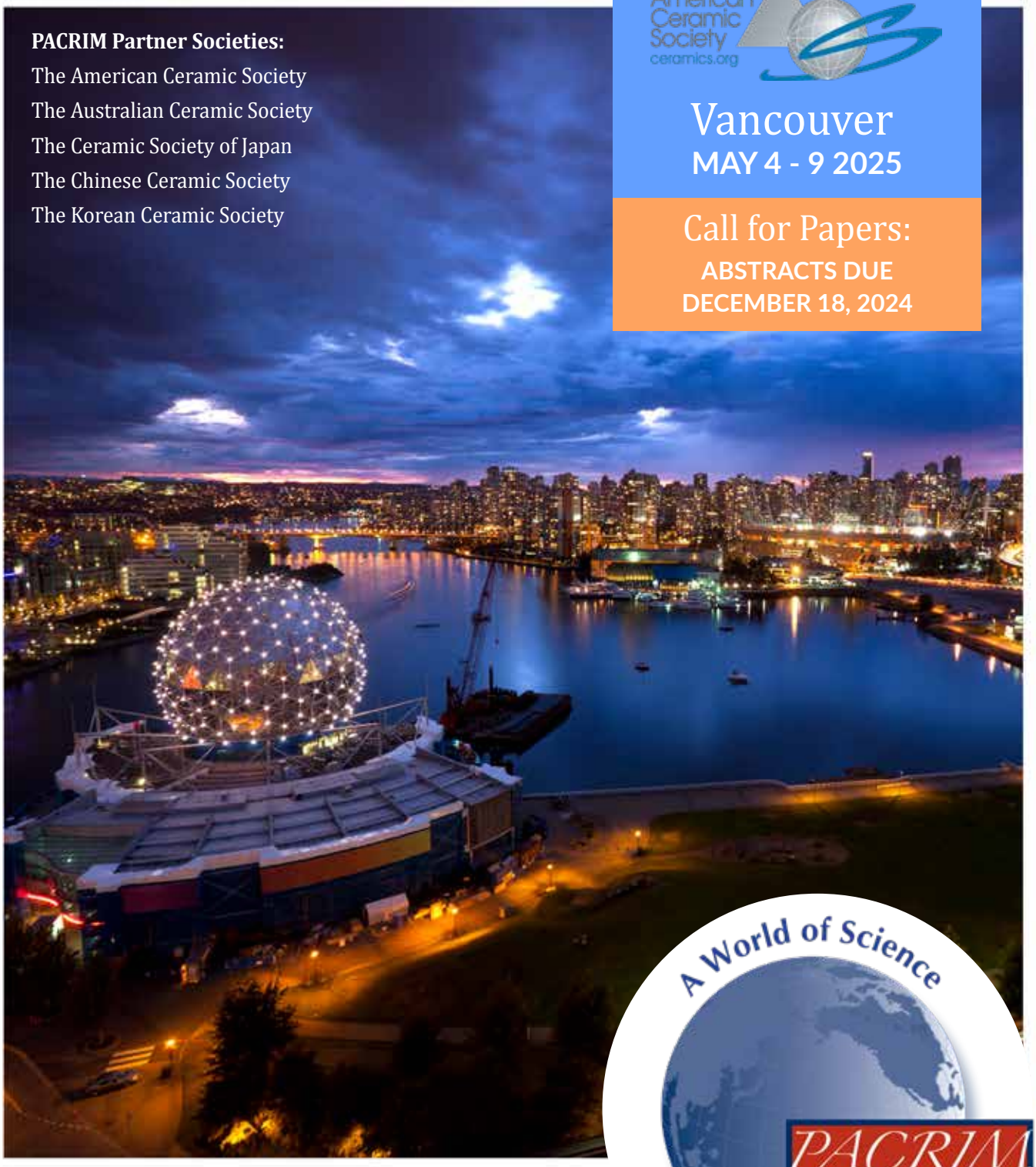
Call for Papers:
ABSTRACTS DUE DECEMBER 18, 2024



A World of Science and Technology

PACRIM 16

16th Pacific Rim Conference on Ceramic and Glass Technology

INCLUDING

Glass & Optical Materials Division Meeting (GOMD 2025)

CERAMICS.ORG/PACRIM16

16th Pacific Rim Conference on Ceramic and Glass Technology

WELCOME TO VANCOUVER

Introduction

Pacific Rim Conference on Ceramic and Glass Technology is a bi-annual conference held in collaboration with the ceramic societies of the Pacific Rim countries - The American Ceramic Society, The Chinese Ceramic Society, The Ceramic Society of Japan, The Korean Ceramic Society, and the Australian Ceramic Society. The 1st PACRIM conference was hosted by The American Ceramic Society (ACerS) at Maui, Hawaii, in 1993. Since then, the conferences have been held in Australia, Canada, China, Korea, Japan, and USA. In 2025, it is hosted by the American Ceramic Society at Vancouver, a bustling west coast seaport in Canada, for the 16th PACRIM conference. Over the years, PACRIM conferences have earned a distinct reputation as a premier forum for presentations and discussions on state-of-the-art and emerging topics in ceramics and glass technologies.

The technical program of PACRIM 16 will cover a wide range of very exciting topics that will include High-Entropy Materials, Multi-scale Modeling; Interatomic Bonding to Macroscopic Properties; Innovative Processing and Manufacturing; High-performance Functional and Structural Ceramics; Multifunctional Materials and Systems; Ceramics for Energy, Environment; and Healthcare. More than 30 different symposia are planned that will identify global challenges and opportunities for various ceramic technologies. PACRIM 16 will provide a unique forum for knowledge exchange and sharing, and facilitates the establishment of new contacts with peers from different continents.

We expect strong participation at PACRIM 16 from various divisions of The American Ceramic Society, including the Art, Archeology and Conservation Science, Basic Science, Electronics, Engineering Ceramics, and Energy Materials and Systems divisions. Additionally, ACerS Glass and Optical Materials Division (GOMD) will host their division meeting at the PACRIM 16.

The 7th International PACRIM Richard M. Fulrath Memorial Symposium on Advanced Ceramics is also planned. The Richard M. Fulrath Award program was established to promote friendship among Japanese and US researchers and scholars. This year's theme of the Fulrath Symposium is Discontinuous Progress for Ceramic Innovations. For the first time, an international symposium of fundamental and frontier sciences of ceramics is initiated to provide a forum to discuss the fundamental and frontier science of advanced ceramics and emerging applications of new processing technologies and ceramic materials.

To engage and promote future leaders in the field of ceramic science and technology, the PACRIM Young Forum is planned. This platform is offered to global young scholars to exchange research ideas and promote international collaborations. The theme is The Design and Processing of Multifunctional Ceramics Materials. We expect this symposium will provide a platform for young researchers from around the globe to present their ideas, discuss their research, and network with their peers.

We invite all of you to take advantage of this opportunity to visit the beautiful coast seaport city Vancouver and actively participate in this conference. This conference will provide an excellent forum for interactions and friendships with participants from various continents, who are involved in the research, development, engineering, manufacturing, and application of ceramics and glass materials.
We look forward to your participation at PACRIM 16.
We are confident you will be inspired and enriched.

PACRIM CO-CHAIRS

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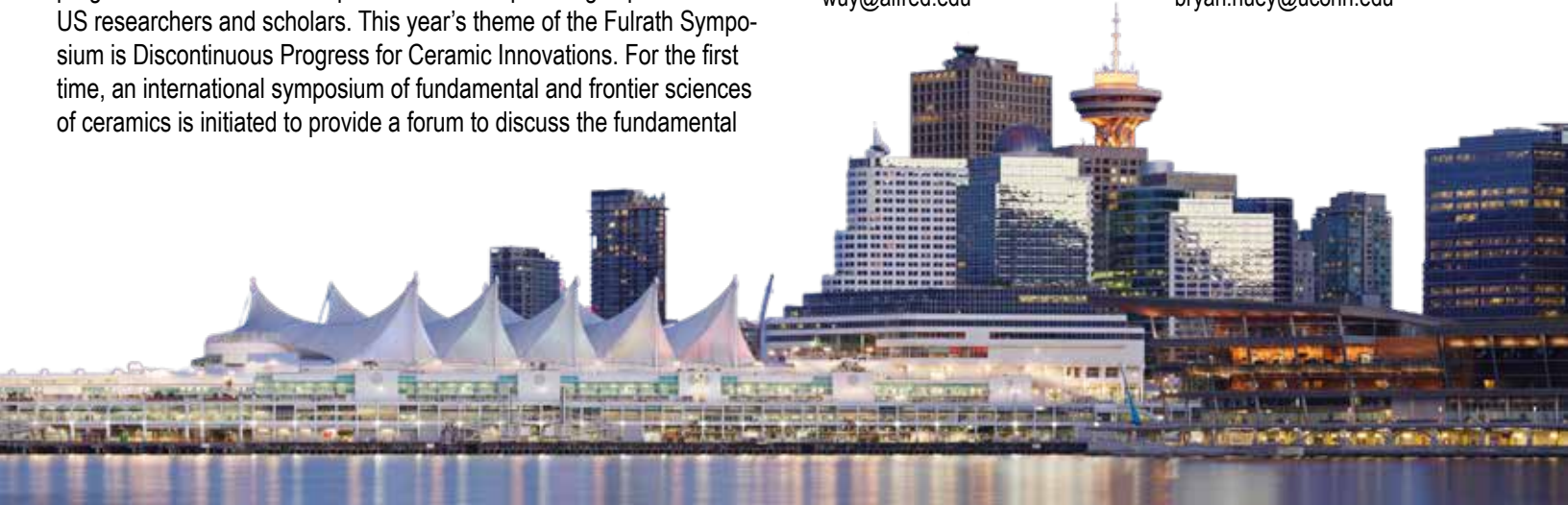

16th Pacific Rim Conference on Ceramic and Glass Technology

WELCOME TO VANCOUVER

PACRIM HQ Hotel:
Hyatt Regency Vancouver

655 Burrard St, Vancouver, BC V6C 2R7, Canada
Phone: +1 604-683-1234
Rate: 349$ CAD per night plus taxes.

To book your reservation online, please click here.
To make reservations by phone, please dial 1-800-233-1234 and mention the American Ceramic Society PACRIM Meeting.

Cut-Off Date: April 11, 2025

Abstract Submission Instructions

Visit the meeting website at ceramics.org/pacrim16 to review the session topics and select the "Submit Abstract" hyperlink to be directed to the Abstract Central website.

Follow the prompts to create an account and submit your Abstract online.

Please note that your ACerS member login and password will not work on this website. You will need to set up a new login and password for the Abstract Central website.

If you have questions please contact Karen McCurdy at kmccurdy@ceramics.org.

ABSTRACTS DUE DECEMBER 18, 2024

S1 | Environmental Barrier Coatings for High-Performance Ceramics

Environmental barrier coatings (EBCs) on ceramic matrix composites (CMCs) have been implemented into commercial aviation products with their durability playing an important role in component performance over time. Understanding degradation modes and their potential impact on coating life will play an important role in designing coating architectures and assessing coating life. Potential degradation modes that impact EBC durability and performance include microstructure changes from oxidation or evolution over time (e.g. EBC densification or devitrification of SiO2-based thermally grown oxides), CMAS-based reactions, exposure to thermal gradients and thermal shock conditions, and volatilization.

The impact of new coating compositions and processing methods on EBC performance along with EBCs with performance capabilities beyond those for melt-infiltrated SiC/SiC CMCs is another topic of interest, including hypersonic or reusable applications. Experimental and modeling approaches to understanding coating degradation, including advanced characterization methods, can either be a standalone topic or part of the evaluation process for different EBC systems.

Proposed sessions and topics of interest:

- Performance and coating evolution at extreme conditions (e.g. oxidation and/or corrosion, higher temperatures, thermal gradients and/or thermal shock)
- CMAS reactions with EBC compositions and their thermomechanical impacts
- Thermomechanical and/or thermochemical modeling of degradation mechanisms
- In-situ characterization or measurement of evolving coating properties
- New coating processing techniques and their effects on coating properties and degradation modes
- Theoretical or experimental approaches to develop new EBC compositions

Organizers:

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- R. Vassen, Forschungszentrum Jülich GmBH, Germany
- J. Wan, GE Aerospace, USA
- Jie Zhang, Institute of Metal Research, Chinese Academy of Sciences, China
- Makoto Hasegawa Yokohama National University, Japan

S2 | Frontier of Modeling and Design of Ceramics and Composites

As we approach the new era of explosive generation of big data and creative concept of high-throughput modeling and design, artificial intelligence and machine learning, we may envisage a completely different paradigm for advancing new knowledge and discovery of ceramic materials. This symposium will focus on the frontiers of modeling advancements on the fundamental understanding and improvement of ceramic performances; the discovery of new ceramic materials; and the design of structural ceramic components. A broader perspective will be discussed on the key challenges and opportunities for modeling related science and technology in accelerating materials innovation and creating sustainable development. Key topics include high throughput design and characterization, informatics and machine learning, and modeling of ceramics and composites with different approaches in both computational research and experimental measurements across the length and time scales to further optimize their behavior and facilitate the design of new structural and functional ceramics and composites with tailored properties.

Proposed sessions and topics of interest:

- High-throughput design and characterization
- Machine learning and artificial intelligence
- Multi-scale modeling of processing, microstructure and performance
- Modeling of structure and property of ceramics and composites
- Modeling defects and amorphous matter
- Modeling of surfaces, interfaces, and grain boundaries at multiple scales

Organizers:

- Jingyang Wang, Institute of Metal Research, Chinese Academy of Sciences, China; jywang@imr.ac.cn
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- Kwang-Ryeol Lee, Korea Institute of Science and Technology, Korea
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- Jian Luo, University of California, San Diego, USA
- Yixiu Luo, Institute of Metal Research, Chinese Academy of Sciences, China
- Sergei Manzhos, Tokyo Institute of Technology, Japan
- Katsuyuki Matsunaga, Nagoya University, Japan
- Bin Liu, Shanghai University, China

S3 | Solid Oxide Fuel Cells and Green Hydrogen Technologies

Solid oxide fuel cells (SOFC) and solid oxide electrolysis cells (SOEC) have gained increasing interest in recent years due to their capability of achieving high-efficiency power generation and hydrogen production. Significant progress has been made in recent decades, bringing SOFC into their early stage of commercialization. Protonic ceramic fuel/electrolysis cells (PCFC/PCEC) offer promising applications at intermediate temperatures (400-600°C). However, ceramic fuel cells are still facing challenges in durability and cost; both of which are associated with degradation of materials, design of cell and stack, and manufacturing processes. The symposium will provide a forum to exchange research ideas on these areas together with conduction mechanisms of component materials and electrochemical processes of ceramic fuel/electrolysis cells.

To achieve a cleaner and low carbon future, hydrogen has garnered significant interest as a chemical means of storage for electricity available from either baseload or renewable power plants. The symposium will give a wide overview of the state-of-the-art materials and technologies in the fields of hydrogen production, storage, transportation, and safety.

Proposed sessions and topics of interest:

- Oxygen ion, protonic, and mixed conductors; conduction mechanisms, materials limitations.
- Proton conducting oxides and fuel/electrolysis cells (PCFC/PCEC).
- Single cell design, microstructural engineering, manufacturing, and electrochemical performance.
- Interconnects materials, manufacturing, coating processes and their properties.
- Sealing materials, chemical compatibility, and their stability.
- Stack design, performance, reliability, and durability.
- Modeling and theory-computation of materials, cells, and stack.
- Degradation mechanisms with various fuels.
- Reversible fuel cells and high temperature electrolysis.
- SOFC system prototypes, commercialization plans, and economic assessments.
- Materials and technologies for hydrogen production, storage, transportation, and hydrogen safety.

Organizers:

- Fatih Dogan, Missouri University of Science and Technology, USA; doganf@mst.edu
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- Minfang Han, Tsinghua University, China
- Guntae Kim, Shanghai Institute of Applied Physics, China
- Sebastian Molin, Gdansk University of Technology, Poland
- Isao Kagomiya, Nagoya Institute of Technology, Japan
- Yasunobu Mizutani, National Institute of Advanced Industrial Science and Technology, Japan
- Kevin Huang, University of South Carolina, USA
- Kwati Leonard, Kyushu University, Japan
- Tae Ho Shin, KICET, Korea

S4 | Polymer-Derived Ceramics, Composites and Nanocomposites as Functional Inorganic Materials

The Polymer-derived ceramics (PDCs) route has emerged as an important strategy for preparing advanced inorganic materials. It allows a precise control over the chemical compositions, microstructure and functionality of advanced ceramics, composites and nanocomposites. The latter can be defined as either a ceramic nanophase, a carbonaceous nanophase in a ceramic matrix or to encompass a metal as the second component in a ceramic matrix. They also provide large opportunities to design complex shapes (fibers, coatings, 3D architectures) more efficiently and easily compared to other ceramic shaping technologies.

This symposium will be the ideal showcase for research activities dedicated to PDCs. Special focus will be given to the relationship between the polymer chemistry (through synthesis and/or chemical modification) and processing conditions, leading to i) various structures at different length scales, ii) complex shapes of materials and to iii) functional materials extensively used in environmental, energy, health and other applications.

Organizers:

- Samuel Bernard, CNRS, France; samuel.bernard@unilim.fr,
- Zhaoju Yu, Xiamen University, College of Materials, China
- Yuji Iwamoto, Nagoya Institute of Technology, Japan
- Günter Motz, University of Bayreuth, Germany
- Rajendra K. Bordia, University of Clemson, United States

S5 | Geopolymers: Low Energy & Environmentally Friendly, Scalable Ceramics

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 natural 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, porous geopolymers for water purification and biocidal activity, porous materials for CO2 sequestration, thermal insulation, fire resistant building materials, structural ceramic composites.

Proposed sessions and topics of interest:

- Synthesis, processing, microstructure, properties
- Conversion to ceramics
- Water purification
- Carbon dioxide sequestration
- Construction materials

Organizers:

– Waltraud M. Kriven, University of Illinois at Urbana-Champaign, USA; kriven@illinois.edu
– Ana Constancia Trinadade, University of Sao Paolo, Brazil
– Peigang He, Harbin Institute of Technology, China
– Henry A. Colorado, Universidad de Antioquia, Colombia
– Hao Wang, University of Southern Queensland, Australia

S6 | Dielectric Ceramics for Microwave and Sub Millimeter-Wave Applications

Ceramics play a key role in modern microwave and submillimeter-wave communication technologies as microwave resonators, filters, antennas, attenuators, etc. Meeting the requirements of increased channel capacity in ground-based cellular and satellite communications requires new devices built from materials with improved performance. Improving a material's performance means achieving better materials properties or figures of merit for given applications. This symposium provides a forum for the worldwide microwave and submillimeter-wave communities from academia, government, and industry to share their vision, gain insights, boost their research, and explore the applications of dielectric ceramics in 5G/6G, V2X, satellite communication/navigation, and other information systems. Topics discussed will include materials development, design, measurement techniques, devices, applications, technology trends, and market demands.

Proposed sessions and topics of interest:

- Components/devices/microsystems based on microwave dielectric ceramics
- Design, modeling, simulation, and measurement
- Dielectric response of materials in the millimeter- and submillimeter-wave ranges
- Millimeter- and submillimeter-wave devices
- Tunable dielectrics for microwave electronics
- Metamaterials, photonic crystals, metasurfaces and advanced artificial structures for microwave devices
- Microwave absorbing and shielding materials
- Ferrites and magnetoelectrics
- High-frequency acoustic-wave devices
- TCC/ULTCC ceramics
- Cold sintering, room-temperature fabrication, and other novel process for ceramics preparation
- 3D printing/photolithography and other emerging fabrication/integration technologies for microwave/submillimeter-wave devices
- Microwave circuits package and integration
- Other related emerging topics

Organizers:

– Rick Ubic, Boise State University, USA; rickubic@oisestate.edu
– Hong Wang, Southern University of Science and Technology, China; wangh6@sustech.edu.cn
– Xiang Ming Chen, Zhejiang University, China
– Michael Lanagan, Pennsylvania State University, USA
– Heli Jantunen, University of Oulu, Finland
– Nate Orloff, NIST, USA
– Zhifu Liu, Shanghai Institute of Ceramics, China

S7 | Direct Heat-to-Electricity Energy Conversion Materials and Thermal Energy Harnessing Challenges

Thermal energy conversion and harnessing is one of the ultimate challenges in science and technology. Scientific and technological progress in materials design and synthesis has always been a key to developing direct heat-to-electricity energy conversion and related technologies. Moreover, recent advances in nanotechnology have elicited unconventional thermal transport across nanostructured materials and nano-interfaces, realizing a novel means to harness thermal energy. This symposium provides an open forum to highlight cutting-edge new materials, theoretical ideas, and novel device and application concepts for direct heat-to-electricity energy conversion and thermal energy harnessing. Thermal, electrical, and mechanical

properties of new materials and processing of those materials into device structures will also be emphasized. It also highlights theoretical insight and materials innovations in unconventional heat transfer that enables us novel approaches toward higher efficiency and revolutionary technologies in thermal energy harvesting and heat management.

Proposed sessions and topics of interest:

- New concepts and challenges for high-performance thermoelectric and thermionic materials
- Nanoscale thermoelectric materials and nanocomposites (nanomaterials and inherent nanostructures in bulk thermoelectric material matrices)
- Theoretical studies on transport properties, band structures, crystal chemistry, thermodynamic analysis, and energy transfer for high-efficiency thermoelectric energy conversion
- Inorganic/organic hybrids and nanocarbon materials for energy harvesting and flexible/wearable thermoelectric applications
- Phase transformation, thermal conductivity switching, and thermal rectification in inorganic and organic materials for thermal energy harnessing

Organizers:

– Michitaka Ohtaki, Kyushu University, Japan; ohtaki@kyudai.jp
– Lidong Chen, Shanghai Institute of Ceramics, China
– Soonil Lee, Changwon National University, Korea
– Takao Mori, National Institute for Materials Science, Japan
– Takayoshi Katase, Tokyo Institute of Technology, Japan
– Sunmi Shin, National University of Singapore, Singapore
– Mona Zebarjadi, University of Virginia, USA
– Jing-Feng Li, Tsinghua University, China

S8 | STE(A)M Outreach, Education, Engagement and Retention (Joint with GOMD)

Participants in this symposium will highlight efforts related to awareness and interest in science, technology, engineering, art, and mathematics [STE(A)M] topics as well as approaches for educating and retaining the next generation of STE(A)M individuals in glass and ceramics research. Work that reaches one's country and/or a global audience is highly encouraged. Additional topics covered may include any pursuit that focuses on underrepresented and/or low-income communities and/or engagements in research with an emphasis on energy equity or environmental justice. Presentations should focus on outreach activities related to glass or ceramics-related topics, including exploration of STEAM essentials and best practices for developing and disseminating activities and tools to prepare students for technical careers; supporting K–12 STEM programs through outreach to teachers and schools; development of curricula and/or courses to support STEAM in schools and universities; and the importance of addressing the imminent gap in a qualified STEAM workforce.

Proposed Session:

- K-12 STE(A)M Outreach
- Workforce Development
- Researcher Engagement and Retention
- Community/Global Outreach and Engagement

Organizers:

– Charmayne Lonergan, Missouri University of Science and Technology, USA; clonergan@mst.edu
– Kim Scott, Colorado School of Mines, USA
– Casey Schwarz, Ursinus College, USA
– Amanda Engen, The American Ceramic Society, USA
– Kathryn Goetschius, Corning Inc., USA

S9 | Fundamentals of Interfaces, Grain Boundaries and Surfaces: From Interatomic Bonding to Macroscopic Properties

Microstructure evolution and physical properties of polycrystalline materials are closely linked to their internal defect configurations. In ceramic grain boundaries, dislocations, point defects, and their associated charge distributions often dominate mechanical, optical, and electrical properties. This symposium aims at reviewing and highlighting the latest discoveries on fundamental aspects of grain boundary structures and thermodynamics, and related interface kinetics. A deep understanding of grain boundaries obtained from advanced characterization, multiscale modeling, and processing experiments, guides microstructure design and development of new physical properties for structural and functional ceramics.

Proposed sessions and topics of interest:

- Thermodynamic and kinetic stability of interfaces
- Microstructure evolution through sintering and grain growth
- Novel Characterization techniques (incl. in-situ, 4D-STEM)
- Interface theory and modeling, including artificial intelligence/machine learning techniques
- Fundamentals of space charge: segregation, adsorption, electronic structures

Organizers:

– Klaus van Benthem, University of California, Davis, USA; Benthem@ucdavis.edu
– Naoya Shibata, University of Tokyo, Japan
– Si-Young Choi, Pohang University, Korea
– Jiangyu Li, Southern University of Science and Technology, China
– Hui Gu, Shanghai University, China
– Rajendra Bordia, Clemson University, USA

S10 | Ceramics of Tomorrow for Green Energy and Cleaner Environment

In an era of increasing environmental consciousness and sustainable development, the role of advanced ceramic materials in shaping a cleaner and greener future cannot be overstated. Recent years have borne witness to remarkable progress in the synthesis, structural analysis, and physical and chemical characterization of ceramic nanostructures. The exploration of nanomaterials has yielded substantial breakthroughs, contributing to both foundational discoveries and practical applications in critical domains such as photo/electrochemical water splitting, photovoltaics, solar hydrogen production, the conversion of CO2 into valuable products, and the generation of carbon-free energy. Achieving these objectives demands the design of effective and efficient materials, complemented by innovative characterization approaches. This collective endeavor needs collaborative efforts across multiple research disciplines, including chemistry, materials science, and environmental science, all converging towards the shared goal of improving human health and life quality.

This symposium centers on establishing a platform for leading global scientific experts from various countries to stimulate discussion on the latest advances in functional materials for sustainable energy and environmental applications.

Organizers:

- Alberto Vomiero, Lulea University of Technology, Sweden; alberto.vomiero@ltu.se
- Federico Rosei, University of Trieste, Italy,
- Gaixia Zhang, École de Technologie Supérieure (ÉTS), Université du Québec, Canada
- Kassa Belay Ibrahim, Ca'Foscari University of Venice, Italy
- Shaowei Zhang, University of Exeter, United Kingdom
- Yawei Li, Wuhan University of Science and Technology, China
- Dong Hao, Shanghai Institute of Ceramics, China
- Csaba Balázsi, HUN-REN Centre for Energy Research, Hungary

S11 | Optical and Electronic Phase Change Materials: Science and Application

Chalcogenide alloys, e.g., Sb2Se3 and Ge2Sb2Te5, and oxides like VO2 are solid-solid phase-change materials (PCMs) that hold immense potential in various applications due to their fast, dramatic, and reversible change in electrical and optical properties. In the last decade, significant progress has been achieved in finding alloys with superior switching speeds and contrast between amorphous and crystalline state properties using advanced optoelectronic devices. These advances have led to exciting applications ranging from reconfigurable RF switches to tunable optical metasurfaces and energy-efficient in-memory computing. With a fast-growing academic and industrial interest, the scientific community is dedicating efforts to expanding the library of materials for optimized and application-tailored PCMs and studying the underpinning principles and structure–properties–processing–performance relationships to inform future research in this field. This symposium will bring together the scientists and engineers behind said cutting-edge research to enable an open and expert discussion on opportunities and challenges ahead.

Proposed sessions and topics of interest:

- Fundamentals of phase change materials
- Simulation and computational discovery of phase-change materials
- Synthesis and Characterization of phase-change materials
- Applications and reliability of optical and electronic phase change devices
- Layered, superlattice, and nanocomposite phase-change materials

Organizers:

- Carlos Rios Ocampo, University of Maryland, College Park, USA ; ricosc@umd.edu
- Juejun Hu, Massachusetts Institute of Technology, USA
- Kathleen Richardson, University of Central Florida, USA
- Matthias Wuttig, University of Aachen, Germany
- Syed Ghazi Sarwat, IBM, Switzerland
- Lan Li, Westlake University, China

S12 | Engineering Ceramics and Ceramic Matrix Composites: Processing, Design and Applications

Engineering ceramics and ceramic matrix composites (CMCs) offer unique combinations of physical and mechanical properties that have the potential to fulfill the demanding material needs in structural and functional applications, such as those in the aerospace, automotive, energy generation, environment, transportation, optical systems, and microelectronics industries. Globally, significant progress has been made in the material development and manufacturing technologies pertaining to these ceramic materials. However, challenges remain with respect to increasing the extent of penetration of these ceramic materials into the industrial marketplace. The successful design and implementation of engineering ceramics and composites into the highly added value applications strongly depends on the consistent development of materials with improved properties and mechanical liability performance, thus providing sound solutions for engineering conditions with special requirements, especially under high temperature and high stress state, and oxidative and corrosive environment. In addition, the development of novel methods to advance computationally driven materials design and validation of modeled structure/property rela-

tionships are also critically needed to significantly accelerate ceramic materials development and lower the production costs. The objective of this symposium is, to provide a broader platform to scientists and engineers from around the world to present and discuss their up-to-date advances and developments in the areas of processing, characterization, modeling, and applications of engineering ceramics and CMCs.

Proposed sessions and topics of interest:

- Innovative processing and synthesis methods
- Fibers, preforms, interfaces/interphases and matrices
- Processing-microstructure-mechanical properties correlation
- Novel sintering and microstructure control
- Advanced design, processing, and manufacturing of CMC
- Fracture mechanics of ceramics and composites
- Thermal, electrical, and optical properties
- Environmental effects and thermo-mechanical performance
- Tribological performance of ceramics and composites
- Nondestructive evaluations
- Energy generation and environmental applications
- Design, reliability, and life prediction modeling of devices and components
- Novel computational approaches to enhance materials design, performance, and predictability
- Characterization of damage and failure mechanisms
- Industrial applications and challenges

Organizers:

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– Gerard L. Vignoles, University of Bordeaux, France
– Kevin Plucknett, Dalhousie University, Canada
– Tatsuki Ohji, National Institute of Advanced Industrial Science and Technology, Japan
– Andrew Wereszczak, Oak Ridge National Laboratory, USA
– Yu-Ping Zeng, Shanghai Institute of Ceramics, China
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– Gunter Motz, University of Bayreuth, Germany
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– Monica Ferraris, Politecnico di Torino, Italy

S13 | Functional Defects in Ceramic Materials

Defects are ubiquitous in ceramic materials, and can fundamentally alter their physiochemical, optical, thermal, mechanical, and electronic properties as well as their coupling with each other. Many opportunities exist for defect engineering in ceramic materials to tune their properties—at not only the ground state but also excited states under external fields and stimuli—especially in a controlled manner. For example, active research in recent years has enabled defect/disorder to play a key role in oxide materials for energy storage and conversion systems. Nevertheless, harnessing functional defects in ceramics presents continuous important scientific and technological challenges to materials scientists and engineers. Advanced theoretical, simulation and experimental tools are urgently required to characterize, visualize, understand, predict, and control formation and evolution of defects and interactions between them. Yet these techniques are largely limited or in some cases unavailable at present.

To address the pressing needs and challenges, this symposium aims to highlight the most recent developments, applications, and breakthroughs in harnessing functional defects in a wide range of ceramic materials via bridging expertise on theoretical modeling/simulation, materials synthesis and processing, and advanced characterizations. Particular attention will be paid to high-throughput studies combining simulations and experiments, predictive modeling of defect physics and chemistry, and the synthesis, control, and advanced characterizations of functional defects in ceramic materials. This topic may also include novel architectures for studying defects, such as the use of epitaxial heterostructures. Also of interest are in-situ or operando monitoring of functional defect formation/migration/ordering, the interplay between defect responses in ionic lattices and their manipulation by external fields, the behavior of functional defects in extreme environments, and use of transformative imaging capabilities to probe defect-driven phenomena in-situ along with their dynamics.

This symposium will provide an interactive forum for scientists from various fields interested in defect engineering for both classical and emerging applications. Specific sessions will be organized based on scientific theme topics in order to foster cross-fertilization of ideas and strategies. We will also host sessions with a focus on recent methodological advances in studying point and extended defects in functional materials. We hope this symposium will benefit ceramists with various

backgrounds, and will help encourage the implementation of predictive design, smart synthesis/control, and advanced characterization approaches to solve the urgent problems in this field.

Proposed sessions and topics of interest:

- Tailoring functional defects in nanostructures, heterostructures, and substrate-supported systems
- Defect-enabled/enhanced properties for (electro-)chemical, light-harvesting, thermal, mechanical, and electronic applications
- Characterizations, control, and applications of defect-induced emergent phenomena including phase transformations
- Advances in methodologies of theoretical techniques for predictive modeling of functional defects
- Multi-scale methods to study the role of extended defects on functionality
- Visualizing the generation and manipulation of defects dynamically in bulk, surface, interface, and grain boundary of functional ceramic materials
- Effects of extreme conditions on the nature and behavior of functional defects
- In-situ and operando characterizations of defects and defect transports in functional ceramic materials
- Structural diagnosis and quantitative analysis on defects from atomic to meso scale and their correlation with properties
- Principles of future development of defect engineering in energy materials

Organizers:

– Hui (Claire) Xiong, Boise State University, USA; clairexiong@boisestate.edu
– Candace Chan, Arizona State University, USA
– Janelle Wharry, Purdue University, USA
– Munekazu Motoyama, Kyushu University, Japan
– Haixue Yan, Queen Mary University of London, United Kingdom
– Bo Zhang, Xinjiang Technical Institute of Physics & Chemistry of CAS, China
– Palani Balaya, National University of Singapore, Singapore

S14 | Advanced Structural Ceramics and CMCs for Ultra-Extreme Environments

Advanced structural ceramics and ceramic matrix composites are enabling materials for applications that involve extreme environments such as those associated with nuclear power generation, turbine engines, hypersonic flight, high speed machining, etc. During their service in demanding environments, some critical challenges for ceramics and composites have to be met, e.g. thermal/chemical stability, complex shape forming, thermal shock resistance, radiation tolerance and oxidation/ablation resistance, etc. Extreme environments and challenging applications of these ceramics and composites have also necessitated new approaches in terms of processing, manufacturing and characterization. This symposium solicits abstracts related to the diverse aspects of structural ceramics and composites for extreme environments, such as powder synthesis, processing, structure-property relationships, thermal and mechanical properties, oxidation resistance, machining and joining, both from fundamental and application-oriented perspectives. Simulation or theoretical works related to the above themes are welcome. It will provide a unique platform for the specialists from all over the world on ceramics and composites to share their knowledge and demands with each other.

Proposed sessions and topics of interest:

- Non-oxide ceramics and composites
- High entropy/compositionally complex ceramics
- Powders, precursors, fibers, matrices, coatings, and interfaces
- Novel synthesis and processing methods
- Processing – microstructure –property relationships
- Properties at elevated temperatures
- Performance in demanding environments
- Methods for improving damage tolerance and resistance to oxidation, ablation, radiation, thermal shock, etc.

Organizers:

– Tessa Davey (Point of contact), Bangor University, United Kingdom; t.davey@bangor.ac.uk
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– Jon Binner, University of Birmingham, United Kingdom
– Bikramjit Basu, Indian Institute of Science, Bangalore, India
– Ryo Inoue, Tokyo University of Science, Japan
– Sea-Hoon Lee, Korea Institute of Materials Science, Korea
– Scott McCormack, UC Davis, USA
– Laura Silvestroni, Institute of Science, Technology and Sustainability for Ceramics, CNR, Italy
– Chris Weinberger, Colorado State University, USA
– Yanchun Zhou, Zhengzhou University, China
– Jie Yin, Shanghai Institute of Ceramics, China

S15 | Porous Ceramics: From Innovative Processing to Advanced Industrial Applications

Porous materials are essential components in numerous applications, including thermal insulation, catalysts, catalyst supports, filters, adsorbers, sensors, and lightweight structures. This symposium aims to unite the scientific community to share recent advances in the formation, characterization, properties, and modeling of porous ceramics for diverse applications. These materials have pore sizes ranging from nanometers to millimeters, with textures varying from random to hierarchical porosity, based on various architectures such as foams, honeycombs, fiber networks, and bio-inspired structures.

They can be produced by a variety of fabrication methods, including direct foaming, porous scaffold replication, sacrificial fillers, and additive manufacturing. Due to these versatile properties, porous materials are widely used in environmental, energy, biological, and other applications. This symposium will serve as an ideal platform to showcase the research activities of numerous groups involved in the development and application of porous materials, encompassing fields such as ceramics, chemistry, mechanics, fluid dynamics, modeling and simulation, and applications engineering.

Proposed sessions and topics of interest:

- Innovations in Processing Methods & Synthesis of Porous Ceramics
- Structure and Properties of Porous Ceramics
- Novel Characterization Tools and Software for Porous Structures
- Computational Techniques, Machine Learning (ML) and Artificial Intelligence (AI) for Porous Ceramics
- Engineered Porous Architectures Enabled by Additive Manufacturing Technologies
- Porous Ceramics for Environmental, Energy, Biological and Functional Applications

Organizers:

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– Samuel Bernard, Institute of Research for Ceramics-CNRS, Limoges, France
– Doug Wing, Corning Incorporated, USA
– Jian-feng Yang, Xi'an Jiaotong University, China
– NV Ravikumar, IIT Madras, India
– Carlos Rambo, University of Santa Catarina Florianopolis, Brazil

S16 | Advanced Powder Processing and Manufacturing Technologies

Powder processing is critical to the economical production of high reliability advanced ceramics, and can also enhance materials functionalities to enable new and broader application in high-technology clean energy and energy-saving industries for sustainable society. To realize these attributes, powder design and synthesis, suspension control, and structural control of the granulated feedstock, green body and sintered ceramics must be well-understood and carefully engineered. This symposium focuses on advanced powder processing and manufacturing technologies including the following areas:

Proposed sessions and topics of interest:

- Nanoparticle and powder design and synthesis
- Particle coating technology and composite particle fabrication
- Particle dispersion control in liquid or polymers
- Novel forming and sintering technology
- Nano/microstructure control
- Controlled composites or pore structure
- Low cost and energy-saving processes
- Novel material recycling
- Characterization of particle and powder

Organizers:

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– Masayoshi Fuji, Nagoya Institute of Technology, Japan
– Fiqiri Hodaj, Grenoble Institute of Technology, France
– Yuji Hotta, National Institute of Advanced Industrial Science and Technology (AIST), Japan
– C.C.Huang, Hosokawa Micron Powder Systems, USA
– Jian Luo, University of California, USA
– Taeseup Song, Hanyang University, Korea
– Tohru Suzuki, National Institute of Materials Science (NIMS), Japan
– Satoshi Tanaka, Nagaoka University of Technology., Japan
– Chiharu Tokoro, Waseda Univ., Japan
– Wei-Hsing Tuan, National Taiwan University, Taiwan, ROC
– Jingxian Zhang, Shanghai Institute of Ceramics, P.R. China

S17 | Additive Manufacturing of Ceramics and Composites

Additive manufacturing (AM, or 3D printing) of ceramic materials has emerged as novel ceramic manufacturing processes with the advantages of design freedom, flexibility, high customization, and waste minimization. Various AM processes have been developed for structural and functional ceramic materials, including binder jetting, stereolithography, digital light processing, ink jet printing, selective laser sintering, directed energy deposition, and fused deposition modeling. As a transformative approach, AM has provided new opportunities to overcome the limitations of traditional ceramic manufacturing processes, such as the long processing time and the difficulty to fabricate structures with complex geometries.

The purpose of this symposium is to provide an international forum to foster technical discussions of the fundamental mechanisms related to processing-microstructure-property relationship during AM of ceramics and composites. With the recent advances in powder processing, in-situ process monitoring, in-situ and ex-situ characterization tools, nondestructive evaluation and testing, qualification and certification, we are gaining a better understanding of the physical mechanisms controlling the unique microstructures, defect formation, and physical properties of additively manufactured ceramics.

Proposed sessions and topics of interest:

- New approaches for AM processes of ceramics and ceramic-matrix composites
- Novel techniques to prepare ceramic powders for AM
- Multiscale computational modeling and data-driven process optimization
- In-situ and ex-situ characterization of phase transformation, textures, defects, etc., using synchrotron X-ray, neutron diffraction, electron microscopy
- Mechanical, thermal, electrical, magnetic, and optical properties
- New applications of additively manufactured ceramics and composites

Organizers:

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– Soshu Kirihara, Osaka University, Japan
– Hui-Suk Yun, Korea Institute of Materials, Korea
– George V. Franks, The University of Melbourne, Australia
– Zehui Du, Nanyang Technology University, Singapore
– Rujie He, Beijing Institute of Technology, China
– Zhangwei Chen, Shenzhen University, China
– Martin Schwentenwein, Lithoz GmbH, Austria
– Paolo Colombo, Universita' di Padova, Italy
– Alberto Ortona, The University of Applied Sciences and Arts of Southern Switzerland, Switzerland
– Jia-Min Wu, Huazhong University of Science and Technology, China

S18 | Nanostructured Metal Oxides and Metal Chalcogenides for Advanced Functional Applications

Ceramics have become critical components of scientific developments in many different areas, such as structural materials in aviation and hypersonics, and primarily in functional applications encompassing chemical sensors, photocatalysts, solar cells, superconductors, etc. This symposium aims to bring together experts in the processing, characterization, and the functional applications of nanostructured ceramics based on metal oxides and metal chalcogenides. The focus will be mostly on modern powder processing methods: hydrothermal, solvothermal, colloidal synthesis, sol-gel, spontaneous combustion processes, spray pyrolysis, mechanical milling, and electrostatic and laser-based techniques for nanostructured particle and fiber formation. The synthesis of binary ferroelectrics and the control of oxide polymorphism, and the functionality of ternary chalcogenides will be featured prominently in this symposium. Structural characterization of the as-synthesized and as-processed materials will be an additional theme of this symposium. Finally, the impact of these materials on defining the tools of the near future (neuromorphic computers; 3D printed devices and batteries; and portable MRIs) will also be highlighted.

Proposed sessions and topics of interest:

- Functional ceramic nanopowders
- Modern powder processing methods
- Synthesis and characterization of metal oxides
- Binary and multicomponent chalcogenides
- Fibrous materials
- Binary ferroelectrics
- Polymorphism
- Advanced materials characterization

Organizers:

– Pelagia-Irene (Perena) Gouma, The Ohio State University, USA; gouma.2@osu.edu
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– Na Ni, Shanghai Jiao Tong University, China
– Wei Pan, Tsinghua University, China

S19 | Nanostructured Bioceramics and Ceramics for Biomedical Applications

Recent advances in nanostructured ceramics for medical applications have resulted from two complementary forces. First, there is a natural evolution from the microscale to the nanoscale as novel processing and characterization techniques become available. Second, nanostructured ceramics provide exceptional capabilities for specialized interactions with proteins, DNA, viruses, and other nanoscale biological structures. Third, novel techniques for processing ceramic materials are being developed that will facilitate improvements in medical and dental care. 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 sessions and topics of interest:

- Nanostructured bioceramics
- Dental biomaterials
- Rapid prototyping of bioceramics
- Advanced processing of bioceramics
- In vitro and in vivo characterization of bioceramics
- Medically-relevant hybrid materials
- Bioinspired materials and devices
- Nanostructured biosensors
- Drug/gene delivery devices
- Biomedical sensors
- Diagnostics for medical applications

Organizers:

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– Chikara Ohtsuki, Nagoya University, Japan
– Akiyoshi Osaka, Okayam University, Japan
– Rizhi Wang, University of British Columbia, Canada
– Chengtie Wu, Shanghai Institute of Ceramics, China,
– Hala Zreiqat, University of Sydney, Australia
– Xuanyong Liu, Shanghai Institute of Ceramics, China
– Yu Zhang, University of Pennsylvania, USA
– Congqin Ning, Shanghai Normal University, China

S20 | Advanced Functional Materials for Clean Energy Solutions

For responsible climate change and to combat global warming, the development of carbon-neutral energy technologies based on renewables and earth-abundant resources is inevitable. Solar-assisted energy conversion processes have the potential to provide sustainable energy solutions, however, sunlight cannot be utilized directly due to its intermittent and diffuse nature. The direct conversion of solar energy to platform chemicals acting as energy carriers needs efficient photoabsorbers and photocatalysts that can convert photonic energy to drive chemical reactions for activating small molecules such as water, nitrogen and carbon dioxide to generate carbon-neutral fuels. This symposium will put the spotlight on the discovery of functional materials such as perovskites, thermoelectrics and heterostructured photoabsorbers. Synthetic routes to produce new materials (including f-block elements) and their assembly for device applications are the key domains for this interdisciplinary symposium.
This symposium will focus on synthesis, processing, modeling and device integration of multifunctional inorganic materials for energy harvesting and conversion processes. It will showcase recent progress on renewable energy sources and various aspects of carbon-neutral sustainable development, providing an opportunity to actively discuss recent research trends and seek opportunities for collaboration.

Proposed sessions and topics of interest:

- Innovative processing of functional nanomaterials by solution and vapor phase techniques
- Two dimensional materials and thermoelectrics for energy harvesting & storage
- Materials for solar fuels, electrocatalysis and electrochemical energy storage systems
- New generation perovskite-based photovoltaic cells
- Piezoelectric nanostructures for self-powered systems
- Advanced in situ and operando techniques
- Modeling and computational studies on energy harvesting materials
- Conceptual advances in green technologies and materials circularity approaches

Organizers:

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– Ahsan Qurashi, Khalifa University, United Arab Emirates
– Tohru Sekino, Osaka University, Japan
– Ravi Kumar, IIT Madras, India
– Wenbin Cao, USTB, Beijing, China
– Graziella Malandrino, University of Catania, Italy
– Ji-Hyun Jang, UNIDST, Ulsan, Korea
– Flavio de Souza, CNPEM, Brazil
– Daniel Chua, NUS, Singapore
– Xun Shi, Shanghai Institute of Ceramics, China
– Katalin Balázsi, HUN-REN Centre for Energy Research, Hungary
– Qinghong Zhang, Donghua University, China

S21 | Cultural Heritage of the Pacific Rim

This symposium will cover a wide range of materials analyses applied on cultural heritage from the past to present, focused on Asian art and archaeology of the Pacific Rim. This symposium is open to materials scientists, archaeologists, conservation scientists, conservators, and other professionals working with cultural heritage materials. Topics can include non-invasive and micro-destructive techniques applied to cultural heritage, cultural heritage conservation and preservation projects, archaeological and historic research on methods and materials, post-depositional processes, cultural heritage deterioration, and human behavioral interpretations based on archaeological artifact sourcing and studies of technology. Topics related to the use of cultural heritage conservation and science as means to improve communication in the field of materials science education, archaeology, architecture, and art history are also welcome.

Proposed sessions and topics of interest:

- Ceramic technology of Asia from earthenware to porcelain
- Interdisciplinary and cross-regional communication to study cultural heritage
- Pigments and dyes in Asian painting and polychromy
- Scientific analysis in support of conservation
- Noninvasive methods of analysis in the study of Asian art

Organizers:

– Fumie Iizuka, University o f Missouri, USA; iizukafumie@gmail.com
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S22 | 7th International PacRim Richard M. Fulrath Memorial Symposium on Advanced Ceramics

This symposium features alumni of the Richard M. Fulrath award. Established in 1978 to memorialize Fulrath's contributions to the ceramics community (1924-1977), the award recognizes major achievements in the ceramics field, promotes technical and personal friendships between US and Japanese professional ceramic engineers and scientists, and encourages understanding and collaboration among our diverse cultures.

The symposium accordingly highlights ongoing advances by some of the 150 overall Fulrath awardees. Spanning fundamental and applied ceramics research. This includes novel processing, characterization, and functionalities; commercialization of ceramics technologies; and especially in the spirit of Fulrath's contributions a focus on applications addressing pressing challenges in society including sustainability, security, medicine, and energy. Fulrath symposia are designed to include historic reviews, incorporate brand new results, and allow extra time for questions, conversation, and friendship.

Proposed sessions and topics of interest:

- Advances in processing, modelling, and characterization
- Bulk ceramics, thin films, and coatings
- New functionalities and multifunctionalities
- Device performance and degradation
- Ceramics in extreme conditions
- Applications in medicine, security, energy, and sustainability

Organizers:

– Bryan D. Huey, University of Connecticut, USA; bryan.huey@uconn.edu
– Tomoyuki Nakamura, Murata Manufacturing Company, Japan
– Hirokazu Sasaki, Shoei Chemical Inc., Japan

S23 | Advanced Processing and Manufacturing Technologies for Ceramics

The forming, processing and manufacturing routes such as sintering and 3D printing impart great effects on mechanical, thermal, optical and electronic properties of ceramics. Novel processing and manufacturing methods could lead to not only advanced properties of ceramics, but also massive time and energy saving. Therefore, developing novel processing and manufacturing technologies for ceramics has driven global-wide research in scientific communities and industrial corporations in recent years. In light of these aspects, the aim of this symposium is to discuss advances in processing and manufacturing technologies for a wide variety of ceramics, composites, and related materials.

Proposed sessions and topics of interest:

- Spark plasma sintering, flash sintering, ultra-fast high-temperature sintering
- Cold sintering and energy-efficient densification techniques
- Novel forming technologies, 3D printing, near-net shaping
- Solidification, in situ characterization, structure and simulation
- Joining, integration, and machining technologies

Organizers:

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– Yuchi Fan, Donghua University, China
– Hidehiro Yoshida, The University of Tokyo, Japan
– Qiaodan Hu, Shanghai Jiaotong University, China
– Fei Zhang, KU Leuven, Belgium
– Sea-Hoon Lee, Korea Institute of Materials Science, Republic of Korea

– Jie Yin, Shanghai Institute of Ceramics, China
– Weiwei Zhou, Tohoku University, Japan
– Wei Ji, Wuhan University of Technology, China
– Pavol Sajgalik, Slovak Academy of Sciences, Slovakia
– Shijie Wang, Institute of Materials Research and Engineering, Agency for Science, Technology and Research, Singapore

S24 | Solid-State Optical Materials and Luminescence Properties

Solid-state materials, including glass, ceramics, and single crystals, have a wide range of important and emerging applications in the fields of optoelectronics, optics, photonics, defense protection, telecommunication, bioengineering, healthcare, and sustainable energy. The aim of this symposium is to provide a forum to exchange research ideas about state-of-the-art optical and luminescent materials, and their perspectives or emerging applications, such as solid-state lasers, scintillators, windows and domes, armors, solid-state lighting, and emissive displays. The topics will be focused on the fundamental issues to advance our understanding and the utilization of optical and photonic materials and related devices for applications in the fields of sustainable environment, healthcare, and energy.

Proposed sessions and topics of interest:

- Optical spectroscopy of crystalline and amorphous materials
- Novel optical materials design and their properties
- Advanced processing of optical materials and devices
- Optoelectronic and magneto-optical materials
- Crystalline and amorphous laser and scintillation materials
- Optical and photonic fiber materials and applications
- Modeling and theory computation of optical materials
- Optical materials for the environment, healthcare, and energy
- Future advanced optical and photonic materials
- Luminescent materials for solid-state lighting

Organizers:

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– Liangbi Su, Shanghai Institute of Ceramics, China
– Rong-Jun Xie, Xiamen University, China
– DoKyung Kim, Korea Advanced Institute of Science and Technology, Korea
– Tatami Junichi, Yokohama National University, Japan
– Hao Wang, Wuhan University of Technology, China
– Mathieu Allix, University of Orleans, France
– Dariusz Hreniak, Polish Academy of Sciences, Poland
– Jianqi Qi, Sichuan University, China

S25 | Synthesis, Processing, and Micro-Structural Control of Materials Using Electric Currents, Magnetic Fields and/or Pressures

Electric fields and currents are powerful processing parameters in addition to the temperature and time available in traditional sintering. Applications of electric current have been leveraged to produce materials with unique properties and/or increase processing efficiency. Of particular note is the widely spread (and continuously increasing) use of the technique often referred to as Spark Plasma Sintering (SPS), Field Assisted Sintering Technique (FAST) and Current Activated Pressure Assisted Densification (CAPAD) among others. This symposium is in the spirit of previous symposia on SPS that were held in conjunction with past PACRIM meetings beginning with Pacrim7, Hawaii. The success of these symposia provided evidence of the continued worldwide growth of research and development activities in this field. The symposium is aimed at providing a forum for scientists and engineers to present and discuss results of various observations on a wide variety of topics related to current/pressure/field assisted processing and synthesis of materials. Experimental and modeling papers covering both fundamental as well as application-oriented studies are solicited.

Proposed sessions and topics of interest:

- Fundamental investigations on electric current/field and/or pressure on materials processing
- Effects of current/field on defects and microstructure
- Modeling and simulation studies of current activated densification
- Consolidation of nanocrystalline materials using pressure and/or electric fields
- Property evaluation of materials processed using electric currents including thermal, mechanical, optical, electrical and magnetic properties
- Magnetic field synthesis/ alignment
- Field-activated synthesis
- Flash Sintering

Organizers:

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– Alexander D. Dupuy, University of Connecticut, USA

S26 | Materials for Advanced Nuclear Energy Systems and Nuclear Waste Management

The next generation nuclear energy plays a crucial role in the development of a sustainable and decarbonization for fission and fusion. Many of the critical structural components inside a next generation nuclear energy system will be subjected to a harsh application environment including high temperature, high energy and high flux neutron radiation, and chemical corrosion by coolants, which likely impose a grand challenge for most incumbent metallic materials. Advanced materials based on inorganic nonmetallic materials are expected to provide a range of material solution for achieving higher fuel burning rate and efficiency, improved economic benefits, an inherently safe reactor with long-term stability, and immobilization of radiation nuclear wastes.

Currently, the incorporation of advanced ceramics would allow engineers to design a nuclear fuel system that would be more accident tolerant during the loss of cooling system as compared to the UO2-Zircalloy system currently employed for light water and pressurized water reactors. Fine-grained graphite and ceramic-based composites have been widely considered for structural components in various high-temperature reactors (HTR). On the other hand, advanced ceramic materials could have the potential to advance radiation detection and secure waste immobilization technologies. Therefore, the aim of this symposium is to provide a forum for materials scientists and nuclear engineers from around the world to share their up-to-date progress and exchange views on the development of various advanced materials for next-generation nuclear energy and application experiences of these materials in the design of reactors, fuels, and waste treatment. Novel approaches utilizing artificial intelligence, including machine learning and deep learning, in materials design, testing, and system advancements are encouraged.

Proposed sessions and topics of interest:

- Advanced ceramics, ceramic composites, and graphite materials for advanced fission and fusion nuclear energy systems
- Radiation effects and damages on microstructure and mechanical properties
- Materials and their behaviors under the accidental conditions
- Next-generation accident-tolerant fuels
- Molten salt, lead, or supercritical water corrosion
- Computer simulation of radiation effect, materials modeling, and database
- Ceramics and glass for nuclear waste management

Organizers:

- Xiao-Ying Yu, Oak Ridge National Laboratory, USA; yuxiaoying@ornl.gov
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- Hua-Tay Lin, Guangdong University of Technology, China
- Young-Wook Kim, University of Seoul, Korea
- Houzheng Wu, SIAMC Advanced Material Corporation, China
- Yingjie Zhang, Australian Nuclear Science and Technology Organization, Australia
- Libin Sun, Tsinghua University, China
- Hans J. Seifert, Karlsruhe Institute of Technology, Germany
- Jia-Xiang Xue, China Nuclear Power Technology Research Institute Co., Ltd., China
- Tatsuya Hinoki, Kyoto University, Japan
- Monica Ferraris, Politecnico di Torino, Italy
- Ping Xiao, The University of Manchester, United Kingdom
- Haibin Zhang, China Academy of Engineering Physics, China

S27 | International Symposium of Fundamental and Frontier Sciences of Ceramics

Ceramics have been playing important roles in our modern society and will continue to propel the advancement of science and technology. Historically, ceramics research has led to the creation of many new theories, materials, innovative processes, functionalities, and properties of advanced ceramics. In the past years, innovations in ceramic materials have been observed by many and have inspired a large number of research efforts to pursue new knowledge, including high-entropy ceramics, novel sintering technology, laser ceramics, lead-free piezoelectric ceramics, interface and grain boundary engineering, atomic-level materials design, characterization, etc. This symposium aims to provide a forum to discuss the fundamental and frontier science of advanced ceramics and emerging applications of new processing technologies and ceramic materials. The topics include all aspects of the basic ceramic sciences and the utilization of new technology, processing, and materials for applications in the fields of sustainable environment, healthcare, energy, etc.

Organizers:

- Yiquan Wu, Alfred University, USA; wuy@alfred.edu
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- Zhengyi Fu, Wuhan University of Technology, China
- Junichi Tatami, Yokohama National University, Japan
- Richard Todd, University of Oxford, UK
- Liangbi Su, Shanghai Institute of Ceramics, China

– Yanhao Dong, Tsinghua University, China
– Paolo Colombo, University of Padova, Italy
– Olivier Guillon, Institute of Energy and Climate Research, Germany
– Nina Obradovic, Institute of Technical Sciences of SASA, Serbia
– Mathieu Allix, University of Orleans, France
– Zbigniew Pędzich, AGH University of Science and Technology, Poland

S28 | Joining and Integration of Ceramics for Enabling Complex Components and Advanced Applications

Ceramic materials (including ceramic matrix composites, CMCs) offer high temperature, mechanical, and/or functional properties for advanced applications. Joining and integration technologies are enabling for the wider utilization of them. Ceramic joining allows for the buildup of larger and more complex shaped ceramic and CMC components which can't be easily fabricated though conventional manufacturing methods. Joining methods include diffusion bonding, transient liquid phase bonding, preceramic infiltration and conversion, glass phase bonding, MAX phase joining, and other forms of bonding, including localized heating joining.

Alternately, ceramic integration utilizes brazing processes to allow for their incorporation with dissimilar materials, typically metals and alloys. In addition, adhesives and glasses can be used for bonding ceramic and CMCs to various materials. For each joining and integration need, a tailored solution is required which considers such factors as materials selection, application conditions, service life requirements, component geometry, interlayer reactions and/or wetting, and thermomechanical properties. This symposium will address all aspects of joining and integration technology development to include modeling, processing, characterization, and testing from nano and microscale to macroscale and from low to high technology development levels.

Proposed sessions and topics of interest:

- Joining of ceramics and CMCs
- Joining, brazing, and adhesion of ceramics and CMCs to metals and other dissimilar materials
- Nano-scale interface of dissimilar materials and micro-/nano-joining
- Micro-joining and application engineering
- Thermodynamics and kinetics of interface formation
- Mechanisms of wetting and adhesion
- Characterization and non-destructive evaluation of joints
- Mechanical testing of joined ceramics and CMCs
- Testing of joints and joined components under extreme conditions
- Modeling and design of joints and assemblies
- Joining enabled component fabrication and demonstration

Organizers:

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– Xiaobing Zhou, Ningbo Institute of Materials Technology and Engineering, China.
– Rajiv Asthana, University of Wisconsin-Stout, USA
– Anming Hu, University of Tennessee-Knoxville, USA
– Jon Binner, Birmingham University, United Kingdom
– Gerard Vignoles, University of Bordeaux, France
– Yanhui Chu, South China University of Technology, China

S29 | Progress in High-Entropy Materials

The high entropy concept focuses on compositions far away from the edge or corner of a multi-component system and hence represents a new paradigm shift in materials design. Consequently, high entropy materials, including solid solution alloys, intermetallics, ceramics, glasses, functional materials, polymers, and their composites, have attracted increasing interest from academia and industries on the fundamental understanding and applications. While great progress has been made in the theory and experiments in the formation, processing, and properties of high entropy materials, many challenges remain, such as lack of efficient and reliable computational tools, complex composition-processing-microstructure-properties relationship, vastly unexplored compositional space, and sensitivities to stress, temperature, pressure, and other environmental/operating conditions.

Proposed sessions and topics of interest:

- Artificial intelligence/machine learning: Model & algorithm development, machine learning interatomic potentials, inverse materials design.
- High throughput, multiscale modeling & simulations: Density functional theory, molecular dynamics, Monte Carlo, finite element method, phase field, mean field, CALPHAD, continuum.
- Thermodynamic, kinetic, physical, magnetic, magnetocaloric, thermoelectric, superconducting, catalytic, and other functional properties.
- Mechanical properties: Tension, compression, creep, fatigue, fracture toughness, brittle to ductile transition, wear, high strain rates.
- Crystal defects: Vacancies, interstitials, dislocations, twins, stacking faults, grain boundaries, surfaces, interfaces, voids, cracks, and their interactions.

- Environmental properties: Aqueous, pitting, stress, & salt corrosion, oxidation, hydrogen embrittlement, high-temperature hydrogen attack, irradiation, plasma erosion.
- High throughput synthesis methods in bulk and film forms.
- Advanced manufacturing and joining: Additive manufacturing, electron beam melting, spark plasma sintering, friction stir welding, novel extrusion.
- High-throughput characterization: Microstructures, and various properties.

Organizers:

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– Xingbo Liu, West Virginia University, USA
– Yong Zhang, University of Science and Technology Beijing, China
– Wei Chen, Buffalo University, USA
– Bai Cui, University of Nebraska at Lincoln, USA
– Yu Zou, University of Toronto, Canada
– Hailong Wang, Zhengzhou University, China

S30 | The Roles of Experimental Thermodynamics and Thermal Analysis in the Design of Materials for Energy Sustainability

Experimental thermodynamics and thermal analysis have played critical roles in the characterization and interpretation of the working mechanisms of materials. Their integration with multi-scale simulation, advanced in situ structural and/or interfacial analyses, and machine learning open a series of new opportunities in the design, synthesis and production of energy-related materials. This symposium aims to highlight the new roles, recent advances, opportunities, and challenges of experimental thermodynamics and thermal analysis in energy storage, conversion, and production. The session topics include but are not limited to:

Proposed sessions and topics of interest:

- Predictive synthesis of materials under thermodynamic guidance
- Characterization of materials with new thermochemical and thermal approaches
- Thermodynamics of interfacial phenomena
- Energetics – structure – functionality relationships
- Machine learning aided material design based on thermodynamic principles

Organizers:

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– Alexandra Navrotsky, Arizona State University, USA
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– Hui Sun, Xinjiang University & East China University of Science and Technology, China
– Xianghui Hou, Northwestern Polytechnical University, China

S31 | Next-Generation Nanolayered Structural/Functional Materials: Ternary Transition Metal Carbides/Nitrides (Max Phases) and Borides (Mab Phases), Solid Solutions Thereof, and 2D Counterparts (MXenes, MBenes)

Nanolayered solids have attracted a lot of attention due to their intrinsic properties like damage tolerance, high toughness, amongst others. As an example, MAX and MAB phases are thermodynamically stable nanolaminates of early transition metals carbides, nitrides, and borides. Due to their inherent nanolaminated crystal structure they have remarkable and unique combination of metal-like and ceramic-like properties, such as machinability, good electrical/thermal conductivity, high thermal shock resistance, good oxidation/corrosion resistance, and stiffness at high temperatures. It is also possible to selectively etch atomic metal layers out of the crystal structure and to separate each nanolaminated block of these transition metal compounds to form 2D solids (MXenes, MBenes). Despite their relatively short history, MXenes have attracted attention due to their attractive properties, such as excellent electronic conductivity, surface functionality, and tunability.

This symposium will focus on the manufacturing, design challenges, properties like thermal, electrical, optoelectronic, solid lubrication and mechanical properties, stability, oxidation/corrosion resistance, and radiation tolerance of both 2D and 3D forms. A special session will be organized for further expanding research on the chemistry of layered and ternary structures.

Organizers:

– Surojit Gupta, University of North Dakota, USA; Surojit.gupta@und.edu
– Miladin Radovic, Texas A&M, USA; mradovic@tamu.edu
– Christina Birkel, Arizona State University, USA
– Babak Anasori, Purdue University, USA
– Aiguo Zhao, Henan Polytechnic University, China
– Jesus Gonzalez-Julian, RWTH Aachen University, Germany
– Qing Huang, Ningbo Institute of Materials Technology & Engineering, China

S32 | Advanced Characterization, Testing, and Analysis of Materials

The symposium will cover recent developments in structure and composition analysis, as well as testing and in-situ analysis of mechanical, physical and chemical properties of ceramics and composites. Advanced characterization methods include, but are not limited to, (synchrotron) X-ray, neutron and electron diffraction, probe microscopy, electron microscopy and spectroscopy, vibrational spectroscopy (IR/Raman), NMR, optical imaging and spectroscopy, and related tools. New insights from in-situ or in-operando studies are of interest, as well as integration of first-principles calculations and complex data modeling methods. These techniques enable one to study not only static and long-range periodic structures, but also dynamic and short-and/or intermediate-range structures that substantially influence the properties of ceramics. This symposium thus aims to provide a cross-technique forum on the characterization of ceramics with emphases on correlations between structural elements, including defects, domains, dislocations, grain boundaries, surfaces and interfaces, and the resulting materials properties.

Proposed sessions and topics of interest:

- Atomic and local structure analysis by X-ray, neutron, synchrotron and electron diffraction
- Scanning probe microscopy/near-field optical microscopy of nanoscale electric, piezoelectric, magnetic, thermal and optical properties
- In-situ time-resolved analysis and ultrafast electron diffraction/microscopy
- Tomography and ptychography based on Bragg diffraction, transmission and fluorescence contrast
- Structure and composition analysis by scanning electron microscopy, transmission electron microscopy, focused ion beam microscopy, electron probe microscopy
- Spectral analysis including XPS, X-ray (XAFS), NMR, EPR, and vibrational spectroscopy (IR/Raman)
- Data modeling, global optimizations, statistical treatment of data

Organizers:

– Scott T. Misture, Alfred University, USA; misture@alfred.edu
– Bryan D. Huey, University of Connecticut; bryan.huey@uconn.edu
– Amanda R. Krause, Carnegie Mellon University, USA
– Jie Zhang, Institute of Metal Research, Chinese Academy of Sciences, China
– Miaofang Chi, Duke University, USA
– Yunseok Kim, Sungkyunkwan University, Korea
– Qiang Zheng, National Center for Nanoscience and Technology, China

S33 | Ceramics for Electrochemical Energy Storage

Electrochemical energy storage systems, such as Li-ion batteries, are crucial for today's world, which relies heavily on them, for portable and mobile devices. They are also key to successfully transitioning toward electric mobility and stationary systems can help bridge the gap between peaks of demand and supplies times for renewable energy.

Ceramic materials play a pivotal role in electrochemical energy storage. Advances in their synthesis, processing, and characterization can lead to breakthroughs enabling technologies, such as rechargeable solid-state batteries. This symposium will focus on ceramic materials and their applications in electrochemical energy storage. We welcome contributions on various aspects, including materials design and modeling, synthesis, characterization, processing, and the properties and performance of these materials in devices. Topics to be covered include ceramics for key components in batteries and supercapacitors, such as electrodes, electrolytes, and active functional additives. Studies on new electrochemical energy storage technologies enabled by advancements in ceramic materials development, as well as fundamental studies on the underlying mechanisms of both new and existing technologies, are welcomed.

Proposed sessions and topics of interest:

- Electrodes for batteries (e.g., Li-ion and Na-ion) and supercapacitors.
- Electrolytes for solid-state batteries (e.g., garnet, NASICON and sulfides)
- Synthesis and processing of ceramic electrodes for solid-state batteries
- Functional inactive components/additives for batteries and supercapacitors (e.g., conductive additives, reinforcements, and current collectors).
- Ab initio calculations and modeling of ceramic materials for electrochemical energy storage
- Ceramics-enabled new electrochemical energy storage technologies

Organizers

– Olivier Guillon, Forschungszentrum Jülich GmbH, Germany; o.guillon@fz-juelich.de
– Michael Naguib, Tulane University, USA; naguib@tulane.edu
– Kun Liang, Ningbo Institute of Materials Technology & Engineering, Chinese Academy of Sciences, China
– Naoaki Yabuuchi. Yokohama National University, Japan
– Do Kyung Kim, Korea Advanced Institute of Science & Technology, Korea

S34 | Carbon Based Materials and Smart Structures for Electronic, Photonics, Electrochemical, MEMS and Energy Applications

Carbon based materials have a wide range of applications in the fields of advanced manufacturing, electronic, photonics, energy and sensing applications. The symposium aims to provide a forum for researchers, students, industry researchers, and entrepreneurs to present and discuss their recent scientific results on a wide variety of topics related to science and engineering issues associated with carbon-based materials (including diamond, and DLC, carbon nitride, 1D, 2D and 3D carbon nanomaterials), structures and composites, as well as fundamental insights and new findings toward advanced functionality in the fields of physics, chemistry, materials science, biology, and manufacturing. An emphasis will also be placed on the fundamental issues to advance our understanding and utilizations of advanced carbon materials, nanostructured carbon materials, hybrid smart structures with wide bandgap semiconductors, and related electronic, optical, photonics, electrochemical, or energy devices applied to environment, healthcare, and energy.

Proposed sessions and topics of interest:

- Graphite/Diamond/DLC/amorphous carbon materials: growth, characterizations, properties, and applications
- New types of carbon associated, hybrid, and composite materials
- Carbon nanostructures and materials, including 1D, 2D and 3D carbon materials.
- Electronic, photonics, biomedical, electrochemical, and power devices
- MEMS/NEMS/microsystems based on carbon materials
- Thermal management and energy
- Antimicrobial and antibacterial properties
- Heterojunction devices and interfacial structures
- Electrochemical corrosion and oxidation resistance, thermal protection, diffusion resistance,
- Surface hydrophilicity/hydrophobicity, and smart/functional carbon surfaces
- Modeling and theory computation of materials growth and property prediction

Organizers:

– Haitao Ye, University of Leicester, United Kingdom; haitao.ye@leicester.ac.uk
– Richard Yongqing Fu, Northumbria University at Newcastle, United Kingdom
– Cinzia Casiraghi, University of Manchester, United Kingdom
– Changzhi Gu, Institute of Physics, Chinese Academy of Science, China
– Jihua Luo, Zhejiang University, China
– Liping Wang, Ninbo Institute of Materials Technology and Engineering, Chinese Academy of Science, China
– Peyman Servati, University of British Columbia, Canada

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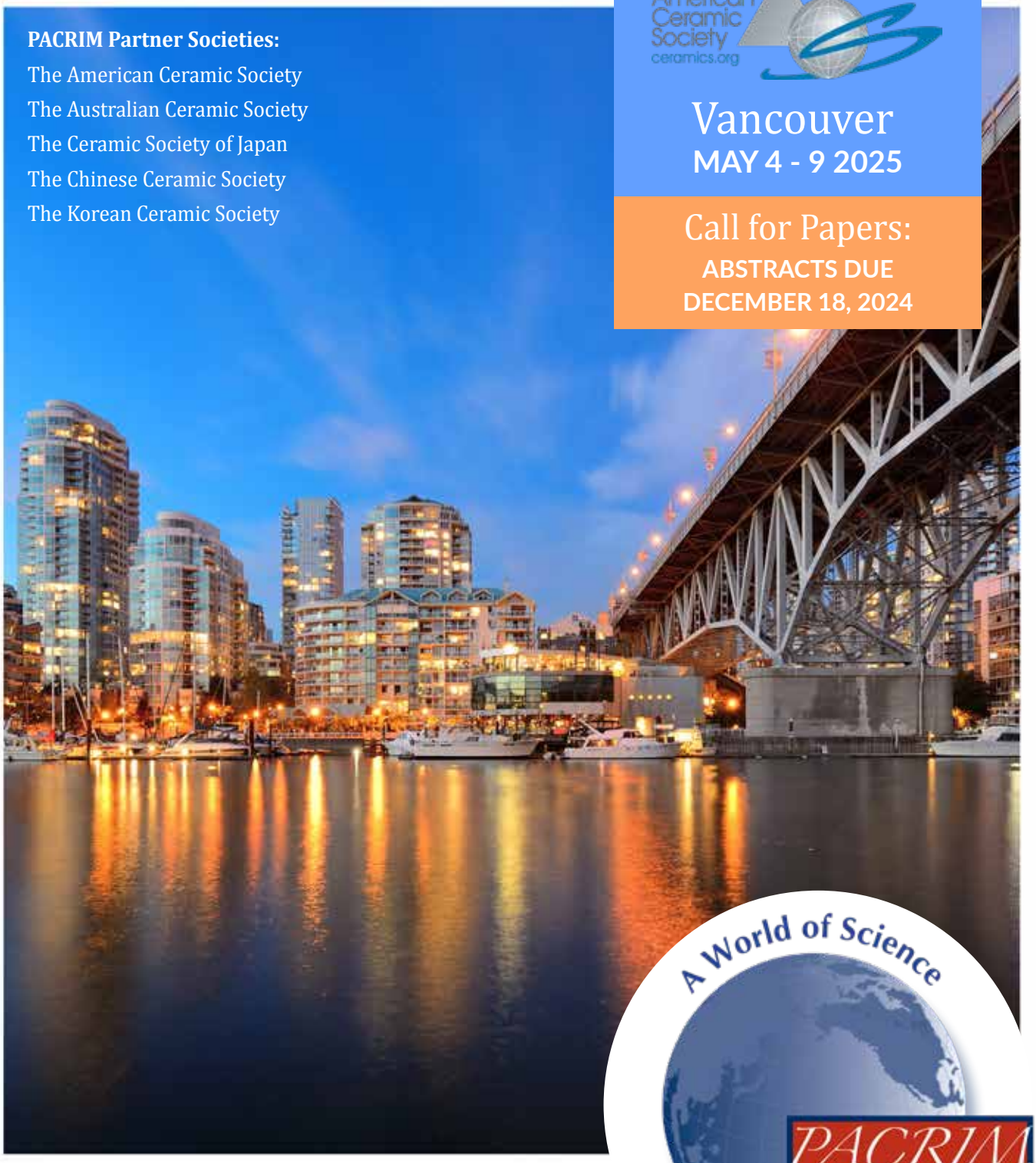
MAY 4 - 9 2025

Call for Papers:

ABSTRACTS DUE DECEMBER 18, 2024



A World of Science and Technology

PACRIM 16

Glass & Optical Materials Division Meeting (GOMD 2025)

CERAMICS.ORG/PACRIM16

16th Pacific Rim Conference on Ceramic and Glass Technology

WELCOME TO VANCOUVER

Introduction

Welcome to the Glass & Optical Materials Division Meeting 2025!

Join ACerS Glass & Optical Materials Division for GOMD 2025, May 4–9, 2025 in Vancouver, British Columbia, Canada. The technical program (in conjunction with PACRIM 2025) features seven symposia: Fundamentals of the Glassy State; Glass and Interactions with its Environment; Optical and Electronic Materials and Devices; Outreach (Joint with PACRIM); Glass Technology, Manufacturing, and Recycling; Jonathan Stebbins Honorary Symposium; and Emerging applications for glass Symposium. Technical sessions consisting of both oral and poster presentations led by technical leaders from industry, national laboratories, and academia will provide an open forum for glass scientists and engineers from around the world to present and exchange findings on recent advances in various aspects related to glass science and technology. The conference will also be an opportunity to honor the life and scientific and technological contributions of the glass giant: Jonathan Stebbins. Students are encouraged to enter their presentations in the annual student poster competition for professional recognition and cash awards. Students attending GOMD 2025 are also invited to attend a career roundtable discussion with scientists from industry, national laboratories, and academia about career opportunities and other topics in a casual environment in the joint-symposium of PACRIM.

The conference will be held at the Fairmont Hotel, conveniently located near the scenic and historic Senary Bay area. This beautiful location offers easy access to nature and a variety of wonderful experiences. The GOMD Executive Committee, program chairs, and volunteer organizers warmly invite you to join us in Vancouver for GOMD 2025. This event will provide an opportunity to learn about the latest breakthroughs in glass science, explore new collaborative opportunities, and exchange ideas within the international glass community.

We look forward to welcoming you in person to beautiful Vancouver!

2024-2025 GOMD Officers

Chair
Michelle Korwin-Edson, Owens Corning

Chair-elect
Jessica Rimsza, Sandia National Lab

Vice chair
Jose Marcial,
Pacific Northwest National Lab

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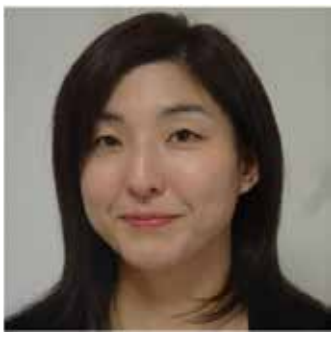

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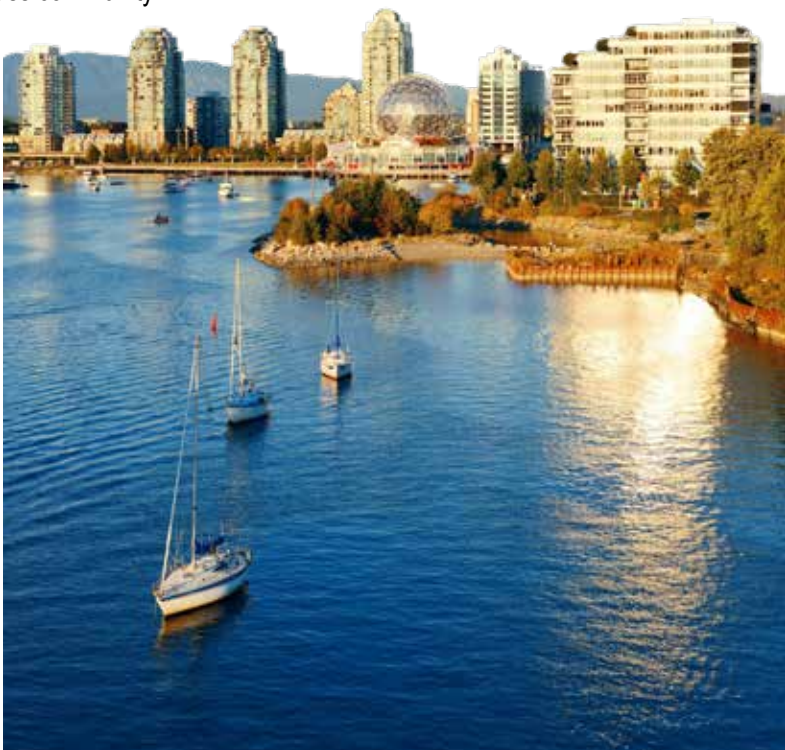


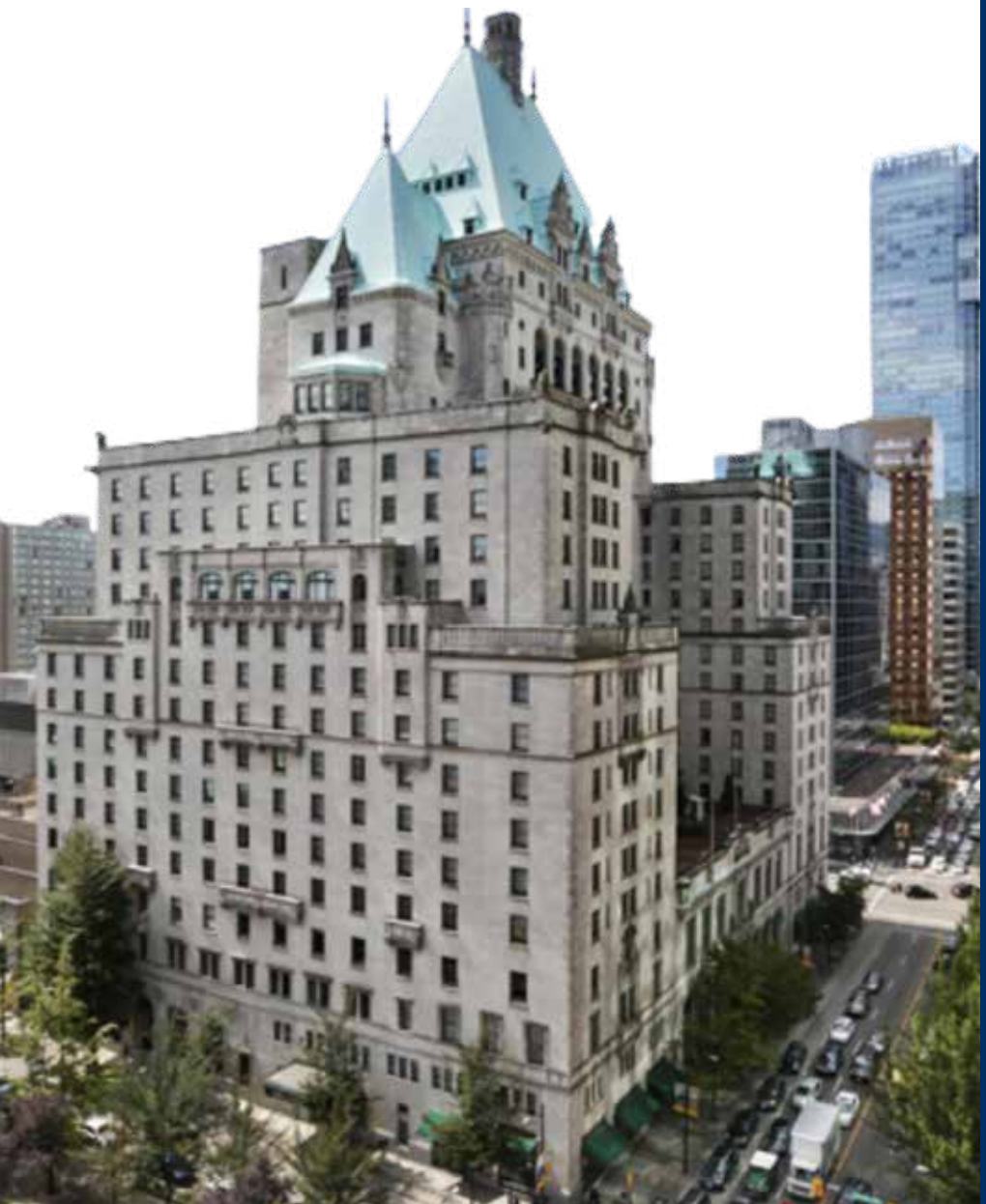
16th Pacific Rim Conference on Ceramic and Glass Technology

WELCOME TO VANCOUVER

GOMD HQ Hotel:
Fairmont Hotel Vancouver

900 West Georgia Street
Vancouver, BC V6C 2W6, CA
Phone: +1 604 684 3131
Rate: 335$ CAD per night plus taxes.
To book your reservation online, please click here.
To make reservations by phone, please dial 1-800-441-1414 and mention the American Ceramic Society GOMD Meeting.

Cut-Off Date: April 11, 2025



Abstract Submission Instructions

Visit the meeting website at ceramics.org/pacrim16 to review the session topics and select the "Submit Abstract" hyperlink to be directed to the Abstract Central website.

Follow the prompts to create an account and submit your Abstract online.

Please note that your ACerS member login and password will not work on this website. You will need to set up a new login and password for the Abstract Central website.

If you have questions please contact Karen McCurdy at kmccurdy@ceramics.org.

ABSTRACTS DUE DECEMBER 18, 2024

SYMPOSIUM 1

Fundamentals of the Glassy State

This symposium will provide a discussion forum on fundamental principles of glass science. Contributions covering experimental and theoretical developments in the field of glass science are welcome. Topics of interest include novel developments in the following sessions.

Session 1 | Glass Formation and Structural Relaxation

This session will address all fundamental aspects of glass formation, including experimental, modeling, and theoretical developments in our understanding of glass transition and relaxation. All glass-forming systems including oxide, non-oxide, metallic, and organic glasses will be covered. Topics of interest include, but are not limited to, various relaxation phenomena and dynamical processes in the glass transition range including fragility, and dynamic heterogeneity.

Organizers:

- Ozgur Gubliten, Corning Inc., USA; gulbiteno@corning.com
- Roger Loucks, Alfred University, USA; loucks@alfred.edu
- Katelyn Kirchner, CelSian, USA; katelyn.kirchner@celsianglass.com

Session 2 | Glass Crystallization and Glass-Ceramics

This session is devoted to advancing our fundamental understanding of crystallization in glasses and its importance in glass-ceramics and related materials. The symposium will cover experimental, characterization, as well as numerical/modeling aspects of nucleation and growth in inorganic, organic, and metallic materials.
Topics to be covered, but are not limited to, include:

- Theoretical, simulation, and experimental studies of nucleation and crystal growth in glasses and liquids
- The role of composition, structure, nucleating agents, and phase separation on crystallization
- Novel techniques for characterizing and inducing crystallization
- Predicting glass-ceramic generation
- Applications of glass-ceramics

Organizers:

- Laurent Cormier, French National Center for Scientific Research, France; laurent.cormier@sorbonne-universite.fr
- Benjamin Moulton, Alfred University, USA; moulton@alfred.edu
- Kenji Shinozaki, AIST, Osaka, Japan; k-shinozaki@aist.go.jp

Session 3 | Structural Characterizations of Glasses and Melts

This session will present on recent advances on the structural characteristics of glasses and melts, crucial for both research and industrial applications. Contributions are sought on basic glass characterization and correlations between structure, properties, and processing. Highlighted techniques include magnetic resonance spectroscopy, X-ray, neutron, and light scattering, as well as X-ray absorption and emission spectroscopy, vibrational spectroscopy, and scanning probe and electron microscopies. Key topics encompass spectroscopic studies to reveal the structures of glasses and melts, but also experimental measurements of physical properties (viscosity, density, diffusivity, elemental partitioning), and computational methods such as molecular dynamics simulations and ab initio calculations.This session aims to bring together specialists in the structural aspects of glasses and melts, as well as those working on macroscopic properties. It will provide a global view of glasses and liquids and cross the boundaries between them.

Organizers:

- Daniel Neuville, CNRS-IPGP-UP, France; neuville@ipgp.fr
- Dominique de Ligny, Friedrich-Alexander-Universität, Germany; dominique.de.ligny@fau.de
- Shinji Kohara, NIMS, Japan; KOHARA.Shinji@nims.go.jp
- John McCloy, Washington State University, USA; john.mccloy@wsu.edu

Session 4 | Atomistic Simulation and Predictive Modeling of Glasses

Modeling and simulation are integral to advancing materials research, especially in the realm of glass, ceramics, amorphous and nanostructured materials, which possess intricate characteristics and challenges to characterize experimentally. This session aims to delve into sophisticated computer simulations and modeling approaches employed to unravel the structures, properties, and behaviors of glasses and glass-forming liquids. We particularly seek to explore the latest advancements and applications of first-principles, classical, and mesoscale methods, with a focus on their integration to expand the spatial and temporal scales traditionally explored by conventional modeling techniques. Additionally, we encourage numerical investigations that facilitate the interpretation of experimental data and structural validation, utilizing techniques such as X-ray and neutron diffraction, solid-state NMR, and various spectroscopic methods. As an emerging technology, we will also highlight applications of machine-learning interatomic potential in this domain.

Organizers:

- Jincheng Du, University of North Texas, USA; jincheng.du@unt.edu
- Alfonso Pedone, University of Modena and Reggio Emilia, Italy; alfonso.pedone@unimore.it
- Shingo Urata, AGC Inc., Japan; shingo.urata@agc.com

Session 5 | Data-Driven Modeling and Machine Learning for Glass Science

Data-driven methods and artificial intelligence-based models have attracted much attention in recent years to solve complex problems in the field of glass science. In particular, machine learning has been successfully applied to solve long-standing problems, such as predicting composition–property relationships, developing optimized glass compositions, accelerating glass modeling, and even understanding some fundamental aspects of the glass transition. This session will focus on recent advances in the use of machine learning and artificial intelligence in glass science, technology, and modeling. Topics of interest include, but are not limited to, the application of machine learning and artificial intelligence to develop and interpret composition–property relationships, design optimized glass compositions, 3D printing and additive manufacturing of glasses, advanced computational modeling by developing machine-learned interatomic potentials and accelerating glass simulations, image processing, predicting the structure of glasses, identifying key structural patterns/descriptors that govern glass properties, and understanding the fundamentals of the glassy state.

Organizers:

- Xiaonan Lu, Pacific Northwest National Laboratory, USA; xiaonan.lu@pnnl.gov
- N.M. Anoop Krishan, Indian Institute of Technology, India; krishnan@iitd.ac.in

Session 6 | Mechanical Properties of Glasses

This session will discuss the mechanical properties of disordered materials across multiple scales while bridging the fields of oxide and non-oxide glasses, as well as mechano-optical and mechanoelectrical couplings. We will consider the structural origin of elasticity, plasticity, and fracture with the objective of designing glasses with superior toughness, defect tolerance, and stiffness, combining mechanical and various functional properties. Particular attention shall be given to the identification of general, material-independent constitutive laws, which may be used as guidelines to improve the mechanical properties; the combination of experimental approaches and computational modeling of the stress response of glasses and early stages of damage infliction; and the interplay between size and time effects, stress corrosion, and the chemical aspect of fracture. The topics covered in this session include, but are not limited to, the following:

- Dynamic fracture and brittleness, or crack initiation, including the application of in-situ techniques
- Slow crack growth and stress corrosion cracking, the underlying chemistry and transport phenomena in high-stress fields
- Multiscale investigation of elasticity, plasticity, and hardness in relation to bulk topology through combining mechanical analyses with structural analyses
- Strategies for toughening inorganic oxide glasses as well as non-oxide including metallic glasses

Organizers:

- Satoshi Yoshida, AGC Inc., Japan; s.yoshida@agc.com
- Linfeng Ding, Donghua University, China; linfeng.ding@dhu.edu.cn
- Yueh-Ting (Tim) Shih, Taipei Tech, Taiwan; ytshih@mail.ntut.edu.tw

Session 7 | Glass Under Non-Ambient Conditions

This session will cover the recent progress in understanding the structure and properties of glassy materials exposed to non-ambient conditions, such as high pressure, low/high temperature, high stress, high radiation, humid environments, etc. These conditions are relevant to many glass manufacturing processes and knowledge of the relationships between composition, processing, structure, and properties can help design the next generation of functional glasses. Experimental studies, novel in situ analysis methods, and computational approaches are within the scope of this session.

Organizers:

- Tomoko Sato, KEK, Japan; tomokos@post.kek.jp
- Anita Ziedler, University of Bath, United Kingdom; az207@bath.ac.uk
- Lawerence Gammond, Corning Inc., USA; gammondl@corning.com

Session 8 | Chalcogenide Glasses and Amorphous Materials

This session aims to present and discuss the recent developments in both fundamental and applied research in chalcogenide glasses and amorphous semimetals (e.g., phase-change materials, thermoelectronic materials, and solid state electrolytes). Topics of interest include structural characterization; structure–property relationship; and advances in physical properties, such as optical, electrical, thermal, crystallization, glass forming, and mechanical behaviors.

Organizers:

- Pierre Lucas, The University of Arizona, USA; pierre@arizona.edu
- Changgui Lin, Ningbo University, China; linchanggui@nbu.edu.cn

SYMPOSIUM 2

Glass and Interactions With its Environment - Fundamentals and Applications

This symposium is dedicated to fundamentals and applications of how glass is used in contact with specific environments, e.g., with the human body, how glass surface and interfaces evolve or can be modified in different environments, and how glass can be used to contain other materials and prevent their release in the environment.

Session 1 | Glasses, Glass-Ceramics, and Glass-Based Biomaterials

Inorganic, non-metallic biomaterials, such as bioactive glasses and glass-ceramics, are primarily sought after for hard tissue engineering and dental repair. However, new applications in cancer treatment, wound healing, soft tissue engineering, antibacterial or antifungal effects, and drug delivery are being extensively studied. Ongoing research also includes glass-based biomaterials such as composites, glass ionomer cements or glass/polymer hybrid materials, and is producing promising results. This session will cover these topics in detail, emphasizing the compositions, structures, processing techniques, and targeted cellular and biological responses of these materials.

Organizers:

- Delia Brauer, University of Jena, Germany; delia.brauer@uni-jena.de
- Leena Hupa, Åbo Akademi, Finland; leena.hupa@abo.fi
- Maziar Montazerian, Pennsylvania State University, USA; mbm6420@psu.edu

Session 2 | Dissolution and Interfacial Reactions

Surfaces and interfaces are critical to nearly every modern application of glass, as they mediate interactions with light and the environment, and dictate its practical durability and functionality over its lifetime. New approaches to thus understand and customize surface and interfacial behaviors—by predicting glass degradation, making glass surface modifications, or applying value-added coatings—all represent critical directions for the future of technical glass. This session will focus on the surfaces and interfaces of glass and glass-ceramic systems, including dissolution and interfacial reactions of glass in aqueous environments (e.g. hydrolysis, interdiffusion, interfacial structures and alteration layers); surface sorption and transport phenomena; innovations in glass surface characterization; novel methods for modifying glass surfaces; and all manner of functional coatings on glass. Particularly encouraged are studies combining both modeling and experimental methodologies to understand interfacial mechanisms or predict degradation kinetics

Organizers:

- Nick Smith, Corning Inc., USA; smithnj@corning.com
- Seong H. Kim, The Pennsylvania State University, USA; seongkim@psu.edu
- Stephane Gin, CEA Marcoule, France; stephane.gin@cea.fr
- Nicholas Stone-Weiss, Corning Inc., USA; stonewenm3@corning.com

Session 3 | Materials for Waste Immobilization

Topics in this session will address new developments and innovative applications in materials and materials processing methods for the immobilization of nuclear and hazardous wastes. Progress in the processing and testing of materials for immobilization is critical to the efficient treatment and safe disposition of nuclear wastes around the world. This session will focus on synthesis, characterization, testing, and modeling techniques that facilitate waste form design and provide quantitative descriptions of waste form behavior. Materials of interest may include glass, ceramics, glass-ceramics, and other composite matrices.

Organizers:

- Jaime George, Pacific Northwest National Laboratory, USA; jaime.george@pnnl.gov
- Jake Amoroso, Savannah River National Laboratory, USA; jake.amoroso@srnl.doe.gov

SYMPOSIUM 3

Optical and Electronic Materials and Devices - Fundamentals and Applications

Optical and electronic materials and devices are of critical importance for various applications, including sustainable energy, information technology, nonvolatile memory, sensing, medical diagnostics and treatment, and national defense. This symposium will address processing and properties of optical and electronic materials as well as design, fabrication, and performance of functional devices.

Session 1 | Laser Interactions with Glasses

The field of light interaction with matter has attracted increased attention with advances in ultrashort pulse lasers and high-power fiber lasers, along with the need to design and fabricate structures for use in low-loss applications and laser damage resistance. New phenomena have been observed and new applications have been developed, whereby lasers are employed in diverse areas, such as cutting, welding, and engraving of glass; fabrication of waveguides, gratings and micro-channels inside the bulk of glass; and, most recently, 3D printing through additive or subtractive laser-assisted processing. Lasers have been shown to be versatile in other applications of phase change, whereby glass or amorphous media are “converted” in a controlled way to crystalline or composites (glass ceramics) material. These advances have been realized in optical phase-change materials; laser-induced crystallization, such as seen in the fabrication of active single crystal architecture, GRIN lenses; and strengthening of glass and other applications, where a knowledge of not only the material but the light/matter interaction mechanism is required. This session will focus on the most recent and advanced issues pertaining to the science and applications of laser–glass interactions, such as laser irradiation effects, compositional and structural changes, and dynamics and mechanisms of laser-induced modifications.

Organizers:

- Casey Schwarz, Ursinus College, USA; cschwarz@ursinus.edu
- Keith J. Veenhuizen, Lebanon Valley College, USA; veenhuiz@lvc.edu
- Rashi Sharma, University of Central Florida, USA; rashi.sharma@ucf.edu

Session 2 | Glasses for Energy Applications

This session invites researchers to share their discoveries about the new and transformative ways glass materials are used in the energy sector. Focusing on theoretical advancements and practical implementations, the session will cover innovative uses of glass in photovoltaic systems, energy storage solutions, thermal insulation, smart technologies, hydrogen production and utilization, and transport phenomenal in the disordered media, involving electronic, ionic, or molecular transport. The session invites members of both academia and industry, and aims to bridge the gap between both areas of expertise.

Organizers:

- Caio Bragatto, Coe College, USA; cbragatto@coe.edu
- Gabriel Agnello, Corning Inc., USA; agnellogp@corning.com
- Takahisa Omata, Tohoku University, Japan; takahisa.omata.c2@tohoku.ac.jp

Session 3 | Optical Fibers and Waveguides, Optoelectronic Glass-Based Devices

Glasses are important materials for optical components and devices given their excellent optical transparency and versatile processing. Novel oxide and non-oxide glass compositions and fabrication technology development have further enabled emerging applications such as light emission, infrared imaging, nonlinear optical signal processing, and sensing. This session will cover material synthesis and processing as well as device fabrication and applications of innovative device architectures including, but not limited to molded optics, diffractive optics, thin film optical coatings, metamaterials/metasurfaces and integrated photonic components. Special attention will be paid on innovative optical fibers and waveguides, with topics of interest including, but not limited to: microstructure optical fibers, infrared fibers, multimaterial fibers, optical fibers for health, novel processes of fiber fabrication

Organizers:

- Xianghua Zhang, Université de Rennes 1, France; xiang-hua.zhang@univ-rennes1.fr
- Jiawei Luo, OFS Laboratories, New Jersey, USA; jluo@ofsoptics.com
- Juejun Hu, MIT, USA; hujuejun@mit.edu
- Laeticia Petit, Tampere University, Italy; laeticia.petit@tuni.fi
- Sylvain Danto, ICMCB, University of Bordeaux, France; sylvain.danto@u-bordeaux.fr

Session 4 | Rare-Earth and Transition Metal-Doped Glasses and Ceramics for Photonic Applications

Rare earth and transition-metal doped materials play fundamental roles in many applications, such as optical communication, sensing, medical diagnosis, or clean energy systems. These roles are the result of intense research efforts on the development of new materials, material platforms, and designs. A deep understanding of the underlying science that determines the optical properties of these dopants has been achieved over the years.
This session will cover the following topics.

- Glass and transparent ceramic lasers
- Ceramic phosphors for solid-state lighting
- Wavelength converters for photovoltaic systems
- Nanoprobe phosphors for biophotonics
- Energy transfer or light storage mechanisms in solids
- Applications in quantum information science
- Optical amplifiers for telecommunication

Organizers:

- Jumpei Ueda, JAIST, Japan; ueda-j@jaist.ac.jp
- Volkmar Dierolf, Lehigh University, USA; vod2@lehigh.edu
- Brian Topper, University of Clemson; btopper@clemson.edu

SYMPOSIUM 4
Outreach (Joint with PACRIM)

Session 1 | STE(A)M Outreach, Education, Engagement and Retention

Participants in this symposium will highlight efforts related to awareness and interest in science, technology, engineering, art, and mathematics [STE(A)M] topics as well as approaches for educating and retaining the next generation of STE(A)M individuals in Glass/Ceramics research. Work that reaches one's country and/or a global audience is highly encouraged. Additional topics covered may include any pursuit that focuses on underrepresented and/or low-income communities and/or engagements in research with an emphasis on energy equity or environmental justice. Presentations should focus on outreach activities related to glass or ceramics-related topics, including exploration of STEAM essentials and best practices for developing and disseminating activities and tools to prepare students for technical careers; supporting K–12 STEM programs through outreach to teachers and schools; development of curricula and/or courses to support STEAM in schools and universities; and the importance of addressing the imminent gap in a qualified STEAM workforce.

Proposed Session:

- K-12 STE(A)M Outreach
- Workforce Development
- Researcher Engagement and Retention
- Community/Global Outreach and Engagement

Organizers:

- Charmayne Lonergan, Missouri University of Science and Technology, USA; clonergan@mst.edu
- Kim Scott, Colorado School of Mines, USA; kimscott@mines.edu
- Casey Schwarz, Ursinus College, USA; cschwarz@ursinus.edu
- Amanda Engen, The American Ceramic Society, USA; aengen@ceramics.org
- Kathryn Goetschius, Corning Inc., USA; kathryn.goetschius@gmail.com

SYMPOSIUM 5
Glass Manufacturing

Glass can be engineered with a wide range of properties and in many different forms for both active and passive applications for current and emerging energy and environmental technologies. This symposium will draw an arc from the fundamental approaches (interplay of theory, modeling and experiment) via material properties (compositional influences and signatures) and their characterization (in-situ, ex-situ) to manufacturing (novel processing techniques). A further important component of this symposium is a session on outreach because such a discussion will allow the field to attract a substantial pool of future researchers on glass science.

Session 1 | Challenges in Glass Manufacturing and Recycling

The glass industry requires constant innovation to meet the needs for new compositions, new products, and sustainable manufacturing processes. Studies of natural silicates, such as magma and lava, can also provide useful insight. This session will cover the spectrum of new research, development, and engineering advances from the lab to the factory, including:

- Physics and chemistry of glass melting and forming via both modeling and experiments
- Energy efficiency strategies
- New furnace designs and process control methods
- Furnace materials—new materials, corrosion, and wear studies
- New concepts for melting and forming
- Post-forming treatments
- Challenges in recycling

Organizers:

– Irene Peterson, Corning Inc., USA; petersonim@corning.com
– Scott Cooper, CelSian, USA; scott.cooper@celsianglass.com
– Hiroyuki Inano, Hokkaido Research Organization, Japan; inano-hiroyuki@hro.or.jp
– Teretaka Maehara, AGC Inc., Japan; terutaka.maehara@agc.com

Session 2 | Additive Manufacturing of Glass

The session provides a forum for exchanging and discussing current issues and trends in additive manufacturing (AM) of glasses. The session will cover recent theoretical and experimental advances in the processing and characterization of 3D-printed glasses for biomedical, optical, architectural, functional, and artistic applications. The session will also provide a forum to a broader audience for emerging technological applications of 3D-printed glasses. All contributions from academia, national laboratories, and industries that address recent advances and new applications are welcome

Organizers:

– Giorgia Franchin, University of Padova, Italy; g iorgia.franchin@unipd.it
– Beck Walton, Lawerence Livermore National Laboratory, USA; walton17@llnl.gov

SYMPOSIUM 6
Jonathan Stebbins Honorary Symposium

This symposium brings together colleagues, former students, and collaborators of Jonathan Stebbins to celebrate his outstanding teaching and research career by presenting their current research results. Presentations will cover all aspects of inorganic materials, glassy and crystalline, including, but not limited to their structural, dynamic and thermodynamic characterization, advances in physical properties and establishment of structure-property relationships at ambient and high temperature and pressure conditions, applications of NMR spectroscopy and other characterization techniques.

Organizers:

– Jingshi Wu, Corning Inc, USA; WuJ@corning.com
– Scott Kroeker, University of Manitoba, Canada; scott_kroeker@umanitoba.ca
– Sabyasachi Sen, University of California, Davis, USA; sbsen@ucdavis.edu
– Sung Keun Lee, Seoul National University, Korea; sungklee@snu.ac.kr

SYMPOSIUM 7
Emerging Frontiers: Glasses in New Technology

This special symposium focuses on the recent advances of glass as photonic material especially for the emerging new technologies such as quantum computation, new telecommunication systems and semiconductor including photonic circuits. The speakers for this session will be by invitation only.

Organizers:

– Madoka Ono, Tohoku University, Japan; madoka.ono.d7@tohoku.ac.jp
– Collin Wilkinson, Alfred University, USA; collin.wilkinson1123@gmail.com