The American Ceramic Society
ceramics.org

10TH INTERNATIONAL

CONGRESS ON CERAMICS

CALL FOR PAPERS

ENABLING A BETTER WORLD
THROUGH CERAMIC AND GLASS MATERIALS

MONTREAL, CANADA

JULY 14-18, 2024
HOTEL BONAVENTURE

ENDORSED BY

ICF International Ceramic Federation

ABSTRACT DEADLINE: JANUARY 15, 2024

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MONTREAL, CANADA

JULY 14 - 18, 2024

Welcome to the 10th International Congress on Ceramics (ICC10)

We are pleased to announce the 10th International Congress on Ceramics (ICC10) will take place at the Hotel Bonaventure in Montreal, Canada on July 14-18, 2024. On behalf of The American Ceramic Society, we are honored to lead the organization of this event with a focus on Enabling a Better World through Ceramic and Glass Materials. Convened under the purview of the International Ceramic Federation, ICC10 will bring together leaders and professionals from across the world to engage in dialogue on critical materials and technologies of the future.

The technical program, spanning the 12 symposia listed below, aims to share ideas and visions for the future of ceramics and glasses:

- Aerospace Ceramics and Composites
- Electronic Ceramics and Devices
- Educational Trends in Ceramics and Glass
- Green Ceramics for Clean Energy and Sustainability
- Global Ceramics and Glass Industry Trends
- Informatics and Data Analytics in Ceramics and Glass
- Novel Processing Techniques
- Nanostructured Ceramics
- Next Generation Bioceramics and Bioglasses
- Optical and Magnetic Ceramic Materials and Devices
- Recent Advances and the Future of Additive Manufacturing
- Transportation and Infrastructure

In addition to these technical symposia, the program will feature social and networking activities to strengthen communications, and promote international cooperation and the growth of the ceramics community.

We cordially invite you to participate in ICC10 and look forward to seeing you in Montreal in 2024!

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Agenda and Schedule of Events

SUNDAY, JULY 14

Registration	3:00 p.m. - 7:30 p.m.
Welcome Reception	7:30 p.m. - 9:00 p.m.
Exhibits	7:30 p.m. - 9:00 p.m.

MONDAY, JULY 15

Registration	7:30 a.m. - 6:00 p.m.
Plenary Session 1	8:30 a.m. - 9:30 a.m.
Coffee Break	9:30 a.m. - 10:00 a.m.
Plenary Session 2	10:00 a.m. - 10:55 a.m.
Plenary Session 3	11:00 a.m. - 11:55 a.m.
Lunch	12:00 p.m. - 12:45 p.m.
Plenary Session 4	12:45 p.m. - 1:30 p.m.
Technical Sessions	1:40 p.m. - 3:40 p.m.
PM Break	2:15 p.m. - 2:30 p.m.
Exhibits	3:30 p.m. - 6:30 p.m.
Technical Sessions	3:30 p.m. - 6:30 p.m.
Poster Reception 1	6:30 p.m. - 8:00 p.m.

TUESDAY, JULY 16

Registration	8:00 a.m. - 6:00 p.m.
Plenary Session 5	8:45 a.m. - 9:40 a.m.
Coffee Break	9:40 a.m. - 10:00 a.m.
Technical Sessions	10:00 a.m. - 12:00 p.m.
Lunch	12:00 p.m. - 12:45 p.m.
Plenary Session 6	12:45 p.m. - 1:30 p.m.
Technical Sessions	1:40 p.m. - 3:40 p.m.
PM Break	2:15 p.m. - 2:30 p.m.
Exhibits	3:30 p.m. - 6:30 p.m.
Technical Sessions	3:30 p.m. - 6:30 p.m.
Poster Reception 2	6:30 p.m. - 8:00 p.m.

WEDNESDAY, JULY 17

Registration	8:00 a.m. - 4:30 p.m.
Plenary Session 7	8:45 a.m. - 9:40 a.m.
Coffee Break	9:40 a.m. - 10:00 a.m.
Technical Sessions	10:00 a.m. - 12:00 p.m.
Lunch on Own	12:00 p.m. - 1:30 p.m.
Plenary Session 8	1:30 p.m. - 2:15 p.m.
PM Break	2:15 p.m. - 2:30 p.m.
Technical Sessions	2:30 p.m. - 4:30 p.m.
Dinner - Offsite Location	6:30 p.m. - 9:30 p.m.

THURSDAY, JULY 18

Registration	7:30 a.m. - 12:00 p.m.
Technical Sessions	8:00 a.m. - 9:20 a.m.
Coffee Break	9:20 a.m. - 9:40 a.m.
Plenary Session 9	9:40 a.m. - 10:40 a.m.

HÔTEL BONAVENTURE MONTRÉAL

900, de La Gauchetière Ouest Montréal, Québec H5A 1E4, Canada
Phone Number: +1 514 878 2910

Rate Single/Double/Triple/Quad:$285 CAD plus tax a night

Cut-Off Date: Wednesday, June 12, 2024

Click HERE to make a reservation.

ABSTRACT DEADLINE: JANUARY 15, 2024

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ABSTRACT SUBMISSION INSTRUCTIONS

- **Visit ceramics.org/icc2024 to review session topics**
- **Select "Submit Abstract" to be directed to the Abstract Central website**

Abstract title plus text total character limit (including spaces) is 1,5000 characters.

If you have questions, please contact Karen McCurdy at kmccurdy@ceramics.org or +1-614-794-5866

10TH INTERNATIONAL

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MONTREAL, CANADA

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SYMPOSIUM 1

Aerospace Ceramics and Composites

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A high-level global platform for scientists, engineers, business leaders, and ceramists to discuss the latest innovations and scientific achievements involving ceramics as monolithics, composites, and coatings in the aerospace field. With a focus on being applications-led, presenters will share ideas and visions of the future for conventional and new materials, processing technologies, characterization techniques, performance goals, and modeling approaches. It is hoped that this symposium will persuade industrialists to set the stage with their goals and desires, whether they are for new, higher performance, and/or longer-life materials; faster, cheaper, and/or more sustainable manufacturing processes; or the creation of new testing regimes. Presenters are encouraged to consider the technology readiness level of their development, and to conclude their oral or poster presentation with an indication of what they believe the future holds and how their work is contributing to it. Abstracts relevant, but not limited, to the sessions listed below are welcomed.

PROPOSED SESSION TOPICS

- Ceramic matrix composites (CMCs) and ultrahigh-temperature CMCs
- Protective coatings, including thermal and/or environment barrier coatings (T/EBCs)
- Mechanical testing and advanced characterization methods of ceramics, composites, and coatings
- Improving damage tolerance and performance of ceramics, composites, and/or coatings in extreme environments
- Simulation and theory for predicting stability or behavior under extreme environments
- Processing–microstructure–property relationships of existing or new ceramic systems
- Novel testing and/or application of ceramics, composites, or coatings for lunar and planetary exploration

SYMPOSIUM 2

Electronic Ceramics and Devices

The continued expansion of ubiquitous computing combined with ever-increasing need for reduced energy and resource consumption enhances the importance of electronic ceramic materials, components, and devices. Better materials and processes are needed to address challenges in low-power and edge computing, sensing, and monitoring across a broad range of operating environments, harvesting and storage of energy and information, accelerating demand in artificial intelligence use, lifetime extension and circularity, and many other topics. Despite the enormous breadth of application spaces where advances in ceramic materials and processes are needed, the fundamentals remain similar: researchers must address fabrication, processing, and integration challenges; engineer defects for benefit rather than detriment; and balance performance with cost, reliability, manufacturability, and sustainability concerns. This symposium aims to unite the wide world of electronic ceramics and devices for cross-cutting discussions around similarities of solutions to disparate challenges. Thus, the focus of this symposium and the proposed sessions are mainly motivated by the challenges being addressed rather than the chemistry of the ceramics being developed or the specific targeted application(s).

PROPOSED SESSION TOPICS

- Computationally guided discovery, development, and/or manufacturing
- Advances in thin film growth, integration, and devices for power electronics, sensing, IoT, and communications
- Cofiring and multimaterial integration
- Engineering defect chemistry for processing and/or properties
- Ceramics for power-efficient computation, including quantum and/or neuromorphic architectures
- Operation in extreme environments

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Educational Trends in Ceramics and Glass

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The education and training of individuals in ceramics and glasses have been crucial to the continued sustainment, growth, and development of our industries. This symposium aims to examine current educational trends in ceramics and glasses, highlighting the challenges and opportunities facing instructors and students.

One significant trend is the increased emphasis on interdisciplinary approaches (e.g., using economists to develop techno-economic and life cycle analysis) to materials science education. Does this approach satisfactorily support the needs of ceramic and glass industries?

Another trend is the growth of online education: online platforms offer greater flexibility and accessibility for individuals who may not have access to traditional education. However, what are the effects of online programs on the hands-on abilities needed in ceramic and glass industries?

In addition, there is a growing emphasis on sustainability and the circular economy in ceramics and glass education: educational programs are focusing on research and development in this area to promote sustainable practices in the industry. What knowledge should entry-level ceramic and glass engineers have with regard to sustainability?

Moreover, there is a renewed focus on traditional craftsmanship and techniques in ceramics and glass education, to recognize the value of preserving traditional techniques and the roles they play in the history and cultural heritage of ceramics and glass. Finally, the continued expansion and ethical use of artificial intelligence use in education must be addressed.

PROPOSED SESSION TOPICS

- Interfacing lectures and laboratory experiences
- Design of experiments in laboratory experiences (e.g., sintering)
- Use of artificial intelligence for data analysis
- Case studies and success stories in flipped classroom frameworks
- Augmented reality for teaching
- Parallel activities among students of different countries by using tools of “remote working”
- Education of sustainability and eco-friendly practices and processes in the circular economy
- Preserving the role of traditional craftsmanship and techniques in the history and cultural heritage through education

SYMPOSIUM 4

Green Ceramics for Clean Energy and Sustainability

This symposium aims to bring together experts to discuss the latest research and developments in the field of green ceramics. The symposium covers a broad perspective of the theme, including sustainable manufacturing and processing solutions to reduce greenhouse gas emissions, ceramics for capturing greenhouse gases (e.g., CO2, CH4, H2, H2O), applications of ceramics for clean power generation, and application of ceramics in energy storage. The symposium will even extend to topics such as ceramics used as base catalysts for biomass conversion and ceramic-based composites and recycling. The symposium invites papers that address topics related to green ceramics, including, but not limited to, the sessions listed below.

PROPOSED SESSION TOPICS

- Characterization of green ceramic materials
- Novel green ceramic synthesis methods
- Applications of green and porous ceramics in energy storage, conversion, and power generation
- Life cycle assessment and sustainability analysis of green ceramics
- Environmental impact and toxicity assessment of green ceramics

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Global Ceramics and Glass Industry Trends

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Ceramic and glass technologies play a central role in enhancing our quality of life today while blazing the trail toward a sustainable future. This symposium seeks to highlight the industrial frontiers of our field, bringing together global leaders to share perspectives on a diverse range of applications. The symposium will be organized into six sessions, including a panel discussion as part of new horizons.

PROPOSED SESSION TOPICS

- Ceramics and glass for the built environment: architectural glass, cement alternatives, multifunctional materials for civil infrastructure
- Specialty glass: design, manufacturing, and applications of bioactive, optical, electronic, and decorative glasses
- Supply chain and sustainability: low-energy manufacturing, recycling at scale, circular economy, perspectives on critical materials
- Ceramics in the “electric” world: batteries and fuel cells, nuclear fuels and containment, transparent conductors, electrical components
- Structural ceramics and glasses: glass, ceramic, and composite materials for use in transportation, armor, and shielding across broad temperature and environmental regimes
- New horizons: current topics at the forefront of technology and practice

SYMPOSIUM 6

Informatics and Data Analytics in Ceramics and Glass

This symposium will focus on current achievements and challenges in the modeling of ceramics and glasses through simulation, informatics, and machine learning. The symposium will span various material types, length scales, time scales, and properties. Investigations performed using various computational techniques are of interest in this symposium, including classical and ab initio molecular dynamics simulations, mesoscale simulations, continuum modeling, data mining, machine learning, natural language processing, optimization, and others. Contributions that combine physics-based simulations and machine learning or informatics are of special interest, but studies focusing on simulation or machine learning are also encouraged to submit.

PROPOSED SESSION TOPICS

- Informatics and machine learning for prediction of materials properties
- Machine learning approaches to identify structure–property relationships
- Physics-informed machine learning for ceramics and glasses
- Development of interatomic forcefields via machine learning
- High-throughput simulations to generate big data for informatics
- First-principle and classical modeling for structure and property prediction
- Mesoscale and continuum modeling of glasses and ceramic materials
- Machine learning for image/microstructure analysis

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SYMPOSIUM 7

Novel Processing Techniques

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Many new applications have aggressive design requirements that surpass the capabilities of current ceramics materials. As ceramic material properties are strongly correlated with processing techniques, new innovations in processing ceramics are needed. The sessions proposed for this symposium cover a range of processing techniques, from feedstock to final component, including novel routes using commercial or custom preceramic polymer chemistries. Preceramic polymer development, in terms of chemistry and synthesis, is needed to scale up ceramic material synthesis. In addition to precursor chemistry, novel processes that address the near-net shaping of ceramics and their final densification is critical to technological maturation of these materials. Finally, coating material properties and integration derive strongly from application processes; therefore, a fundamental understanding of the impact of these processes on coating properties is required. In each of these sessions, both modeling (computational, analytical) and experimental work will be considered.

PROPOSED SESSION TOPICS

- Purification and refinement of ceramic feedstock
- Pre-ceramic polymer and organometallic precursor development
- Novel near-net shape processes
- Alternative energy sources for curing, drying, debinding, and sintering
- Environmental coating application techniques
- Novel processing of porous ceramics

SYMPOSIUM 8

Nanostructured Ceramics

Ceramic materials have been vital to society since the beginning of civilization. Conventional ceramics, while useful and practical to several industries today, have limitations that restrict their use in some applications in fields such as medicine, aerospace, construction, renewable energy, and beyond. One approach toward achieving breakthrough innovation is to consider material size reduction into the nanoscale. Nanoceramics are found in crystalline, amorphous, glass, and composite forms. They provide opportunities for new functionalities and can include the diversity of the entire periodic table. Because of these tunability combinations, the properties of such materials can be expected to be controlled at the atomic level for desired applications.

The scope of this symposium is targeted to discuss the design, structure, properties, and performance of nanostructured ceramics and their applications in advanced technologies. This symposium will provide a forum and opportunity to address the burning issues related to energy, health, electronics, industrial progress, and sustainable technologies from a nanoceramics perspective. It is expected to achieve a better understanding of the fundamentals of nanostructured ceramics, technological progress for future innovations, and a better society with continued growth.

PROPOSED SESSION TOPICS

- Advanced nanoceramics
- Fabrication and characterization methods
- Modeling and computational studies of nanostructured ceramics
- Green synthesis and processing approaches for nanoceramics
- Glass and glass ceramics
- Nanoceramics for renewable energy, electronics, catalysis, structural, and medical applications
- Nanostructured ceramic coatings

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SYMPOSIUM 9

Next Generation Bioceramics and Bioglasses

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Ceramics, including bioceramics and bioglasses, have demonstrated advantages for biomedical applications on several fronts, including their similarity with hard tissues (bone and tooth); biocompatibility, bioactivity and biodegradability; and unique optical, magnetic, electrical, thermal, and chemical properties. In addition to their use as medical devices and tissue scaffolds for bone regeneration, their application in soft tissue applications is growing rapidly. They have also been found to have antimicrobial properties, thus helping to tackle the pressing problem of antibiotic resistance of bacteria. Glass- and ceramic-based nanoparticles also have potential in drug delivery systems, theranostics, and biosensors. To enable translation of new technology toward clinical use and broaden potential impact, novel processing and manufacturing methods are required. This symposium intends to address and discuss the latest achievements, trends, issues, challenges, and opportunities on ceramic- and glass-related technologies for biomedical applications that are critically needed for future medical technologies. We are hopeful that this symposium will provide a forum to share ideas and visions on these technologies and grow interaction and friendship among participants from academia, industry, and medical fields all around the world. We invite you to take advantage of the opportunity to visit the great city of Montreal and actively participate in this symposium.

PROPOSED SESSION TOPICS

- Dental and orthopedic bioceramics
- Ceramics for soft tissue applications
- Ceramics for novel therapeutic strategies, drug delivery, and anti-bacterial properties
- Ceramics for biosensors
- Ceramics and glasses for cosmetic, pharmaceutical, and nanomedicine
- Hybrid materials for biomedical applications

SYMPOSIUM 10

Optical and Magnetic Ceramic Materials and Devices

Ceramic and glass materials have unique property combinations that allow them to perform in a variety of applications, especially in new emerging technology areas. In this symposium, we seek papers that examine the technical area of optical and magnetic behavior of inorganic, solid-state materials. In the area of optical materials, we seek papers that examine ceramics and glass that perform in various bands of the electromagnetic spectrum, focusing on UV-VIS-IR from 0.2–25 microns. Papers addressing the thermal properties of those materials are being sought as well. In the area of magnetic materials, we seek papers on magnetic and high-frequency/GHz/microwave properties and applications, as well as papers examining the fundamental mechanisms associated with magneto-optical materials, and their potential use in next-generation devices. Synthesis, processing, and manufacturing approaches to both categories of materials are also desirable.

PROPOSED SESSION TOPICS

- Advanced synthesis and processing of optical and magnetic materials
- Functional optical and magnetic materials and devices
- Magneto-optical materials
- Advanced characterization of optical and magnetic materials
- In-situ characterization approaches of functional materials
- Device design implementing new optical/magnetic materials
- The role of lanthanides as a class of critical materials

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SYMPOSIUM 11

Recent Advances and the Future of Additive Manufacturing

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Additive manufacturing (AM) is widely recognized as an enabling technology for the fabrication of ceramic components with complex architectures and optimized morphology. Great advances in terms of technologies, equipment, and feedstocks have been recently achieved, allowing additive manufacturing to transition from mere rapid prototyping to industrial-scale fabrication and distributed digital manufacturing. In particular, the hybridization of technologies, the possibility of multimaterial printing, and the development of volumetric AM approaches have contributed to further widening the range of components that can be produced and their applications in diverse fields, such as energy, aerospace, defense, automotive, constructions, and healthcare. This symposium will showcase recent developments in materials, technologies, equipment, design, characterization, and applications of additive manufacturing of ceramic materials. Nondestructive evaluation and in-situ monitoring of processes, cost, qualification, and certification will also be discussed. Proposed topic areas relating to the AM of traditional, advanced, functional, high and ultrahigh-temperature ceramics and composites include, but are not limited to, the sessions listed below.

PROPOSED SESSION TOPICS

- Recent advances in additive manufacturing technologies for ceramics (DLP/SLA/TPP, BJ, DIW, LOM, IJP, DED, VAM, RAM)
- New additive manufacturing approaches including multimaterial and hybrid printing technologies for ceramics
- Post-processing and characterization of printed ceramics
- Qualification, certification, standards, and property database of AM ceramics
- Applications and testing of AM ceramics and ceramic components

SYMPOSIUM 12

Transportation and Infrastructure

Transportation and infrastructure activities take an enormous share of human labor, energy consumption, and environmental impact around the world. Global construction accounts for 30% of the world's energy demand and costs about US$7 trillion each year, US$1.4 trillion of which comes from bridges, highways, and roads. Supporting all this activity is a global cement market worth about US$340 billion annually. New cementitious materials and additives are being explored that can enable new construction methods, prolong service life, decrease embodied energy, and reduce the impact of infrastructure materials on the environment. This symposium will provide a forum for communicating the latest advances in cementitious materials for transportation and infrastructure. Contributions are encouraged that highlight enabling chemistries, processing methods, models, and applications in the seven sessions listed below.

PROPOSED SESSION TOPICS

- Low-carbon infrastructure materials
- Additive construction materials and methods
- Geopolymer chemistry and processing
- Computational modeling and artificial intelligence for materials discovery and optimization
- Understanding and controlling material degradation
- Repair and retrofit materials for infrastructure and transportation
- Novel materials and additives for sustainable infrastructure

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