CMCEE 14

14TH INTERNATIONAL CONFERENCE ON CERAMIC MATERIALS AND COMPONENTS FOR ENERGY AND ENVIRONMENTAL SYSTEMS

18–22 AUGUST 2024

BUDAPEST, HUNGARY
BUDAPEST CONGRESS CENTRE

CALL FOR PAPERS

DEAR COLLEAGUES,

The 14th International Conference on Ceramic Materials and Components for Energy and Environmental Applications (CMCEE-14) will be held in the beautiful city of Budapest, Hungary. The conference series began in 1980s and has established a strong reputation for state-of-the-art presentations and information exchange on the latest emerging ceramic technologies and their wide-ranging applications. CMCEE-14 will contain more than 30 symposia covering a wide range of topics, which will facilitate global dialogue and discussion with leading world experts in ceramic technologies for sustainable development of society.

We would like to invite all of you to actively participate in the conference and visit the city of Budapest. We are quite hopeful that this conference will provide an excellent forum for interaction and friendship with participants from various continents.

We hope to meet you all in 2024!

Kind regards,
Organizing Committee

CONFERENCE CHAIRS

MRITYUNJAY SINGH
Executive Chairman

KATALIN BALÁZSI
Conference Chair

JINGYANG WANG
Conference Co-chair

TATSUKI OHJI
Conference Co-chair

ZHENGYI FU
Conference Co-chair

ALEXANDER MICHAELIS
Conference Co-chair

CSABA BALÁZSI
Conference Chair

PALANI BALAYA
Conference Co-chair

PLENARY SPEAKERS

M. STANLEY WHITTINGHAM
NOBEL LAUREATE 2019

Binghamton University
State University of New York
USA

SANG IL SEOK

Laboratory for Energy Harvesting Materials and Systems
Ulsan National Institute of Science and Technology
South Korea

CMCEE 14

ABSTRACT SUBMISSION

Each applicant can submit and present maximum one abstract (1 oral or 1 poster). Acceptance of a paper implies that at least one of the authors must attend the conference and present the paper. Authors are advised that abstracts will not be included in the final program unless registration documents and payment in full have been received from at least one of the authors.

IMPORTANT DATES FOR ABSTRACT SUBMISSION

Deadline for abstract submission (Poster & Oral): 15 January 2024
Notification on acceptance: 15 March 2024
Payment deadline for early registration fees: 15 May 2024*

AUTHORS ARE INVITED TO SUBMIT THEIR CONTRIBUTIONS FROM THE FOLLOWING FIELDS:

T1 Ceramics for Energy Conversion, Storage, and Distribution Systems

- T1.1 High-Temperature Fuel Cells and Electrolysis
- T1.2 Ceramics-Related Materials, Devices, and Processing for Heat-to-Electricity Direct Conversion and Thermal Energy Harnessing
- T1.3 Emerging Materials and Technologies for Solar Cells and Solar Fuel Technologies
- T1.4 Material Science and Technologies for Advanced Nuclear Fission and Fusion Energy
- T1.5 Nanostructured, and Hybrid Functional Materials for Energy and Sustainability
- T1.6 Advanced Batteries and Supercapacitors for Energy Storage Applications
- T1.7 Materials for Solar Thermal Energy Conversion and Storage
- T1.8 High Temperature Superconductors: Materials, Technologies and Systems
- T1.9 Recycling

T2 Ceramics for Energy Conservation and Efficiency

- T2.1 Advanced Fiber Reinforced Composites for Turbine Engines
- T2.2 Advanced Ceramic Coatings for Power Systems
- T2.3 Engineering Ceramics: Advanced Processing, Properties, and Applications
- T2.4 Materials for Solid State Lighting
- T2.5 Advanced Polymer Derived Ceramics (PDCs) and Related Materials for Energy Applications
- T2.6 Sustainable Materials and Systems for Energy Efficient Building and Structures
- T2.7 Energy Efficiency and Green Technologies in Ceramic Manufacturing Industries

T3 Ceramics for Environmental Systems

- T3.1 Photocatalysts for Energy and Environmental Applications
- T3.2 Ceramics for Carbon Capture and Storage Technologies
- T3.3 Geopolymers, Inorganic Polymer Ceramics and Sustainable Composites
- T3.4 Porous and Cellular Ceramics: Porosity design and Engineering Applications
- T3.5 Advanced Sensors for Energy, Environment and Health Applications
- T3.6 Advanced Materials and Membrane Technologies for Sustainable Water Purification and Desalination Systems

T4 Cross-Cutting Materials Technologies

- T4.1 Computational Design and Modeling
- T4.2 Additive Manufacturing & 3-D Printing Technologies
- T4.3 Novel, Green, and Strategic Processing and Manufacturing Technologies
- T4.4 Powder Processing Technology for Advanced Ceramics
- T4.5 Advanced Materials, Technologies, and Devices for Electrooptical and Biomedical Applications
- T4.6 Multifunctional Coatings for Energy and Environmental Applications Applications
- T4.7 Materials for Extreme Environments: Ultrahigh Temperature Ceramics (UHTCs) and Nano-laminated Ternary Carbides and Nitrides (MAX Phases) Applications
- T4.8 Design, Processing, and Applications of Nanolaminated Ternary Transition Metal Carbides/Nitrides/Borides and MXenes and Mbenes
- T4.9 Ceramic Integration Technologies for Energy and Environmental Applications
- T4.10 Environmental Friendly and Energy Efficient Manufacturing Routes for the Production Root Technology Applications
- T4.11 Hybrid and Bio-inspired Materials
- T4.12 Graphene and 2-D materials

T5 Technology, Society and Sustainability

- T5.1 Global Innovations in Biomaterials, Biomanufacturing, and Biotechnologies
- T5.2 Global Young Investigator Forum
- T5.3 Energy Policy with participation
- T5.4 Women in Ceramics
- T5.5 Satellite Events

*We provide a longer than normal timeframe for visa application and travel arrangements to Hungary due to recently experienced travel restrictions and longer waiting periods for visa applications. As of November 2022, the median worldwide wait time for a tourist visa interview appointment is about two months so we strongly advise you to book your visa interview in due time. Please note that the CMCEE-14 Secretariat makes no contact with embassies or consulates on behalf of the foreign participants invited to the event.

T1.1 High-Temperature Fuel Cells and Electrolysis

High-temperate fuel cells (SOFC, MCFC) have overcome the status of lab testing and technology demonstration and are meanwhile available as marketable products for stationary power generation and combined heat and power (CHP) in the range between 100 W and 1 MW. However, basic research, materials development and process engineering are still essential for achieving competitiveness of the technology with respect to lifetime and cost. The development of novel solutions on cell, component and system level is required to open up additional markets for the application of high-temperature Fuel Cells. Sophisticated design concepts and manufacturing technologies are essential for the up-scaling of plant sizes and production numbers.

The development of Solid Oxide Electrolysis Cells (SOEC) and Reversible SOFC (R-SOFC) has gained increased interest, motivated by the growing share of renewable energy sources in power distribution grids. While a number of proven SOFC solutions and experience might be adopted for high-temperature electrolysis, particular material developments and system integration concepts are still necessary, leading to challenging tasks for basic and applied sciences. Together with the use of biogenic fuels in SOFC, the development of SOEC and R-SOFC constitutes the role of ceramics-based energy converters in future renewable energy scenarios.

The primary purpose of this symposium is to provide an international forum for scientists and engineers to present recent technical progress, and to exchange ideas and technical information on various aspects of high-temperature fuel cells and electrolysis.

Proposed Session Topics

- Materials development and microstructural engineering for enhanced performance and durability of electrolytes, cell components and functional layers
- Investigations of lifetime-related phenomena on material, component and system level
- Model-based analyses of electrochemical, thermal, mechanical and coupled phenomena in high-temperature Fuel Cells
- Materials development and system engineering for high-temperature electrolysis and reversible SOFC
- Materials development and process engineering for low-cost, series production of high-temperature Fuel Cells and SOEC
- Mass production processes and manufacturing technologies for Fuel Cell components, stacks and systems, including energy efficiency savings, recovery and recycling of materials
- System design and optimization towards performance, cost and durability
- Fuel processing technologies and BoP components
- High-temperature fuel cell systems for residential applications and special markets
- High-temperature fuel cell systems for industrial and large-scale applications

Symposium organizers

Xingbo Liu - West Virginia University, USA
Alexander Michaelis - Fraunhofer IKTS, Germany
Federico Smeacetto - Politecnico di Torino, Italy
Suddhasatwa Basu - IIT-Delhi, Inida
Minfang Han - Tsinghua University, China
Teruhisa Horita - AIST, Japan
Mihails Kusnezoff - Fraunhofer IKTS, Germany
Prabhakar Singh - University of Connecticut, USA

Points of contact

Xingbo Liu
Benjamin M. Statler College of Engineering
& Mineral Resources
West Virginia University, USA
xingbo.liu@mail.wvu.edu

Alexander Michaelis
Fraunhofer IKTS, Germany
alexander.michaelis@ikts.fraunhofer.de

Federico Smeacetto
Politecnico di Torino, Italy
federico.smeacetto@polito.it

T1.2 Ceramics-Related Materials, Devices, and Processing for Heat-to-Electricity Direct Conversion and Thermal Energy Harnessing

With regard to ceramic materials and processing for thermoelectric, thermionic, thermos-photovoltaic, ultra-low thermal conductivity, thermal conduction controlling materials and technologies for heat-to-electricity direct conversion as well as for thermal energy harnessing, this symposium aims to hold an open discussion and give scientists and researchers from around the world an opportunity.

Materials and processing to optimize efficiency and cost/performance aspects of heat-to-electricity direct conversion will be enlightened with emphasis on tailoring electrical and thermal transport properties to the demand of applications with concerns of global environmental safety for sustainable future of human society.

Proposed Session Topics

The symposium will focus discussion on fundamentals, modeling, mechanisms, materials design, screening, electrode architectures, diagnostics, materials characterization, and electrode/electrolyte interface characterization of the following energy storage devices:

- High-performance materials for heat-to-electricity direct conversion
- New concepts and strategies for novel thermoelectric materials and conversion
- Ceramic and novel processing for thermoelectric materials and devices
- Advanced thermoelectric devices and modules, and system-level applications
- Solid state and defect chemistry on thermoelectric materials and candidates
- Theoretical studies of bulk materials and low-dimensional nanostructures
- Phonon engineering materials and device applications
- Novel concepts and materials design for efficient thermal energy harnessing

Symposium organizers

Michitaka Ohtaki - Kyushu University, Japan
Emmanuel Guilmeau - Recherche CNRS, France
Lidong Chen - Shanghai Institute of Ceramics, China
Jon Goldsby - NASA Glenn Research Center, USA
Ramanathan Mahendiran - National University of Singapore, Singapore
Takao Mori - National Institute for Materials Science (NIMS), Japan
Michihiro Ohta - National Institute of Advanced Industrial Science and Technology, Japan

Points of contact

Michitaka Ohtaki
Kyushu University, Japan
ohtaki@kyudai.jp

Emmanuel Guilmeau
Recherche CNRS, France
emmanuel.guilmeau@ensicaen.fr

T1.3 Emerging Materials and Technologies for Solar Cells and Solar Fuel Technologies

The significant increase in demand of world energy consumption including clean and efficient energy resources, have prompted the imperative searches of new materials, devices and technologies. The development of technologies aiming for the effective and efficient use of solar energy is one of the top priority to guarantee sustainable growth and development of the present society.

This symposium will focus on the advanced ceramics, glass and related materials technologies including semiconductor, charge transfer materials and device/systems that could help to achieve the stated goals. A broad perspective is desired, including photovoltaic materials, solar cells, solar energy conversion systems for increased energy efficiency, transparency conduction oxides/non-oxides/compounds films/electrodes, solar-to-fuel conversion such as hydrogen, solar-fuel cell hybrid systems. Fundamental materials properties and characterization of solar-energy conversion, state-of-the art of solar cell materials and architectures including hybrid system, structure-property correlations, and materials development and processing technologies for reliable and efficient solar-energy conversion and related application technologies are also highly desired.

Proposed Session Topics

- Fundamental phenomena and properties in photovoltaic materials and solar cells
- Semiconductor photovoltaic materials and thin films solar cells
- Single crystal, polycrystalline and amorphous materials utilizing homo- and hetero-junction
- Nobel sensitizers for solar-energy conversion systems
- Energy efficient materials and architectures
- Ceramic processing technologies for advanced solar-energy conversion
- Novel design and strategies for solar energy conversion systems
- Transparent conduction oxide films for solar cells
- Materials for solar-thermal device and applications
- Surfaces and interfaces in solar-energy conversion systems
- Solar-fuel conversion materials and systems
- Solar-hydrogen/fuel cell hybrid systems
- Energy and cost efficient manufacturing technologies and industrial applications
- Computational sciences in photovoltaic materials and solar-energy conversion systems

Symposium organizers

Alberto Vomiero - Luleå University of Technology, Sweden
Kassa Belay Ibrahim - Ca' Foscari University of Venice, Italy
Zhengyi Fu - Wuhan University of Technology, China
Alexander Michaelis - Fraunhofer IKTS, Germany

Points of contact

Alberto Vomiero
Luleå University of Technology, Sweden
alberto.vomiero@ltu.se

T1.4 Material Science and Technologies for Advanced Nuclear Fission and Fusion Energy

Advanced ceramics, ceramic-based composites, and glasses are attractive for advanced fission and fusion energy systems due to their high thermal efficiency and high temperature stability. These advanced materials are well positioned to address the critical challenges imposed by the demanding operating environments in advanced nuclear systems for both power generation and space propulsion applications. In addition, inovative technologies and materials are being researched and developed to effectively close the nuclear fuel cycle which includes safe and hazard-free generation, processing, storage, transport, and disposal of nuclear waste.

The purpose of this symposium is to provide an opportunity for material scientists and engineers to present and discuss the latest developments on ceramic-based materials and related technologies in nuclear energy systems and nuclear waste management. The topics of interes include processing, characterization, fundamental materials science issues, and practical aspects of their deployment.

Proposed Session Topics

- Advanced characterization and modelling of ceramic materials and components for advanced nuclear fission and fusion energy systems
- Innovative concept and design of nuclear systems, fuels, components, and waste management enabled by ceramics, ceramic composites and glasses
- Refractory ceramics, carbon and nuclear graphite materials for high temperature reactors
- Ceramics and cermic-based composites for accident-tolerant fuels
- Ceramic and glass sciences for waste immobilization
- Development and scale-up of waste management technologies
- Novel techniques in solid and liquid characterization, sensing and monitoring of radionuclides, and modeling tools
- Ceramic technology for nuclear heat exchangers
- Joining and integration technologies for ceramic structures
- Qualification of ceramic materials and components for nuclear reactors
- Cross-cutting topics

Symposium organizers

Tatsuya Hinoki - Kyoto University, Japan
Dong Liu - University of Bristol, UK
Josef Matyas - Pacific Northwest National Laboratory, USA
Guo-Jun Zhang - Donghua University, China
Gustavo Costa - NASA Glenn Research Center, USA
Jana Kalivodova - Centrum výzkumu Řež s.r.o., Czech Republic
Valentina Casalegno - Politecnico di Torino, Italy
David Arregui Mena - Oak Ridge National Laboratory, USA
Sylvain Peuget - Commissariat a L'Energie Atomique, France
Daniel Gregg - Australia's Nuclear Science and Technology Organization, Australia

Points of contact

Tatsuya Hinoki
Kyoto University, Japan
hinoki.tatsuya.3n@kyoto-u.ac.jp

Dong Liu
University of Bristol, UK
dong.liu@bristol.ac.uk

Josef Matyas
Pacific Northwest National Laboratory, USA
josef.matyas@pnnl.gov

Guo-Jun Zhang
Donghua University, China
gjzhang@dhu.edu.cn

T1.5 Nanostructured, and Hybrid Functional Materials for Energy and Sustainability

This symposium will focus on synthesis, processing and device integration of multifunctional inorganic materials for energy harvesting and conversion processes. In particular, special emphasis will be given to novel synthesis approaches, surface functionalization, and investigation on hybrid (organic-inorganic) interfaces. Application of advanced materials in photovoltaic, electrocatalysis, energy harvesting and storage applications will form the major scientific thrust areas. Current materials challenges that are crucial to address the demands of energy transition will be discussed to include new materials development, surface modifications and coatings, operando methods of materials characterization and computational approaches.

This symposium aims to bring together scientific experts from various countries to stimulate discussion on the latest advances in functional materials for sustainable energy conversion and storage technologies and to establish new research collaborations.

Proposed Session Topics

- Innovative processing of functional nanomaterials by solution and vapor phase techniques
- Two dimensional materials and heterostructures for energy harvesting & storage
- Materials for solar fuels and electrocatalysis
- New generation perovskite-based photovoltaic cells
- Piezoelectric nanostructures for self-powered systems
- Advanced nanomaterials for renewable fuels and energy generation
- Nanomaterials for electrochemical energy storage systems
- Conceptual advances in green hydrogen technologies

Symposium organizers

Sanjay Mathur - University of Cologne, Cologne, Germany
Silke Christiansen - Fraunhofer Institute for Ceramic Technologies and Systems IKTS, Germany
Graziella Malandrino - University of Catania, Italy
Federico Rosei - Université du Québec, Canada

Points of contact

Sanjay Mathur
University of Cologne, Germany
sanjay.mathur@uni-koeln.de

Silke Christiansen
Fraunhofer Institute for Ceramic Technologies and Systems IKTS, Germany
schrist1@gwdg.de

T1.6 Advanced Batteries and Supercapacitors for Energy Storage Applications

Batteries and supercapacitors are two important electrochemical energy storage devices. Batteries store electrical energy by converting it into chemical energym while supercapacitors store energy at the electrode/electrolyte interface. There are several concepts available for batteries and supercapacitors, representing multi-billion dollar industries. The state-of-the-art battery and supercapacitor systems are not able to meet the requirements for energy-efficient use in transportation, grid, and commercial technologies. Both storage technologies seek new concepts in material design to overcome their current limitations in performance and lifetime. More critical insights are required in terms of ceramic material compositions and structures, including surface or interfacial reactions, to produce next-generation electrode materials enabling higher energy densities, higher power densities, and a longer cycle life of batteries and supercapacitors.

This symposium will explore novel energy storage ceramic materials and technologies that are critical to making current energy storage technologies more effective in the near future.

Proposed Session Topics

The symposium will focus discussion on fundamentals, modeling, mechanisms, materials design, screening, electrode architectures, diagnostics, materials characterization, and electrode/electrolyte interface characterization of the following energy storage devices:

- Lithium-ion batteries
- Sodium-ion batteries
- Magnesium batteries
- Lithium-air batteries
- Lithium-sulfur batteries
- Redox Flow batteries
- All-solid-state batteries
- High-temperature batteries
- Supercapacitors
- Li-ion capacitors

Symposium organizers

Palani Balaya - National University of Singapore, Singapore
Michael Dolle - Université de Montréal, Canada
Aninda J. Bhattacharyya - Indian Institute of Science, India
Dany Carlier-Larregaray - ICMCB-CNRS, Bordeaux, France
Robert Dominko - National Institute of Chemistry, Slovenia
Xiangxin Guo - Shanghai Institute of Ceramics, China
Lee Pooi See - Nanyang Technological University, Singapore
Neeraj Sharma - University of New South Wales, Australia
Naoaki Yabuuchi - Tokyo Denki University, Japan

Points of contact

Palani Balaya
National University of Singapore, Singapore
mpepb@nus.edu.sg

Michael Dolle
Université de Montréal, Canada
mickael.dolle@umontreal.ca

T1.7 Materials for Solar Thermal Energy Conversion and Storage

Concentrated solar power (CSP) technology is expected to contribute significantly to future sustainable, efficient and diverse energy mix. Together with suitable thermal storage systems, CSP may provide base load power. Moreover, concentrated solar heat can be used for high temperature process technology for the production of fuels or chemicals. However, for widespread use of CSP, it is estimated that cost to produce electricity should be about $0.06/kWh. This requires higher plant efficiencies, power cycles operating at higher temperatures, and thermal energy storage solutions for future CSP plants. In this regard, there are significant materials challenges to meet the demanding performance and cost requirements.

This symposium solicits abstracts related to the diverse aspects of materials and components related to CSP systems and their correlations to processing, integration, performance and reliability.

Proposed Session Topics

- Collectors, mirrors and coatings
- Receivers, absorber materials, and heat transfer media
- Materials for advanced power cycles
- Novel materials and systems for thermal energy storage
- Materials for thermochemical processes to produce fuels
- System integration technologies
- Environmental effects on material components
- Modeling of degradation mechanisms
- Reliability and lifetime predictions

Symposium organizers

Dileep Singh - Argonne National Laboratory, USA
Martin Schmücker - Institute of Mechanical Engineering, HRW University of Applied Sciences, Germany
Shailendra Kumar Shukla - Indian Institute of Technology BHU, India

Points of contact

Dileep Singh
Argonne National Laboratory, USA
dsingh@anl.gov

T1.8 High Temperature Superconductors: Materials, Technologies and Systems

Since the discovery of superconductivity in cuprates, pnictides and related materials an outburst of research activity was generated. However, the key challenge remains the understanding of mechanisms of unconventional superconductivity, still under debate in spite of many relevant advances in research and materials development. Meanwhile many new superconductors have emerged, including ruthenates, cobaltates, borides, borocarbides, doped fullerenes and intercalated graphite, hydrides, sulphites, organic and heavy-fermion superconductors, accompanied by in-depth characterization of their physical properties by means of a variety of experimental approaches and by successful applications in wires, tapes, processing in electronics and in novel nano-related technologies like nano-engineering.

The focus will be on novel aspects, issues and systems including fundamental aspects of theory, advances in synthesis, functionalization and processing and the latest progresses in the areas of the field effect, artificial layering, novel devices at small scale and large scale ranges, including new applications.

Proposed Session Topics

- Materials, structure, physical chemistry and general properties
- New superconductors of the pnictides and related families
- Properties of superconductors, their theory and mechanisms
- Vortex lattice physics
- Synthesis by novel methods and processing
- Power applications
- Low power applications and superconducting electronics

Symposium organizers

Giorgi Mumladze - Vladimir Chavchanidze Institute Of Cybernetics Georgian Technical University , Georgia
Jean-Claude Grivel - Technical University of Denmark, Denmark
Matija Čulo - Institute of Physics, Croatia
Yu He - Department of Applied Physics, Yale University, USA

T1.9 Recycling

With more than 4,000 research articles in 2022, circular economy is clearly a topic that meets wide scientific interest. The predicted demand for energy and environmental technologies depending on advanced ceramic materials and components is huge (going from batteries, catalysts, filtration membranes, solid oxide electrolyzers, high-temperature composites for gas turbines and concentrated solar power, to structural and refractory ceramics, to electronics, and many more). In order to increase their sustainability, crucial chemical elements, scraps from subtractive machining manufacturing methods as well as components, and their consisting materials, need to be recycled instead of being discarded as useless waste.

Ceramics are indeed advanced materials with tailored composition and microstructure with a high “embodied” energy requirement from the raw material extraction, synthesis, and processing. Direct routes to use waste straight in production are attractive from both environmental and cost perspectives. Innovative, practical, and cheap methods to reuse (in the same application or different ones), refurbish, resynthesize, remanufacture, or simply repair or rejuvenate ceramic products are highly needed.

The primary purpose of this symposium is to provide an international forum for scientists and engineers to present recent scientific and technical progress on the recycling of ceramic-based materials.

Proposed Session Topics

- Chemical, thermal, and mechanical approaches combined with an evaluation of the material’s microstructure and properties
- Re-use of powders
- Re-synthesis and processing of waste ceramic materials
- Sintering methods to densify waste materials
- Repair of ceramic components
- Complementary aspects such as Life Cycle Analysis and techno-economic approaches are welcome.

Symposium organizers

Olivier Guillon - Forschungszentrum Jülich, Germany
Ender Suvaci - Eskisehir Technical University, Turkey
Andraž Kocjan - Jožef Stefan Institute, Slovenia
Vincenzo M. Sglavo - University of Trento, Italy
Victor C. Pandolfelli - Universidade Federal de São Carlos, Brazil

Points of contact

Olivier Guillon
Forschungszentrum Jülich, Germany
o.guillon@fz-juelich.de

T2.1 Advanced Fiber Reinforced Composites for Turbine Engines

Oxide and non-oxide based ceramic matrix composites (CMCs) are being implemented as replacements for metallic materials in key hot section components of gas turbine engines because CMCs are 70% lighter than metallic materials, and possess superior mechanical, thermomechanical and chemical properties in extreme environments which have been achieved via careful engineering design and tailoring of microstructure and interfacial properties. Substantial progress has been made in CMCs development, advanced manufacturing technologies, processing and behavior modelling, testing and applications over the past several decades. However, there is still much needed research to enable and optimize the design, fabrication and reproducibility of high performance CMCs, joining CMCs with ceramic or metallic parts, identification of life limiting damage mechanisms, and development of high fidelity physics based models that capture CMCs combined response and durability during thermomechanical loading while exposed to extreme environements in the various applications.

This symposium will focus on the microstructural engineering of matrix and interface, reinforcement architecture, mechanical behavior and component design and joining integration of advanced ceramic matrix composites for various turbine engine systems. Engineers and scientists continue to strive significant efforts to understand the relationship between mechanical performance and material macro-, meso-, micro- and nano-structures for the purpose of establishing the reliability and durability of these materials and components made from them. This symposium provides an ideal open platform for this dialog.

Proposed Session Topics

- Processing - microstructure - mechanical properties relationships
- Fibers, matrices, and interfaces
- Engineering of functionally graded materials and systems
- Mechanical properties of advanced ceramics and composites
- Mechanics and characterization techniques
- Thermal shock, oxidation, corrosion and ablation resistance
- NDE of advanced ceramic components
- Machining of ceramics matrix composites
- Coatings for advanced ceramics and composites in turbine environments
- System and interface integration ; joining of CMCs with ceramics and metallic parts
- Simulation and field testing of components
- Design, reliability and life prediction methodologies

Symposium organizers

Amjad Almansour - NASA Glenn Research Center, USA
Gerard L. Vignoles - University of Bordeaux, France
Hua-Tay Lin - Guangdong University of Technology, China
Dietmar Koch - University of Augsburg, Germany
Yutaka Kagawa - Tokyo University of Technology, Japan
Jon Binner - University of Birmingham, UK
Monica Ferraris - Politecnico di Torino, Italy
Michael Halbig - NASA Glenn Research Center, USA
Toshihiro Ishikawa - Sanyo-Onoda City University, Japan
Alberto Ortona - SUPSI, Switzerland
Jingyang Wang - IMR-CAS, Shenyang, China
Dong (Lilly) Liu - University of Bristol, UK
Gregory N. Morscher - The University of Akron, USA
Ji-Yeon Park - KAERI, Korea

Points of contact

Amjad Almansour
NASA Glenn Research Center, USA
amjad.s.almansour@nasa.gov

Gerard L. Vignoles
University of Bordeaux, France
vinhola@lcts.u-bordeaux.fr

T2.2 Advanced Ceramic Coatings for Power Systems

This symposium will provide a forum for material scientists and engineers to showcase and discuss current advances in coating science & technology. Innovative coating and surface modification processes are key enablers to realize surfaces with enhanced structural and environmental properties and/or novel multi-functionality, thereby to meet present and future demands for more efficient, reliable, economical, and clean applications that serve the technological needs and sustainability goals of modern societies, in particular carbon-neutral power generation and conversion.

Potential symposium topics include advanced manufacturing technologies, microstructure-property relationships, characterization methods, environmental resistance, and life time prediction. Coating materials and systems of interest include oxide and non-oxide ceramics, new carbons, cermets, organic-ceramic and nano-composites, and hybrid and graded structures. The symposium is open for contributions in the field of advanced ceramic coatings for aerospace, power generation and storage, automotive, and industrial applications.

Proposed Session Topics

- Thermal and environmental barrier coatings for gas turbines / carbon-neutral fuels
- Coatings for thermal managment / optical properties / energy harvesting
- Coatings for extreme environments (corrosion, abrasion, and erosion)
- Smart and multifunctional thin films and coatings: self-cleaning, anti-microbial, anti-smog, catalytic, electrically/magnetically/optically stimuli-responsive, etc.
- Advances in coating manufacturing
- Advanced characterization techniques and non-destructive testing
- Interfacial phenomena, adhesion and functional properties
- Substrate materials, pre- and post-deposition treatments
- Modelling, simulation, and data-science

Symposium organizers

Peter Mechnich - German Aerospace Center, Germany
Kang Lee - NASA Glenn Research Center, USA
Rong Tu - Wuhan University of Technology, China
Doug Wolfe - Penn State University, USA
Satoshi Kitaoka - Japan Fine Ceramics Center, Japan
Kuying Chen - National Research Council, Canada
Daniel Mack - Research Center Jülich, Germany
Kentaro Shinoda - AIST, Japan

Points of contact

Peter Mechnich
German Aerospace Center, Germany
peter.mechnich@dlr.de

Kang Lee
NASA Glenn Research Center, USA
kang.n.lee@nasa.gov

Rong Tu
Wuhan University of Technology, China
turong@whut.edu.cn

Doug Wolfe
Penn State University, USA
dew125@arl.psu.edu

T2.3 Engineering Ceramics: Advanced Processing, Properties, and Applications

Engineering ceramics materials and components are key technologies for innovation in energy saving and environmental protection. For example, engineering ceramics are strongly desired for use in aerospace, automobile, wind turbine, and semiconductor production. Superior properties such as high stiffness, high strength, high fracture toughness, light weight, low thermal expansion coefficient, high thermal conductivity and corrosion resistance are critical material parameters in these ceramics widespride used in harsh environments, energy systems or bearings and wear resistant components. Furthermore, low cost processing to make large components and tribology behavior in extreme conditions are also important in order to expand the industrial application fields. The aim of this symposium is to provide an open platform to discuss energy efficient advanced engineering ceramics processing, properties and applications as components in energy fields such as solar, battery, nuclear, thermal conversion or bearings and wear resistant materials for sustainable and green societies.

Proposed Session Topics

- Ceramics for solar, battery, nuclear components, bearing and wear resistant applications
- Thermal durability, light weight, low expansion coefficient, high hardness, toughness and strength, and high corrosion resistance
- Microstructural control for low friction coefficient and high wear resistance
- Green wear materials for renewable energy technology
- Low cost and green processing and manufacturing
- Tribology in extreme conditions
- Role of fibers, matrices, coatings, and interfaces in mechanical behavior
- Functionally graded materials and multilayer ceramic systems
- Manufacturing and testing of joined and integrated components and structures
- Ceramics for energy generation, turbines, and environmental applications

Symposium organizers

Young-Wook Kim - University of Seoul, Korea
Matthias Herrmann - IKTS, Germany
Diletta Sciti - ISTEC, Italy
Raoul Bermejo - Montauniversitaet Leoben, Austria
Jan Dusza - Institute of Materials Research, Slovakia
Karel Maca - Brno University of Technology, Czech Republic
Pavol Sajgalik - Slovak Academy of Sciences, Slovak Republic
Hua-Tay Lin - Guangdong University of Technology, China
Peter Tatarko - Institute of Inorganic Chemistry, Slovak Academy of Sciences, Slovakia
Branko Matovic - University of Belgrade, Serbia
Jerzy Lis - AGH, Poland
Frank Kern - Institute for Manufacturing Technologies of Ceramic Components and Composites, University of Stuttgart, Germany
Filiz Cinar Sahin - Istanbul Technical University, Turkey
Servet Turan - Eskisehir University, Turkey
Dileep Singh - Argonne National Laboratory, USA

Points of contact

Young-Wook Kim
University of Seoul, Korea
ywkim@uos.ac.kr

Mathias Herrmann
IKTS, Germany
mathias.herrmann@ikts.fraunhofer.de

Diletta Sciti
ISTEC, Italy
diletta.sciti@issmc.cnr.it

Raul Bermejo
Montauniversitaet Leoben, Austria
raul.bermejo@unileoben.ac.at

T2.4 Materials for Solid State Lighting

Solid state lighting is a type of lighting which is generated by light emitting diodes (LEDs). Light is generated by solid-state electroluminescence. Electroluminescent devices are fabricated using either organic or inorganic electroluminescent materials. The active materials are generally semiconductors of bandwidth wide enough to allow exit of the light. While the LED generates monochromatic light the society requirement is generation of the white light. This problem can be solved either by combination of several LEDs (e.g. red, blue and green) or by using phosphors. The second solution seems to be more efficient and easier technologically viable. A wide variety of phosphors is already patented and fabricated by several companies. On the other hand, a serious research is driven in this area. Oxide, non- oxide, crystalline and/or amorphous inorganic materials are studied and synthetized for this particular purpose. The computational modeling is also involved in the research in order to make the selection of the proper materials and dopants more effective for the perspective phosphors. The present session should cover all aspects of synthesis, simulation and fabrication of phosphors suitable for the production of white light by using LEDs.

Proposed Session Topics

- Phosphors for better performance of white LEDs
- Amorphous phosphors (powders, thin films)
- Oxide based phosphors
- Non-oxide based phosphors
- Crystalline phosphors (powders, thin films)
- Oxide based phosphors
- Non-oxide based phosphors
- Thin film phosphor processing
- Thin layer architecture of white emitting phosphors
- Computer simulation of phosphor composition (excitation, emission wave length)
- Industrial applications of phosphors

Symposium organizers

Rongjun Xie - Xiamen University, China
Zoltán Lencés - Institute of Inorganic Chemistry, Slovak Academy of Sciences, Slovak Republic
You Zhou - National Institute of Advanced Industrial Science and Technology (AIST), Japan
Kiyoshi Hirao - National Institute of Advanced Industrial Science and Technology (AIST), Japan
Marco Bettinelli - University of Verona, Italy

Points of contact

Rongjun Xie
Xiamen University, China
rjxie@xmu.edu.cn

Zoltán Lencés
Institute of Inorganic Chemistry
Slovak Academy of Sciences, Slovak Republic
uachlenc@savba.sk

T2.5 Advanced Polymer Derived Ceramics (PDCs) and Related Materials for Energy Applications

Precursor-based ceramics play an increasing role because of their flexibility in incorporating elements at a molecular level resulting in different classes of ceramics as amorphous networks containing the constituents homogeneously dispersed on the atomic level, crystalline phases and (nano)composites of binary or multinary phases which cannot be formed by traditional routes. Additionally, technical fibers, coatings, matrices of composites and functional porous ceramics are examples for the wide field of applications of these pre-ceramic polymers. In comparison to other ceramic manufacturing technologies, the use of polymer-shaping techniques and the considerable low processing temperatures are technological advantages which allow unique properties and functionalities.

The aim of the symposium is to discuss the latest developments on PDC ceramics, including modelling, structural characterization, microstructure/property correlations, and the manufacture of functional and structural components based on these organic-inorganic polymers.

Proposed Session Topics

- Application oriented synthesis of advanced preceramic polymers
- Nanostructure, modeling, and thermodynamics of polymer-derived-ceramics
- Structural and functional polymer-derived ceramics
- Innovative polymer-to-ceramic conversion methods
- Advanced fabrication processes, including additive manufacturing
- In-situ formation of nanocomposites and polymer-derived ceramic matrix composites
- Polymer-derived ceramics for clean energy generation and storage
- Modeling and simulation of pahes formation and microstructure
- Applications of PDCs as ceramic fibers, coatings, and functional ceramics
- Industrial applications

Symposium organizers

Ravi Kumar - Indian Institute of Technology Madras, India
Yuji Iwamoto - Nagoya Institute of Technology, Japan
Günter Motz - University of Bayreuth,
Ceramic Materials Engineering (CME), Bayreuth, Germany
Doh-Hyung Riu - Seoul National University of Science and Technology, Korea
Jo Woong Ha - Inocera Inc., Korea
Thomas Konegger - Technical University Vienna, Austria
Matthew B. Dickerson - Air Force Research Laboratory, USA
Samuel Bernard - CNRS, Institute of Research for Ceramics-Limoges, France
Angella Gallardo López - University of Seville, Spain

Points of contact

Ravi Kumar
Indian Institute of Technology Madras, India
nvrk@iitm.ac.in

Yuji Iwamoto
Nagoya Institute of Technology, Japan
iwamoto.yuji@nitech.ac.jp

Günter Motz
University of Bayreuth, Germany
Guenter.Motz@uni-bayreuth.de

T2.6 Sustainable Materials and Systems for Energy Efficient Building and Structures

A significant amount of energy is consumed worldwide to maintain the comfort condition of buildings. For achieving the targeted reduction of energy consumption and CO 2 generation of a country, energy efficiency of building sector has been identified as one of the major areas. Energy performance of a building mainly depends on the thermal characteristics of the building envelope, energy efficiency of cooling and heating equipment and lighting systems. Building envelope refers to the walls, roof, floors, and any fenestrations that enclose the building. High performance novel materials for building envelope contribute remarkably to control input/output of heat energy and moisture content and reduce the cooling/heating load demand of the space. Air-conditioning chiller systems and heat pumps are commonly used in buildings as the cooling and heating equipment. The heat transfer and resulting energy efficiency of the cooling and heating equipment largely depend on the thermal characteristics of the material used in the heat exchangers of condensers, evaporators, air handling units and heat recovery systems. Solution providers such as industrial experts and researchers have made significant effort to develop advanced green materials for new and existing building envelope, air-conditioning equipment and energy efficient lighting system.

Development of affordable, green, advanced materials to meet the energy efficiency and sustainability targets of building sector remains challenging.

This symposium will focus discussion on fundamentals, material synthesize and design, materials characterization, real performance in building, modeling and experiment for enhancing the energy performance of building and equipment.

Proposed Session Topics

- Composite materials for building envelope (metallic, ceramic and polymeric materials)
- Building materials with enhanced properties
  (Corrosion and oxidation resistance, ultraviolet resistance, fire behavior, insulation properties, light transmission or reflection, scratch resistance, aging resistance, dirt pick-up resistance, etc.)
- Nanotechnologies for enhancing building materials performance
- Ceramic materials for interior and exterior application (e.g., Nano-coatings for tiles)
- Sustainable, low–carbon footprint, energy efficient building materials
- Insulation materials for building envelope and equipment
- Surface structure/treatment of building materials for enhanced thermal properties
- High reflectance durable outdoor coating
- Reflective and anti-bacterial indoor coatings
- Phase change materials for energy storage
  (PCM slurries, macro- or micro-encapsulated PCMs in building envelopes, bulk PCM for modulating photovoltaic temperatures)
- Low-emissivity, thermochromics, electrochromic window glasses including coating and film for fenestration
- Ceramic composites for heat exchangers and building envelope
- New materials for energy-efficient lighting systems
- Composite desiccant materials for absorption and adsorption chillers
- Solid and liquid desiccant materials for heat recovery and dehumidification
- Modeling of building materials influence on energy performance

Symposium organizers

Henry A. Colorado - Engineering School,
Universidad de Antioquia, Colombia
Esra Zayim - Faculty of Sciences and Letters,
Istanbul Technical University, Turkey
Márta Szabó - Department of Building Services and Environmental Engineering, Faculty of Mechanical Engineering, Hungary
Jozef Kraxner - Centre for Functional and Surface Functionalized Glass
Alexander Dubček University, Slovakia

Points of contact

Henry A. Colorado
Engineering School
Universidad de Antioquia, Colombia
henry.colorado@udea.edu.co

Esra Zayim
Faculty of Sciences and Letters
Istanbul Technical University, Turkey
ozesra@itu.edu.tr

T2.7 Energy Efficiency and Green Technologies in Ceramic Manufacturing Industries

Traditional Ceramic Industries around the world are more and more energy consuming industry especially thermal energy in kilns. Nowadays awareness on energy efficiency for being competitive is increasing day by day. Industry is moving on Piped Natural Gas, Roller Hearth Kilns. Ultra Low Thermal Mass Kiln furniture designs, research on ware-to kiln furniture ratio, use of nano size ceramic colors and stains, reducing firing temperatures through change in raw materials use of energy efficient processing techniques, use of solar energy for drying the products, use of automatic shaping machineries, use of new designing techniques, use of new house keeping techniques, waste minimization techniques, waste utiliuzation techniques and many more. All these are contributing to green manufacturing technologies.

Proposed Session Topics

- Alternate Raw Materials
- Fast firing technologies in ceramic tableware industry
- Ultra Low Kiln furniture
- Modern machineries for green technologies
- New Developments in Wall & Floor tile industries
- Efficiency Analysis of Continuous & Intermittant Kilns
- New Quality Assurance Techniques in Whiteware & Tile Industries
- Ceramics & Energy Efficient Cooking Devices

Symposium organizers

Lalit K. Sharma - Mahamana Ceramic Development Organization, New Delhi, India
Chandresh Agarwal - Cerafrik, Dubai
G.M. Anil Kumar - Noritake Co. Ltd, Nagoya, Japan
Vinay Kumar Jha - Central Department of Chemistry, Tribhuvan University, Kathmandu, Nepal
Vinay Kumar Singh - Department of Ceramic Engineering, IIT-BHU, Varanasi, India
Sanjeev Bhasin - Ashapura Group of Industry, Bhuj, Gujarat, India
Manjula Jayawardane - Ceramic Consultant, Prothick Ceramics Ltd, Kalampur, Bangladesh
Parvesh Agrawal - CSIR-Central Glass & Ceramic Research Institute, Ahemadabad, India
V. Thirumurugan - Glorex Mines & Minerals Pvt Ltd, Bhuj, Gujarat, India
M. Neelwarnam - Amerys Special Refractory, Vagashiya Industrial Estate, Wankaner, India
Manas Ranjan Majhi - Department of Ceramic Engineering, IIT-BHU, Varanasi, India
Yogendra Singh Yadav - Orental Collection, Indra Nagar, Kanpur, India
Vinay Daga - J.L.D Minerals, Bikaner, India
K.C. Singh - CSIR-CGCRI, Khurja, India
Shakeel Ahmad Khan - Geo Industries, Khurja, India

Points of contact

Lalit K. Sharma
Mahamana Ceramic Development Organization, New Delhi, India
lksharma6@rediffmail.com

Chandresh Agarwal
Cerafrik Ltd., Dubai
chandreshagarwal@hotmail.com

T3.1 Photocatalysts for Energy and Environmental Applications

There has been remarkable progress in the fields of photocatalysis for energy and environment, including solar fuels (CO 2 capture, water splitting, etc.), photocatalytic degradation of pollutants, disinfection, self-cleaning, and photocatalytic organic synthesis.

The research, development, demonstration and commercialization in this principal field have attracted global interest from academia, government research laboratories and industry. Accordingly, the symposium will focus on the science of ceramic materials for energy and environmental technologies, and facilitate information sharing on the up-to-date developments and industrial applications of photocatalysis. These techniques will be essential for generating renewable energy and eliminating environmental pollutants in future generations. CMCEE14, covering and merging recent developments in photocatalysis for energy and environment, is being organized with principal objectives to bring together interested parties from universities, research institutions and industry to exchange information, views, experience and perspectives. This session will present the most current findings generated at laboratories of universities and research institutions, as well as in the field by the practitioners.

Proposed Session Topics

- Photocatalytic water splitting
- Photocatalysts for environmental purification (water, air, soil)
- Solar fuels and artificial photosynthesis
- Photoinduced self-cleaning coatings
- Photocatalytic antimicrobial materials
- Photocatalytic reactors and systems
- Photoelectrochemistry, photoelectrochemical cells
- Integrated photoelectrochemcial conversion systems including perovskite solar cells
- Photocatalytic mechanism
- Fundamental researches on nanostructured photocatalysis
- Computation and simulation on new photocatalytic materials

Symposium organizers

Pelagia I. Gouma - The Ohio State University, USA
Se-Hun Kwon - Pusan National University, Korea
Nicola Pinna - IRIS Adlershof & CSMB,
Humboldt-Universität zu Berlin, Germany
Luigi Angelo Castriotta - University of Rome Tor Vergata, Italy
Rahul Vaish - School of Engineering,
Indian Institute of Technology Mandi, India
Lianzhou Wang - Australian Research Council, Australia

Points of contact

Pelagia I. Gouma
The Ohio State University, USA
gouma.2@osu.edu

Se-Hun Kwon
Pusan National University, Korea
sehun@pusan.ac.kr

Nicola Pinna
IRIS Adlershof & CSMB
Humboldt-Universität zu Berlin, Germany
nicola.pinna@hu-berlin.de

T3.2 Ceramics for Carbon Capture and Storage Technologies

To achieve a sustainable relationship with the environment, the development of carbon capture, utilization and storage technologies will be crucial in global efforts to reduce the emission of greenhouse gases such as carbondioxide in our atmosphere. This symposium will provide a forum for the presentation and discussion of recent research and development in this fields that utilize ceramic materials and components, through the technologies that can significantly reduce greenhouse gas emissions.

The symposium will be focused only on cutting-edge high impact research and technologies covering all aspects from basic material development and characterization, through manufacturing of ceramic layered systems, components and module designs for these novel technologies. For this purpose, worldwide researchers, educators, policymakers, and experts on different topics will be solicited to present their recent activities. The broad scope of the symposium allows for a wide overview of the current issues, and methods regarding carbon capture and storage, aiming to stimulate interdisciplinary discussions and collaborations in a wide range of science, engineering, and environmental fields.

Proposed Session Topics

The symposium will focus discussion on fundamentals, modeling, mechanisms, materials design, screening, electrode architectures, diagnostics, materials characterization, and electrode/electrolyte interface characterization of the following energy storage devices:

- Materials and Technologies for CO2 utilization
- Ceramics and composites for carbon storage
- Technologies, Materials and Components for carbon capture technologies
- Novel technologies and computation for CO2 reduction
- Current status and new trends on carbon neutrality
- Date-based designing of materials for carbon reduction
- High energy efficiency for lower CO 2 emissions

Symposium organizers

Yiquan Wu - Alfred University, USA
Wilhelm A. Meulenberg - Forschungszentrum Jülich, Germany and University of Twente, Netherlands
Ralf Riedel - Technical University of Darmstadt, Germany
Paolo Colombo - University of Padova, Italy
Manabu Fukushima - National Institute of Advanced Industrial Science and Technology, Japan
Yin Jie - Shanghai Institute of Ceramics, China
Jose M. Serra-Alfaro - Polytechnic University of Valencia, Spain
Kang Li - Imperial College London, UK
Peter Vang Hendriksen - Technical University of Denmark, Denmark
Diletta Giuntini - Eindhoven University of Technology, Netherlands
Nobuhito Imanaka - Osaka University, Japan

Points of contact

Yiquan Wu
Alfred University, USA
wuy@alfred.edu

Wilhelm A. Meulenberg
Forschungszentrum Jülich, Germany
University of Twente, Netherlands
w.a.meulenberg@fz-juelich.de

T3.3 Geopolymers, Inorganic Polymer Ceramics and Sustainable Composites

Ceramic-like, inorganic polymers can be made under low energy conditions such as ambient temperatures and pressures. These materials include alumino-silicates or “geopolymers”, phosphates and other chemically bonded inorganic compounds. Relatively pure geopolymers are made from metakaolin and aqueous alkalisilicate solutions, but industrial waste products such as type F fly ash or other natural materials can also be used as starting materials for less pure materials. Ceramic, metallic, polymeric or biological reinforcements such as particulates, chopped fibers, unidirectional fibers or planar weaves have been used to make structural ceramic composites. Higher technology functional ceramic composites can also be made.

Such novel potential applications include hydrogen storage, water purification and biocidal activity, porous materials for CO 2 sequestration, thermal insulation, fire resistant panels and architectural panels as building materials.

Proposed Session Topics

- Synthesis, processing methods
- Tailored porosity (micro-, meso-, nano-, macro-)
- Mechanical properties and thermal shock resistance
- Composites
- Nuclear waste and heavy metal encapsulation
- Conversion to ceramics
- Construction materials
- Coatings (fire resistant, acid resistant)
- Sustainable materials and novel applications
- Other inorganic analogues

Symposium organizers

Waltraud M. Kriven - University of Illinois at Urbana-Champaign, USA
Dechang Jia - Harbin Institute of Technology, China
Joseph Davidovits - Geopolymer Institute, France
Jae-Chul Pyun - Yonsei University, Korea
John L. Provis - Sheffield University, UK

Points of contact

Waltraud M. Kriven
University of Illinois at Urbana-Champaign, USA
kriven@illinois.edu

Dechang Jia
Harbin Institute of Technology, China
dcjia@hit.edu.cn

T3.4 Porous and Cellular Ceramics: Porosity design and Engineering Applications

Porous ceramics can be utilized in a wide range of engineering applications, including insulation, catalysts, catalyst supports, filters, absorbers, sensors, and light-weight structural components, often together with hierarchical pore structures. To fully take advantage of the vast potential of porous ceramics, of oxide and non-oxide types, the manufacturing routes, which can be coupled with numerical approaches, used to design such components play a key role. Therefore, this symposium will include recent progress in the design, characterization, properties, and modelling of porous ceramic, carbon, glass, and glass-ceramic components. These materials contain pore sizes from nanometers to millimeters and can have textured to random, or hierarchical porosity and be based on various pore architectures, such as foams, honeycombs, fiber networks, and bio-inspired structures.

This symposium will be the ideal showcase for recent research interests and activities, covering areas from inorganic chemistry to materials science via experimental, modelling, and simulation approaches. Engineering applications can include energy related technologies (energy storage, conversion, and/or saving) and environmental protection technologies such as sensors, catalysts, catalyst supports, gas filters, and so on.

Proposed Session Topics

- Novel processing technologies of porous ceramics
- Polymer-derived ceramics and sol-gel routes
- Microstructural and morphological control of porous ceramics including pore design approaches
- Additive manufacturing of porous ceramics
- Ceramic membranes
- Micro-porous and meso-porous ceramics
- Mechanical characterization and modelling of porous ceramics
- Innovative characterization tools of porous ceramics
- Engineering applications of porous ceramics for environmental protection, energy applications, functional applications, emission control

Symposium organizers

Tobias Fey - Friedrich-Alexander-University of Erlangen-Nuremberg, Germany
Samuel Bernard - CNRS, Institute of Research for Ceramics-Limoges, France
Chengala D. Madhusoodana - Bharat Heavy Electricals Ltd., India
Manabu Fukushima - National Institute of Advanced Industrial Science and Technology - Japan
Young-Wook Kim - University of Seoul, Republic of Korea
Tatsuki Ohji - National Institute of Advanced Industrial Science and Technology, Japan
Paolo Colombo - Universita di Padova, Italy
Alberto Ortona - University of Applied Sciences and Arts of Southern Switzerland, Switzerland
Takashi Shirai - Nagoya Institute of Technology, Japan

Points of contact

Tobias Fey
Friedrich-Alexander-University of Erlangen-Nuremberg, Germany
tobias.fey@fau.de

Samuel Bernard
CNRS, Institute of Research for Ceramics-Limoges, France
samuel.bernard@unilim.fr

C.D. Madhusoodana
Bharat Heavy Electricals Ltd., India
madhusoodana@yahoo.com

Manabu Fukushima
National Institute of Advanced Industrial Science and Technology, Japan
manabu-fukushima@aist.go.jp

T3.5 Advanced Sensors for Energy, Environment and Health Applications

The goal is to bring together researchers from a wide range of disciplines from Engineering to Science and Technology. The symposium will be devoted to recent developments in materials, methods and materials integration into appropriately designed devices for the detection or measurement of various stimuli, including physical parameters and single or multiple inorganic, organic and biological species over a range of temperatures and concentrations ranging from sub-ambient to high temperatures and from micro-molar to several percent, respectively.

The sensor could be electrochemical, semiconducting, impedimetric, amperometric, capacitive, tomographic, optical, magnetic, acoustic, piezoelectric or a combination of these and any others. The sensors could be invasive or non- invasive type for enhancing productivity, quality, process automation, safety, security and health. Abstracts focusing on sensing signal processing, mechanisms, kinetics, modelling, simulation, new sensing materials, structures, and design, fabrication, process control and automation, packaging and applications of sensors are welcome.

Proposed Session Topics

- Chemical sensors for monitoring harsh environments
- Biosensors for preventative healthcare and point of care diagnostics
- Piezoelectric and acoustic sensors
- Sensor materials, methods, mechanisms
- Emerging sensing technologies, applications and future challenges
- Sensors for safety, security and health
- Sensors for explosive materials and performance enhancing drugs in sports
- Sensors for food safety
- Sensors for oil and gas industries
- Sensors for in-line process diagnostics
- Sensors for extreme, corrosive and harsh environments
- Sensors for marine, mines and space applications
- Sensor reliability and reproducibility
- Wearable wireless technologies for remote sensing, monitoring and actions
- Sensor manufacturing, packaging and integration
- Data acquisition and real-time process monitoring, evaluation, feedback and control
- Theory, Modelling and Simulation

Symposium organizers

Girish Kale - Faculty of Engineering and Physical Sciences, University of Leeds, UK
Nobuhito Imanaka - Osaka University, Japan
Ho Won Jang - Department of Materials Science and Engineering, Seoul National University, Republic of Korea
Kui Yao - Institute of Materials Research and Engineering (IMRE), Singapore
Sheikh Akbar - Ohio State University, USA
Milind Kulkarni - C-MET, India
Jong-Huen Lee - Korea University, Korea
Li Xiangcheng - Wuhan University of Science and Technology, China
Radu Ionescu - Estonian University of Life Sciences, Estonia

Points of contact

Girish Kale
Faculty of Engineering and Physical Sciences
University of Leeds, UK
g.m.kale@leeds.ac.uk

Ho Won Jang
Seoul National University
Republic of Korea
hwjang@snu.ac.kr

T3.6 Advanced Materials and Membrane Technologies for Sustainable Water Purification and Desalination Systems

The state-of-the art membrane-based separations for water purification and desalination have been increasingly researched to address the global challenges of water scarcity and the pollution of water environments. Recent advances in methods for controlling the structure and chemical functionality in polymer or ceramic films can potentially lead to new classes of membranes for water purification. The symposium is addressing to the recent membrane technologies for water purification and desalination, highlight their inherent limitations and establish the urgent requirements for next-generation membranes. Finally, we highlight promising membrane surface modification approaches that minimize interfacial interactions and enhance fouling resistance.

Proposed Session Topics

- Microfiltration, ultrafiltration and nanofiltration
- Reverse osmosis
- Forward osmosis
- State-of-the-art membranes for water treatment
- Thin-film composite polyamide membranes
- Self assembling materials, graphene
- Designing fouling-resistant membrane
- Ceramic membranes

Symposium organizers

György Székely - King Abdullah University of Science and Technology, Saudi Arabia
Nándor Nemestóthy - University of Pannonia, Hungary
Chanhyuk Park - Ewha Womans University Korea, Korea
Ashok Vaseashta - International Clean Water Institute, USA

Points of contact

György Székely
King Abdullah University of Science and Technology, Saudi Arabia
gyorgy.szekely@kaust.edu.sa

Nándor Nemestóthy
University of Pannonia, Hungary
nemestothy.nandor@mk.uni-pannon.hu

T4.1 Computational Design and Modeling

Recent progress in computational materials science has significantly enhanced the efficiency with which the understanding of fundamental phenomena, the improvement of materials performance, the discovery of new materials, and the design of structural and functional components can be achieved. This symposium will focus on the design and modeling of ceramics and composites with tailored properties so as to further optimize their behavior. A broader perspective is desired that includes the interests related to the ceramic genome, design for new innovative phases and components, integrated computational engineering, prediction of the structure and properties of crystals and defects, modeling materials behavior under extreme/harsh environments, application of novel simulation methods for materials processing and performance, and simulation of ceramics for energy and environmental applications.

Proposed Session Topics

- Ceramic genome
- Computational engineering of integrated materials
- Multi-scale modeling approaches
- Modeling and design of ceramics for energy and environmental applications
- Modeling materials behavior under extreme/harsh environments (ultrahigh temperature, radiation, environmental damages and severe load and stresses)
- Prediction of the crystal structure and properties of new ceramics
- Modeling defects and amorphous matter

Symposium organizers

Jingyang Wang - Institute of Metal Research, Chinese Academy of Sciences, China
Gerard L. Vignoles - University of Bordeaux, France
Sergei Manzhos - Tokyo Institute of Technology, Japan
Wai-Yim Ching - University of Missouri-Kansas City, USA
Kwang-Ryeol Lee - Korea Institute of Science and Technology, Korea
Hans J. Seifert - University of Karlsruhe, Germany
Sean Smith - The University of New South Wales, Australia
Isao Tanaka - Kyoto University, Japan
William J. Weber - University of Tennessee, USA
Qingfeng Zeng - NWPU Xi'An, China
Emmanuel Baranger - Lab of Mechanics of Paris-Saclay University, France
Olivier Dezellus - Lab of Materials & Interfaces, University of Lyon, France
Christophe Martin - Science & Engineering of Materials & Processes Institute (SIMaP), CNRS & University of Grenoble, France
Olivier Masson - Research Institute on Ceramics, IrCer, Limoges, France

Points of contact

Jingyang Wang
Institute of Metal Research, Chinese Academy of Sciences, China
jywang@imr.ac.cn

Gerard L. Vignoles
University of Bordeaux, France
vinhola@lcts.u-bordeaux.fr

T4.2 Additive Manufacturing & 3-D Printing Technologies

Additive manufacturing (AM) and 3D printing (3DP) are novel manufacturing processes of ceramic components with functional properties. The processes allow for innovative complex part manufacturing, client customization, rapid prototyping, and distributed manufacturing. Three-dimensional models are designed according to theoretical concepts in computer graphic applications, and two-dimensional cross sections are created automatically by slicing operations. Different technologies employing various consolidation methods have been developed, including vat polymerization, binder jetting, selective laser sintering, extrusion-based approaches volumetric additive manufacturing, robotic arm manufacturing and multi-material additive manufacturing.

Various functional components such as dielectric lattices to control electromagnetic waves, biomaterials components for medical applications and ceramic electrodes with large surface area have been developed. Large scale structural components for aerospace and other high temperature applications can be fabricated with internal cooling path networks formed without casting molds. This symposium will focus on the superiority of design, efficient processing, and advanced applications of additive manufacturing and 3D printing processes.

Proposed Session Topics

- Selective laser sintering (SLS)
- Vat photopolymerization technologies (DLP, SLA, TPP, VAM)
- Binder Jetting (BJ)
- Extrusion-based technologies (DIW, FDM)
- Laminated object manufacturing/green tape stacking
- Ink jet printing technologies
- Emerging additive manufacturing technologies and multi-material AM

Symposium organizers

Paolo Colombo - University of Padova, Italy
Soshu Kirihara - Osaka University, Japan
Majid Minary - University of Texas at Dallas, USA
Hui-Suk Yun - Korea Institute of Materials Science (KIMS), Korea
Richard Gaignon - 3DCERAM SINTO, France
Tassilo Moritz - Fraunhofer-Institut für Keramische Technologien und Systeme (IKTS), Germany
Fabrice Rossignol - IRCER, France
Lisa Rueschhoff - Air Force Research Laboratory (AFRL), USA
Martin Schwentenwein - Lithoz GmbH, Austria
Xiaoyong Tian - Xi'an Jiaotong University, China

Points of contact

Paolo Colombo
University of Padova, Italy
paolo.colombo@unipd.it

Soshu Kirihara
Osaka University, Japan
kirihara@jwri.osaka-u.ac.jp

Majid Minary
University of Texas at Dallas, USA
majid.minary@utdallas.edu

Hui-Suk Yun
Korea Institute of Materials Science (KIMS), Korea
yuni@kims.re.kr

T4.3 Novel, Green, and Strategic Processing and Manufacturing Technologies

The properties and performance of materials largely depend on their processing and manufacturing routes. Recently developed new processing and manufacturing technologies of ceramic materials and systems give us unique properties which cannot be achieved from the conventional routes. On the other hand, we should take into account at least two critical issues in making materials and products. One is that the technologies are “green” or environmentally benign so as to avoid generation of elements and compounds hazardous to the human health and environments and to protect the global environment by preserving energy during the fabrication. The other is that they are “strategic” or using no or less quantity of rare natural resources for stable production. Keeping these aspects in view, the aim of this symposium is to discuss advances in processing and manufacturing technologies for a wide variety of ceramic materials.

Proposed Session Topics

- Green manufacturing; global environmental issues and standards
- Alternative manufacturing processes with lower environmental burden
- Nanotechnology for environmental remediation and protection
- Energy efficient processing
- Education and Learning in sustainable materials processing
- Ecological binder and slurry technologies
- Strategic materials: processing and manufacturing technologies
- Materials recycling for ceramic manufacturing
- Alternatives for rare metals and materials
- Room/low-temperature synthesis
- Aqueous synthesis and processing, colloidal processing
- Polymer-based processing
- Rapid prototyping, patterning, templates and self-assembly
- Large scale/complicated shape processing
- Advanced composite manufacturing technologies, hybrid processes

Symposium organizers

Tatsuki Ohji - National Institute of Advanced Industrial Science and Technology (AIST), Japan
Zhengyi Fu - Wuhan University of Technology, China
Enrico Bernardo - University of Padova, Italy
Henry A. Colorado - University of Antioquia, Colombia
Surojit Gupta - University of North Dakota, USA
Mathias Herrmann - Fraunhofer Institute for Ceramic Technologies and Systems IKTS, Germany
Hisayuki Suematsu - Nagaoka University of Technology, Japan

Points of contact

Tatsuki Ohji
National Institute of Advanced Industrial Science and Technology, Japan
t-ohji@aist.go.jp

Zhengyi Fu
Wuhan University of Technology, China
zyfu@whut.edu.cn

Enrico Bernardo
University of Padova, Italy
enrico.bernardo@unipd.it

T4.4 Powder Processing Technology for Advanced Ceramics

Powder processing is a key technology in the design, development, and production of advanced ceramics and composites. The achievement of materials with application-specific optimized properties for energy and environmental applications requires that all processes from the ceramic powder design, from its synthesis, transformation (e.g. milling, mixing, dispersion, granulation) and shaping, to the final sintering step must all be fully understood and controlled. Indeed, each process step matters in powder technology to engineer a material with desired microstructure and resulting (macro-) properties. In-depth powder technology know-how is also a prerequisite for establishing energy-efficient recycling processes for a variety of materials.

This symposium will focus on the current state-of-the art in powder processing, as well as recent advances in powder processing and manufacturing technologies.

Proposed Session Topics

- Powder design and synthesis
- Composite particle synthesis and particle coating technologies
- Controlled particle dispersion in a liquid or polymer medium
- Novel powder shaping technologies (including self-assembly)
- Novel sintering technologies
- Nano/microstructure control by powder processing
- Powder processing for advanced composite manufacturing
- Powder processing for (hierarchical) porosity control
- Low cost and energy-saving processing of advanced ceramics
- Novel processes for the re-circulation of resources by powder processing

Symposium organizers

Chiharu Tokoro - Waseda University, The Universiy of Tokyo, Japan
Michael Stuer - Empa, Switzerland
Junichi Tatami - Yokohama National University, Japan
Makio Naito - JWRI, Osaka University, Japan
Yuji Hotta - National Institute of Advanced Industrial Science and Technology (AIST), Japan
Wei-Hsing Tuan - National Taiwan University, Taiwan
Tohru Suzuki - National Institute of Materials Science (NIMS), Japan
Jerzy Lis - AGH University of Science and Technology, Poland
Jingxian Zhang - Shanghai Institute of Ceramics, China
Motoyuki Iijima - Yokohama National University, Yokohama, Japan
Yutaro Takaya - The University of Tokyo, Japan
Rodrigo Moreno - CSIC, Spain
Astri Bjørnetun Haugen - Technical University of Denmark, Denmark
Anne Aimable - Ecole Nationale Supérieure de Céramique Industrielle, France

Points of contact

Chiharu Tokoro
Waseda University, Universiy of Tokyo, Japan
tokoro@waseda.jp

Michael Stuer
Empa, Switzerland
michael.stuer@empa.ch

T4.5 Advanced Materials, Technologies, and Devices for Electrooptical and Biomedical Applications

Recent developments in crystalline materials research and development will be presented and discussed at this symposium. From fundamental research and material characterisation to physicochemical aspects of growth, synthesis, and deposition techniques, the symposium will cover every angle, as well as the technological development of industrialized materials. International experts on the various subjects will be asked to discuss their most current work for this purpose. The symopsium's broad focus ensures a thorough overview of the state-of-the art issues relating to crystalline materials aiming to stimulate cross-disciplinary conversations and collaborations in a variety of fields.

Proposed Session Topics

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

Symposium organizers

Kiyoshi Shimamura - National Institute for Materials Science, Japan
Shibin Jiang - AdValue Photonics Inc.
Noboru Ichinose - Waseda University, Japan
Frederic Smektala - University of Burgundy, France
Maurizio Ferrari - Institute for Photonics and Nanotechnologies, Italy
Karine Seneschal-Merz - ASML, Germany
Alain Largeteau - Institute of Condensed Matter Chemistry of Bordeaux, France
Romain Gaume - University of Central Florida, USA
Kenji Toda - Niigata University, Japan
Takayuki Yanagida - Nara Institute of Science and Technology, Japan
Hiroaki Furuse - National Institute for Materials Science, Japan

Points of contact

Kiyoshi Shimamura
National Institute for Materials Science, Japan
shimamura.kiyoshi@nims.go.jp

Shibin Jiang
AdValue Photonics Inc., USA
sjiang@advaluephotonics.com

T4.6 Multifunctional Coatings for Energy and Environmental Applications Applications

This symposium will provide an open forum for scientists, engineers, and practitioners from around the world to discuss the latest advances in coating technologies that can give very new or markedly improved functions onto materials surface in terms of physical, mechanical, thermal, chemical, optical, electrical, electronic, and/or magnetic properties. These functional coatings include thin film technologies such as PVD, CVD, and sol-gel methods, and thick film technologies such as thermal spray, suspension/solution precursor spray, cold spray, and aerosol deposition.

The goal of this symposium is to identify current key issues, effective approaches, and outlook for functional coating technologies and applications through comprehensive discussion on the following proposed topics.

Proposed Session Topics

- Innovative technologies and coatings for automotive and electronic industry
- Functionally graded and nanostructured coatings
- Thermal spray, suspension/solution precursor spray, cold spray, aerosol deposition
- CVD, PVD, sol-gel technologies
- Interface phenomena, adhesion and other fundamentals of coatings
- Technical issues and potential solutions of surface related properties and processes in industries
- Characterization of structural and other properties of coatings
- Next generation production methods for surface engineering
- Surface modification for functional coatings

Symposium organizers

Katalin Balázsi - Centre for Energy Research, Hungary
Andrej Vincze - Slovak Centre of Scientific and Technical Information, Slovakia
Robert Grasin - Robert Bosch Ltd, Romania
Jun Akedo - National Institute of Advanced Industrial Science and Technology, Japan
Christian Mitterer - UNI LEoben, Austria

Points of contact

Katalin Balázsi
Centre for Energy Research
Hungarian Research Network, Hungary
balazsi.katalin@ek-cer.hu

Andrej Vincze
Slovak Centre of Scientific and Technical Information, Slovakia
vincze@ilc.sk

Robert Grasin
Robert Bosch Ltd, Romania
robert.grasin@bosch.com

Jun Akedo
National Institute of Advanced Industrial Science and Technology, Japan
akedo-j@aist.go.jp

T4.7 Materials for Extreme Environments: Ultrahigh Temperature Ceramics (UHTCs) and Nano-laminated Ternary Carbides and Nitrides (MAX Phases) Applications

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

This symposium will focus on design, processing, structure-property relationships, thermal and mechanical properties, oxidation resistance, machining and joining, and stability of UHTCs and MAX phases both from fundamental and application-oriented perspectives.

Proposed Session Topics

- New precursors for powders, coatings, and matrix or fibers of composites
- Structure-property relationships of existing systems
- Materials design, new composition and composites
- Novel processing methods (bulk, coatings and thin films)
- Novel characterization methods and lifetime assessment
- Methods for improving damage tolerance, oxidation and thermal shock resistance
- New methods for joining and machining of components
- Structural stability under extreme environments (irradiation, ultrahigh temperature)

Symposium organizers

William G. Fahrenholtz - Missouri University of Science and Technology, USA
Yanchun Zhou - Aerospace Research Institute of Material & Processing Technology, China
Daniel Doni - Department of Aerospace and Aircraft Engineering, Kingston University London, UK
Miladin Radovic - Department of Materials Science and Engineering, Texas A&M
Erica L. Corral - University of Arizona, USA
Per Eklund - Linköping University, Sweden
Surojit Gupta - University of North Dakota of Materials Science and Engineering, USA
Greg Hilmas - Missouri University of Science and Technology, USA
Sea-Hoon Lee - Korea Institute of Materials Science, Korea
Frederic Monteverde - Institute of Science and Technology of Ceramics - CNR, Italy
Jochen Schneider - Materials Chemistry, RWTH Aachen, Aachen, Germany
Guo-Jun Zhang - Shanghai Institute of Ceramics, Chinese Academy of SciePnces, China

Points of contact

William G. Fahrenholtz
Missouri University of Science and Technology, USA
billf@mst.edu

Yanchun Zhou
Aerospace Research Institute of Material & Processing Technology, China
yczhou@alum.imr.ac.cn

Daniel Doni
Department of Aerospace and Aircraft Engineering
Kingston University London, UK
d.daniel@kingston.ac.uk

T4.8 Design, Processing, and Applications of Nanolaminated Ternary Transition Metal Carbides/Nitrides/Borides and MXenes and Mbenes

These phases are thermodynamically stable nanolaminates of early transition metal carbides/nitrides and borides with an inherently nanolayered crystal structure. Nano-laminated ternary carbides and nitrides are generally named as MAX phases, where M is transition metal, A is A-group element, and X is caron and/or nitrogen. Borides with similar structure are named as MAB phases. The MAX phases are hexagonal materials with an inherent layering at nanoscale. These materials are responsible for a unique combination of metal/ceramic properties. The layers from the MAX and MAB crystal structures, exfoliating the MX and MB nanolaminates to form the respective 2D solids (MXenes and MBenes). Notwithstanding their recent discovery, the 2D MXenes and MBenes combine excellent electrical conductivity with tunable surface functionality, holding great promise for a range of innovative functional applications.

This symposium focuses on the design; processing; structure–property relationships; thermal, electrical, optoelectronic, and mechanical properties; thermodynamic stability; oxidation and corrosion resistance; and radiation tolerance of these nanolaminated compounds, as well as on the potential applications of both their 3D and 2D forms.

Proposed Session Topics

- Design of novel compositions and manufacturing methods
- Methods for improving damage tolerance, oxidation and corrosion resistance, electromagnetic interference, and thermal shock resistance
- Novel applications and device fabrication (electrochemical energy storage, biosensors, etc.) of 2D MXenes and MBenes
- Study of electronic, optical, plasmonic, and thermoelectric properties
- Theoretical calculations to predict thermodynamically stable 3D MAX and MAB phases, 2D MXenes and MBenes, and solid solutions with desired properties
- Nuclear applications of the MAX and MAB phases

Symposium organizers

Miladin Radovic -Department of Materials Science and Engineering, Texas A&M
Surojit Gupta - University of North Dakota of Materials Science and Engineering, USA
Jochen M. Schneider - RWTH Aachen University, Germany
Konstantina Lambrinou - University of Huddersfield, UK
Thierry Cabioch - Université de Poitiers, France
Sylvain Dubois - Université de Poitiers, France
Per Eklund - Linköping University, Sweden
Johanna Rosén - Linköping University, Sweden
Chenxu Wang - Peking University, China

Points of contact

Miladin Radovic
Department of Materials Science and Engineering
Texas A&M, USA
mradovic@tamu.edu

Surojit Gupta
University of North Dakota of Materials Science and Engineering, USA
surojit.gupta@und.edu

Jochen M. Schneider
RWTH Aachen University, Germany
schneider@mch.rwth-aachen.de

T4.9 Ceramic Integration Technologies for Energy and Environmental Applications

Despite having excellent properties, ceramics and Ceramic Matrix Composites (CMCs) are still much less used than metals and polymers for energy and environmental applications such as: energy production systems (fuel cells, thermoelectrics, photovoltaics, nuclear systems, sensors, wind and geothermal, etc.), energy storage and distribution (batteries, phase changing materials, etc.), energy conservation and efficiency (gas turbines, heat exchangers, etc.) and environmental systems (advanced sensors, filters and membranes, etc.). One reason of concern for designers and engineers is the impossibility of welding or riveting ceramics and CMCs together or to other materials. That is why ceramics and CMCs integration to metals and to other materials is more and more considered an enabling technology to obtain more efficient components, devices and structures for energy production and environment. Together with the development of reliable joining materials and technologies, the availability of widely accepted testing methods for joined ceramics and CMCs can also widen their use.

Proposed Session Topics

- Joining of ceramics and CMCs
- Joining of ceramics and CMCs to metals
- Mechanical tests of joined ceramics and CMCs
- Joining at the nano- and micro-scales
- Design and modeling of joints and interfaces
- Joining applications, enabled components and their evaluation in relevant operating conditions

Symposium organizers

Monica Ferraris - Politecnico di Torino, Italy
Jochen Schilm - IKTS-Fraunhofer Institute, Germany
Michael C. Halbig - NASA Glenn Research Center, OH, USA
Rajiv Asthana - University of Wisconsin-Stout, USA
Stefano De la Pierre - Politecnico di Torino, Italy

Points of contact

Monica Ferraris
Politecnico di Torino, Italy
monica.ferraris@polito.it

Jochen Schilm
IKTS-Fraunhofer Institute, Germany
jochen.schilm@ikts.fraunhofer.de

Michael C. Halbig
NASA Glenn Research Center, OH, USA
michael.c.halbig@nasa.gov

T4.10 Environmental Friendly and Energy Efficient Manufacturing Routes for the Production Root Technology Applications

"Production Root Technology" symbolically refers to an integration of six production technologies, casting, molding, forming, welding, heat treatment, and surface treatment. The Production Root Technology includes both materials development and process technologies, which strongly influence the final products quality. In recent years, major issues have been raised about the impact of production root technology on green and sustainable growth through the development of environment-friendly and energy-efficient manufacturing processes. Additionally, industry has prioritized recycling and resource management of the various materials including critical and rare materials. This symposium is designated to serve as a forum for the world's leading scientists and engineers from diverse fields to exchange ideas and build collaborative partnerships to develop of environment-friendly and energy- and resource-efficient Production Root Technology.

Proposed Session Topics

- Environment-friendly & low-emission processes
- Energy control issues & energy-efficient processes
- Recycling and resource management
- Smart usage of ceramics, composites and other materials
- Rapid and innovative processing routes
- Advanced and hybrid processes for novel materials

Symposium organizers

Asthana Rajiv - University of Wisconsin-Menomonie, USA
Natalie Sobczak - AGH University of Krakow, Poland
Sung-Wook Mihn - Kyonggi University, Korea
Dechang Jia - Harbin Institute of Technology, China
Martin Fehlbier - Institut für Produktionstechnik und Logistik, Germany
Sang Mok Lee - Korea Institute of Industrial Technology, Korea
Tadachika Nakayama - Nagaoka University of Technology, Japan
Joonho Lee - Korea University, Korea

Points of contact

Asthana Rajiv
University of Wisconsin-Menomonie, USA
asthanar@uwstout.edu

Natalie Sobczak
AGH University of Krakow, Poland
nataliesobczak@interia.pl

Sung-Wook Mihn
Kyonggi University, Korea
hyeleci@gmail.com

T4.11 Hybrid and Bio-inspired Materials

The Symposium intends to bring together chemists, materials scientists, physicists, and engineers from both academia and industry to share information on the Bio-Inspired and Hybrid Materials. It includes all types of bio-inspired materials and organic/inorganic hybrid materials, their properties and applications. The research topics include all types of synthesis, processing techniques (molecular crystals, multilayers, self-assemblies, and ultrathin films), compounds (composites and blends), micro- and nano-fabrication, interfaces, spectroscopic characterization (linear and non-linear), morphology, electronic, and photonic properties.

Proposed Session Topics

- Processing and forming for the hybrid materials
- Organic/inorganic hybrid materials
- Simulations, characterization and applications of hybrid materials
- Nanoparticles, nanosheet, nanofiber and nanotube materials
- Multifunctional material, complex functional materials and multidisciplinary
- Advanced manufacturing technologies, patterning and self-assembly
- New concepts for the multi-disciplinary R&D and applications

Symposium organizers

Yogendra Kumar Mishra - University of Southern Denmark, Denmark
Zoltán Kónya - University of Szeged, Hungary
Sanjay Mathur - University of Köln, Germany
Malgorzata Kujawska - Poznano University of Medical Sciences, Poland
Angel Serrano Aroca - University of Valencia, Spain
Murtaza Tambuwala - University of Lincoln, UK
Su Ryon Shin - Harvard Medical School, USA
Hélder A. Santos - University Medical Center Groningen
University of Groningen, The Netherlands
Alireza Dolatshahi-Pirouz - DTU-Health, Technical University of Denmark
Julien E. Gautrot - Queen Mary University of London, UK
Ajeet Kaushik - Florida Polytechnique University, USA
Adarsh Pandey - Sunway University, Malaysia
Zeynep Altintas - Kiel University, Germany
Shabir Hassan - Khalifa University, Abu Dhabi, UAE
Yun Suk Huh - Department of Biomedical Engineering,
Inha University, South Korea
Gorka Orive - Department of Pharmacy,
University of the Basque Country, Spain
Vivek Pachauri - RWTH Aachen University, Germany
Amirali Popat - University of Queensland, Australia
Robert Vajtai - Rice University, Houston, TX, US

Points of contact

Yogendra Kumar Mishra
University of Southern Denmark, Denmark
mishra@mci.sdu.dkp

Zoltán Kónya
University of Szeged, Hungary
konya@chem.u-szeged.hu

T4.12 Graphene and 2-D materials

This symposium focuses on the frontiers of fundamental and applications of two-dimensional (2-D) materials and carbon nanomaterials. Examples of carbon nanomaterials include carbon nanotubes, nanodiamonds, graphene, and fullerenes. Graphene has received worldwide attention as result of the 2010 Nobel Prize for physics and the exceptional properties and growing number of applications of graphene. This symposium further expands this to the 2-D family of nanomaterials, which includes chalcogenide (sulfide, selenide, and telluride) materials with bandgaps comparable to conventional group IV or group III-V semiconductors, and MXenes (transition metal carbides and carbonitrides with 2D Mn+1Xn layers).

This symposium aims to focus on a wide range of spectrum, ranging from the preparation of composites by the combination of carbon nanostructures and/or 2D materials with inorganic or organic compounds to applications areas of energy, electronic devices, environmental science, nanomedicine, and sensing. A part of this symposium focuses on the development of new functional composite materials with unique properties. These composite materials will have important roles in nanotechnology engineering as well their application in different technological areas.

Proposed Session Topics

- Synthesis of 2-D and carbon nanomaterials
- Creation of atomic layers of 2-D materials by exfoliation/delamination and unzipping of 3-D materials
- Surface chemistry, surface functionalization
- Inorganic/organic hybrid composites
- Structural, electrical, mechanical, and optical characterization of 2-D materials
- Electronic and optical properties
- Carbon and 2-D materials based devices
- Electronics applications
- Biomedical applications
- Energy production and storage
- Sensing applications
- Computational methods in the design of tailored nanostructured materials
- Electronic band structure, and transport theory and modeling of 2-D crystals
- General properties of 2-D-layered oxides, carbides, nitrides, and sulfides
- New physical and chemical properties of 2-D materials

Symposium organizers

Jesus Gonzalez Julian - RWTH Aachen University, Germany
Andreas Kailer - IKTS Freiburg, Germany
Pavol Hvizdos - Institute of Materials Research, Slovak Academy of Sciences, Slovakia
Wei Chen - National University of Singapore, Singapore
Edo Goki - National University of Singapore, Singapore
Wencai Ren - Institute of Metal Research, Chinese Academy of Sciences, China
Ziqi Sun - The Queensland University of Technology, Australia
Hua Zhang - Nanyang Technological University, Singapore
Irina Hussainova - Technical University Tallin, Estonia
Cristina Ramirez - Instituto de Ceramica y Vidrio, Spain

Points of contact

Jesus Gonzalez Julian
RWTH Aachen University, Germany
gonzalez@ghi.rwth-aachen.de

Andreas Kailer
IKTS Freiburg, Germany
andreas.kailer@iwm.fraunhofer.de

Pavol Hvizdos
Institute of Materials Research
Slovak Academy of Sciences, Slovakia
phvizdos@saske.sk

T5.1 Global Innovations in Biomaterials, Biomanufacturing, and Biotechnologies

Biomaterials science and biomedical engineering have sustained as a frontier and growing area of research and innovation within the engineering science community in the world; considering the number of scientific discoveries and their societal impact. Significant attempts on bioceramics and composites have been made to re-create functional musculoskeletal systems with considerable potential to treat various types of human diseases, to fabricate high-performance bio-inspired and biomimetic materials, to confer new properties to materials and improve their performances, to innovate new materials synthesis methods and manufacturing technologies, etc.

This symposium will provide a platform to facilitate discussion among researchers from academia, hospitals, industry and medical device companies, involved in biomaterials, biomanufacturing, and biotechnological innovation, while inspiring many young researchers in this emerging field.

Proposed Session Topics

- 3D printing of Bioceramics
- Bioceramics for Regenerative Bioelectronics
- Porous bioceramics
- Bio-synthetic interfaces
- Biomineralization
- Bioactive and resorbable ceramics and composites
- Bio-inspired and biomimetic ceramics and composites
- Tissue-material interactions
- Self-assembled bioceramics
- Ceramics for drug and gene delivery
- Antimicrobial bioceramics and composites
- Dental bioceramics and composites
- Magnetoactive bioceramics
- Ceramic biosensors

Symposium organizers

Bikramjit Basu - Indian Institute of Science, India
Zhaoyong Zou - Wuhan University of Technology, China
Cristina Balagna - Politecnico di Torino, Italy
Csaba Balázsi - Centre for Energy Research, Hungary
Ashutosh Kumar Dubey - Indian Institute of Technology, India
Annabel Braem - Katholieke Universiteit Leuven, Belgium
Katalin Balázsi - Centre for Energy Research, Hungary
Marc Bohner - RMS Foundation, Switzerland
Yuri Dekhtyar - Riga Technical University, Latvia

Points of contact

Bikramjit Basu
Indian Institute of Science, India
bikram@iisc.ac.in

Zhaoyong Zou
Wuhan University of Technology, China
zzou@whut.edu.cn

Cristina Balagna
Politecnico di Torino, Italy
cristina.balagna@polito.it

Csaba Balázsi
Centre for Energy Research
Hungarian Research Network, Hungary
balazsi.csaba@ek-cer.hu

T5.2 Global Young Investigator Forum

The Global Young Investigators Forum aims to bring together students, postdoctoral researchers, young professionals, and early career faculty from around the world to showcase their research and promote scientific discussions to identify and tackle emerging global challenges at the forefront of ceramic science and engineering research. The Forum dedicated symposium and poster session are a platform to support networking among young professionals, fostering global cooperation to approach current and future challenges in ceramic science and technology.

Symposium organizers

Thomas Fischer - Institute of Inorganic Chemistry, University of Cologne, Germany
Wei Ji - Wuhan University of Technology, China

Points of contact

Thomas Fischer
Institute of Inorganic Chemistry
University of Cologne, Germany
t.fischer@uni-koeln.de

Wei Ji
Wuhan University of Technology, China
jiwei@whut.edu.cn

T5.3 Energy Policy with participation

Energy Policy symposium is addressing the policy implications of energy supply and use from their economic, social, planning and environmental aspects.

The aim is to create a dialoque between decision makers and researchers. The main questions as „What insights can research offers today´s problems?" or „What new knowledge do industry and goverment need, how can research best contribute and how should it be communicated?" will be discussed.

Symposium organizers

Katalin Balázsi - Centre for Energy Research
Hungarian Research Network, Hungary
Csaba Balázsi - Centre for Energy Research,
Hungarian Research Network, Hungary

Points of contact

Katalin Balázsi
Centre for Energy Research
Hungarian Research Network, Hungary
balazsi.katalin@ek.hun-ren.hu

Csaba Balázsi
Centre for Energy Research
Hungarian Research Network, Hungary
balazsi.csaba@ek.hun-ren.hu

T5.4 Women in Ceramics

Scientists are professionals engaged in the conception or creation of new knowledge. Women scientists are leading ground-breaking research across the world. Overall, women account for a minority of the world's researchers. Only 11 % of senior research roles are held by women in Europe. Despite the growing demand for cross-nationally-comparable statistics on women in science, national data and their use in policymaking often remain limited.

The Women in Ceramics symposium will feature a panel of women with diverse perspectives and experiences in the field of ceramics. The symposium will focus on invited presentations and a brief panel-led discussion focusing on experiences.

The main goals will show the best practices for effectively addressing barriers for increased diversity, inclusions in ceramics, materials science and the broader fields of science, technology.

Proposed Session Topics

- Diversity
- Carrier and family balance
- Childcare for help of women researchers
- Good practices

Symposium organizers

Valerie Wiesner - NASA Langley Research Center, USA
Jie Zhang - Shenyang National Laboratory for Materials Science Institute of Metal Research, Chinese Academy of Sciences, China
Katalin Balázsi - Centre for Energy Research, Hungarian Research Network, Hungary

Points of contact

Valerie Wiesner
NASA Langley Research Center, USA
valerie.l.wiesner@nasa.gov

Jie Zhang
Institute of Metal Research
Chinese Academy of Sciences, China
jiezhang@imr.ac.cn

Katalin Balázsi
Centre for Energy Research
Hungarian Research Network, Hungary
balazsi.katalin@ek.hun-ren.hu

T5.5 Satellite Events

SE1: Budapest Research reactor visit

The aim of this event was to visit the Budapest Research Reactor which has been utilized as a neutron source for research and various industrial and medical applications. Irradiations are performed in vertical channels (the reactor has more than 40 channels that can be used for isotope production and material testing) whereas physical experiments are carried out at the horizontal neutron beam ports.

Venue: Centre for Energy Research, Hungarian Research Network

SE2: Industrial presentations

Smart manufacturing systems are realizing the promise and potential of Industry 4.0 that enables any product to be made at the smallest possible cost, the highest quality, and the lowest environmental impact for industrial ceramics. The industrial exhibitors will present the novelties helping the ceramic research and developments.

SE3: Publisher presentations

How to prepare the good scientific paper? In this round table disscusion, you will outline a complete scientific paper, choose an appropriate journal to which you'll submit the finished paper for publication, and prepare a checklist that will allow you to independently judge whether your paper is ready to submit.

SE4: Additive manufacturing of ceramics, presentations

Additive manufacturing has the potential to disrupt the ceramic industry by offering new opportunities to manufacture advanced ceramic components without the need for expensive tooling, thereby reducing production costs and lead times and increasing design freedom. The exhibitors in field of additive manufacturing will present the novelties help the ceramic developments.

SE5: Ceramic Art, Design and Global Impact

The aim of the topic is the interconnection of materials, transformation of ceramic process to art. The topic will bring together international ceramic artists and specialists from the universties, crafts and institutions share their view and present their thoughts of future developments in ceramics art.

Different topics will be demostrated: Art, Design, Technology and Reconsideration of new ceramics

Symposium organizers

Katalin Balázsi - Centre for Energy Research
Hungarian Research Network, Hungary
Csaba Balázsi - Centre for Energy Research,
Hungarian Research Network, Hungary

Points of contact

Katalin Balázsi
Centre for Energy Research
Hungarian Research Network, Hungary
balazsi.katalin@ek.hun-ren.hu

Csaba Balázsi
Centre for Energy Research
Hungarian Research Network, Hungary
balazsi.csaba@ek.hun-ren.hu

CONTACT
Krisztina Tóth
Conference Secretariat
cmcee14@akcongress.com