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Montecatini Terme - Italy • June 8-20/2014

CIMTEC 2014

13th International Ceramics Congress

June 8-13/2014

6th Forum on New Materials

June 15-20/2014

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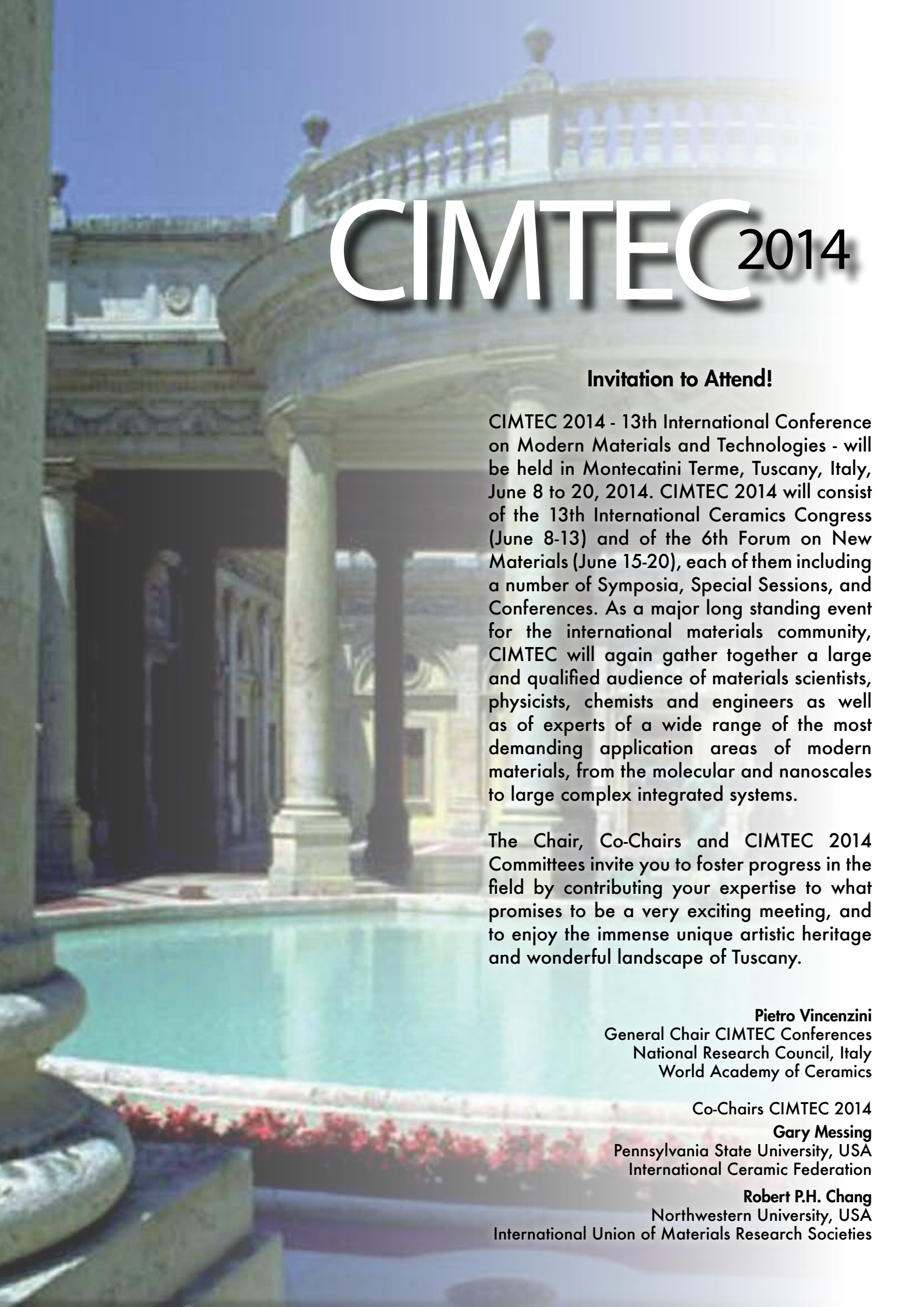

CIMTEC 2014

Invitation to Attend!

CIMTEC 2014 - 13th International Conference on Modern Materials and Technologies - will be held in Montecatini Terme, Tuscany, Italy, June 8 to 20, 2014. CIMTEC 2014 will consist of the 13th International Ceramics Congress (June 8-13) and of the 6th Forum on New Materials (June 15-20), each of them including a number of Symposia, Special Sessions, and Conferences. As a major long standing event for the international materials community, CIMTEC will again gather together a large and qualified audience of materials scientists, physicists, chemists and engineers as well as of experts of a wide range of the most demanding application areas of modern materials, from the molecular and nanoscales to large complex integrated systems.

The Chair, Co-Chairs and CIMTEC 2014 Committees invite you to foster progress in the field by contributing your expertise to what promises to be a very exciting meeting, and to enjoy the immense unique artistic heritage and wonderful landscape of Tuscany.

Pietro Vincenzini
General Chair CIMTEC Conferences
National Research Council, Italy
World Academy of Ceramics

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CIMTEC 2014

Montecatini Terme, June 8-20, 2014

13th International Ceramics Congress
June 8-13, 2014

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June 15-20, 2014

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Symposium CA

Ceramic Powders: Advances in Synthesis, Processing and Manufacturing

Despite the variety of emerging processing methods today available, the classical powder route keeps up its prevalent role in the mass production of advanced ceramics, R&D being especially focused in innovative synthesis of high performing (nano)powders and their processing with highly reliable, cheaper and clean production cycles to obtain materials with properties tailored to an expanding range of applications in several high-tech fields.
Novel techniques and rational improvements of the conventional methods for powder synthesis; refined meso- and nano-scale characterisation of ultra fine powders coupled with an accurate control of surface chemistry and inter particle forces in colloidal processing; advances in forming techniques and green body characterisation and processing; state-of-the-art sintering theory and practice to approach a rational design of micro(nano)structure and desired performance in the final products are main topics for this symposium. Innovations in manufacturing and general issues of green technology and soft processing will be objects of discussion as well.

Session Topics

CA-1 Advances in powder synthesis and characterisation

Powder Synthesis
Solid state techniques
Solution processes (coprecipitation, polymer complex method, Pechini method, etc.)
Sol-gel and related processes
Hydrothermal and solvothermal processes
Synthesis by liquid phase and gas-phase reactions, aerosols and emulsions
Melt quenching
Combustion synthesis (flame/solution/SHS)
Laser/microwave/plasma/mechanical/ultrasound-assisted synthesis
Electrochemical/photochemical/sonochemical synthesis
Template synthesis

Powder characterisation
Structure
Phase composition, chemical homogeneity
Morphology, state of aggregation
Packing, flowability, sinterability, reproducibility
Surface Properties

CA-2 Colloidal processing

Surface chemistry
Surfactants, dispersants, complex agents
Control of interparticle forces
Suspension rheology
Slurry technology
Novel additive systems
Agglomerate softening/removal
Moulding, casting, gel-casting

CA-3 Shape forming and consolidation mechanisms

Surface chemistry in ceramic forming
Role of and new processing aids
Conventional and microwave drying
Advances in shape forming (pressing, moulding, slip/tape casting, plastic forming,..)
Near-net-shape (injection moulding, gel casting,...)
Direct consolidation processing
Forming of large/complex shape components
Green body characterisation and processing
Computer-aided processing
Modelling and simulation of forming and consolidation

CA-4 Sintering, grain growth and microstructure evolution

Free sintering (solid state, liquid phase, transient-liquid sintering)
Reaction bonding
Pressure(stress)-assisted densification (GPS,HP,HIP)
Constrained sintering
Nanoscale sintering
Effective grain growth and micro(nano)structural evolution control approaches
Scanning probes in refined interfaces characterisation
Simulation of sintering and interface dynamics
Nano/micro structure control by powder processing
Properties/structure relationships

CA-5 Innovation in fabrication and technology

Novel approaches and general directions of green manufacturing
Case studies of industrial concern from powder synthesis to final product
Innovative concept and technology to overcome demerits of powder processes

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Symposium CB

Progress in Non Conventional and Novel Manufacturing Routes to Ceramics

This symposium will cover recent progress and emerging novel approaches in a selected number of non conventional or novel processing techniques capable of embodying ceramic materials with unique properties not achievable or difficult to be achieved with conventional methods and/or provide simplified and/or environmentally benign and energy saving "green" processing routes. Covered will be dense or porous materials, functional nanoparticles*, fibers, thin and thick films, and laminated, composite, graded and hybrid structures that are capable to offer a variety of innovative functions enabling improved electronic, dielectric, magnetic, optical, electrochemical, biomedical and structural applications. Mechanisms and kinetics of processes, new directions and challenges for the design at atomic/molecular scale of complex high performing, micro-, meso- and macro-structures with optimized properties will be enlightened as well as advances on the state-of-the-art computation applied to the design of materials and processing, novel characterization and imaging tools and ongoing and forecast applications.

Session Topics

CB-1 Solution-based processing

Science and technology of solution-based processing of:
functional nanoparticles
fibres
thin film devices, coatings, membranes
bulk porous and mesoporous materials
aerogels
nanocomposite and hybrid structures
Functional characterisation and application:
mechanical
electronic, dielectric, magnetic, optical
chemical, electrochemical
biomedical

** Contributions dealing with the synthesis of nanopowders for sintering purposes by the classical ceramic route may be more appropriately submitted to Symposium CA-Ceramic Powders: Advances in Synthesis, Processing and Manufacturing*

CB-2 Polymer derived ceramics

Design and synthesis of novel preceramic polymers
Conversion mechanisms to oxide and non-oxide ceramics
Innovation in fabrication methods for monoliths, fibers, composites, hybrid materials, coatings, membranes, foams
Microstructure characterisation
Structural and functional properties
Thermodynamics and modelling of materials, processes and functions
PDCs devices and components for application

CB-3 Electrophoretic forming

Colloidal stability and deposition kinetics control
Magnetic field assisted EPD
Constrained drying and sintering
Thin films, superlattices coatings, bulks, laminates, composites, hybrids, FGMs, nanostructured materials, nanotubes...
Structural and functional characterisation
Materials and process modelling
Process scale-up and applications of EPD materials and components

CB-4 Microwave processing

Advances in the understanding of microwave-materials interaction
Dielectric properties measurement
Temperature control during microwave processing, non contact temperature sensing systems
Microwave assisted synthesis, deposition processes, melting, joining, surface sealing
Microwave sintering of oxide and non-oxide ceramics, and composites
New theories, and modelling of materials and processes
Structural and functional characterisation of materials
Advances in production techniques (hybrid heating, sintering in inert atmosphere..)
Scale-up of microwave processing and application

CB-5 Spark Plasma and Flash Sintering

5.1 Spark Plasma Sintering (SPS)

SPS mechanisms and control
Process optimisation
Non equilibrium phases
SPS nanomaterials, composites, coatings, joints
Modelling of process and materials
Materials characterization and performance

5.2 Flash Sintering

Thermodynamics and kinetics of flash heating.
Process control parameters and transient phenomena in Flash Sintering
Mechanisms of charge transport and chemical diffusion
Influence of powder grain size and stoichiometry, and of green body texture
Stress assisted flash sintering
Potential and limits

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CB-6 Bio-inspired Processing
Biomineralization
Self-assembly
Bioclastic processing
Sol-gel
Soft lithography
Layer-by-layer deposition
Biomolecule/material interactions
Smart bioresponsive materials
Materials and process modelling and simulation
Bio-inspired materials design vs applications

CB-7 Solid Freeform Fabrication
Selective Laser Sintering
Laminated Object Manufacturing (LOM)
Fused Deposition Modelling
Stereo lithography
3D-printing
Ink-jet printing
Extrusion Free Forming

CB-8 Other non traditional or novel routes
Ultra-high Pressure Materials Synthesis and Processing
Microgravitational Proceesing
Directional Solidification from Eutectics
Controlled crystallization of Undercooled Glasses
Direct Consolidation
Others

Special Session CB-9

SHS Ceramics

The remarkable improvements in the SHS process underwent within the last few years have expanded substantially the field of application of SHS as an effective, simple, low-cost method for the production of various industrially useful ceramics. A variety of high performing nanopowders and (multi)layered nanostructures of nitrides, carbides, cermets and complex mixed oxides is to day being produced and exploited in such diverse field as metal working, biomedical implants, solid state lighting, catalytic systems as well as in advanced functional devices. Aim of this Special Session, following those on the same subject held in previous CIMTEC Conferences, is to overview recent achievements in the theory and modelling of the self-combustion process, in the design, processing and applications of SHS ceramic-based material and enlighten perspectives for a more effective penetration of the SHS technology in the industry.

Session Topics

CB-9.1 Conceptual analysis of structural macrokinetics in SHS-processes
CB-9.2 Experimental and mathematical modeling of SHS-processes
CB-9.3 Theoretical and experimental investigation in structure transformation (phase composition, morphology, crystallization and condensation, etc.)
CB-9.4 SHS materials and compounds (including intermetallic materials, composites)
CB-9.5 SHS as alternative technology
CB-9.6 Models of continuous SHS-processes as a basis of continuous technologies
CB-9.7 Characterization of SHS-products
CB-9.8 Industrialization and commercialization
CB-9.9 SHS-coupled processes (mechanoactivation, solution combustion synthesis, etc.)

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Symposium CC

Materials Solutions for Highly Demanding Tribological Applications

Despite recent advances and great scientific knowledge gained on the bulk mechanical properties and behaviour of advanced engineering materials, their surface properties, such as friction and wear still remain as the main limiting factors for the performance, efficiency, reliability and environmental compatibility in a myriad of industrial applications ranging in size from nano-to macro-scales and involving literally no-contact to severe contact situations as well as extreme temperatures, pressures, and harsh environments.
Computer simulations and in-situ real time experiments performed to exploit forces and dissipative mechanisms at the atomic scale where friction and wear have their roots, coupled with multiscale simulation and modelling at atomistic, mesoscale, and continuum range may be the key to the design and development of new tribological materials that can ultimately meet increasingly more stringent operating conditions of future tribological systems that are expected to provide much higher performance, efficiency, and durability than before.
This Symposium aims to provide a comprehensive update on the progress made in recent years in the fundamental aspects and mechanistic understanding of friction and wear at the micro- and nano-scales. It is hoped that such an in-depth understanding can be used to increase performance, efficiency, and reliability of future materials in a large variety of tribological applications i.e., from NEMS/MEMS to meso-scale mechanical and energy conversion and utilization systems, from manufacturing and biomedical applications to advanced transportation and aerospace systems. Materials covered include coatings and bulk forms of oxide and non-oxide ceramics, including carbides, borides, nitrides, fluorides and sulphides. Recent advances in protective ceramic thin films and thick coatings, metal-ceramic and

polymer-ceramic based multifunctional composites and nanocomposites, as well as fullerenes, graphene, diamond, DLCs and other carbon-based materials, coatings, and composites are also emphasized. Surface nano-texturing or -structuring by high energy beams (ion beams, plasmas, lasers, etc.) and latest solid lubrication approaches for improved tribological performance under extreme conditions and environments will be important topics of this symposium. Modelling and simulation of materials and tribological systems across the different orders of time and length scales are also emphasized.

Session Topics

CC-1 Fundamentals of friction, wear, adhesion, and lubrication
CC-2 Coatings, surface engineering and nanostructuring
CC-3 Friction and wear at micro/nanoscale
CC-4 Biotribology
CC-5 New theory and computer simulations
CC-6 In-situ testing, new test and characterization methods
CC-7 Applications from micro- to macro-scale systems

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Symposium CD

Joining Inorganic Materials at Different Length Scales

Advances in methods for joining materials at macro-, micro- or nano-scale, to provide adequate mechanical coupling, environmental protection or electrical connections to devices and engineering systems are unavoidable needs for a myriad of applications especially those that have to withstand extreme stresses, temperature and chemical environments or to fulfil the needs of the continuing trends to miniaturisation. In order to develop integration methods for emerging materials into advanced components and produce long-term reliable devices, the behavior of material surfaces and interfaces needs to be well understood as their properties ultimately control the reliability of material joints and systems.
This symposium, which follows the ones held on similar subjects at previous CIMTEC Conferences, will discuss fundamental and practical issues of inorganic materials joining, across length scales and from both the experimental and theoretical viewpoints concerning: physical-chemistry of surfaces and interfaces; wetting and interfacial reactions; diffusion and compound formation; adhesion; joining techniques of soldering, brazing, solid state and transient liquid phase diffusion bonding and microwave/laser/electron beam welding; joint characterisation and testing; lifetime and reliability predictions of joints, and their in-service performance.

Developing techniques of nano-joining processes (such as solid-state nano-bonding, femtosecond laser irradiation joining, in-situ or focused e-beam processing, ultrasonic nano-welding ...), their understanding across research disciplines and length scales are challenging steps for faster, more reliable and cheaper routes for nanomaterials integration in micro- and macro-scale devices and systems.
Contributions on every aspect of materials joining, from theory of interfaces to practical issues of joining techniques are welcome. Specific matter on which the Authors are encouraged to concentrate include: i-Modelling of materials joints and processes at different length scales (from atomic scale modelling of interfaces to engineering scale simulations); ii-Experimental and theoretical studies on thermodynamics, diffusion kinetics, wetting and adhesion; iii-Joining of metals, ceramics, glasses, composites to each other or to dissimilar materials; iv-Use of nanoeffects in joining methods and the development of nanostructured joining materials; v-Mechanisms and materials science of nano-joining; vi-Joining of nanostructures such as carbon nanotubes and graphene and their integration into micro- and macro-scale devices and systems vii-Application engineering from micro- to macro-scale.

Session Topics

CD-1 Basic issues
Thermodynamics and kinetics of interface formation
Mechanisms of wetting and adhesion
Theory, modelling and simulation of interfaces

CD-2 Macro-joining
Advances in joining methods and materials
Thermal and chemical stability of joints
Strength, fracture and reliability of joints
Prediction, modification and measurements of residual stresses
Joint modelling, design, characterisation and analysis
New testing methods and NDT of joints

CD-3 Micro-/nano-joining
Mechanisms and materials science of micro-/nano-joining
Nanoscale effects
Micro-/nano-joining techniques
Joint design and analysis
Joining for integration in micro- and macro-scale devices and systems
Energy, functional, biomedical and other ongoing or forecast applications

CD-4 Application engineering
Joining and integration issues at the macro-, micro- and nanoscales in diverse areas
Joining techniques for microelectromechanic systems and microelectronic packaging
Joints for energy applications (nuclear and thermoelectric power, solid oxide fuel cells, etc.)
Joining for structural applications (aerospace, automotive industry, etc.)
Biomedical joints

International Advisory Board

Symposium CE

Innovative Synthesis and Processing of Nanostructured, Nanocomposite and Hybrid Functional Materials for Energy and Sustainability

New materials based on innovative processing technologies continue to enrich our daily comfort and standard of living. Sustainable growth is concerned with the responsible use of chemical products, materials and processes that integrate economic, environmental and socio-political aspects inevitable to address the mega-challenges of our time. In this context, the necessity of developing novel materials that overcome their intrinsic theoretical bulk limits and are able to manifest unprecedented material properties, while keeping the fabrication cost and environmental footprint to a minimum is crucial. Research and development related to controlled synthesis and processing of nanostructured, nanocomposite and hybrid functional materials offers the greatest potential to efficiently contribute to such essential goals, for instance, by discovering processes that are ecological and will enable both energy and resource efficiencies.
This symposium will particularly focus on the functional and multifunctional inorganic materials and techniques that offer advanced processing, improved properties, and low-cost/low-temperature synthesis, with a strong focus on the recent innovation in nanotechnological approaches and the assessment of their industrial impact. In particular, special emphasis will be given to novel synthesis approaches, functionalization, processing, and characterization of nanoparticles, nanowires, nanoscopic films and their heterostructures. Application of nanostructures in catalysis, energy and sensing applications, nanocomposites in structural lightweight materials, nanostructured coatings for photovoltaic, bio-medical and optical applications will form the major scientific thrust areas. It will provide an international forum for the presentation of technological advances, and latest research on the state-of-the-art in innovative processing and device applications of new materials to meet the challenges of sustainable energy and environment technologies. Interested and committed individuals from academia, national laboratories, industries and start-up companies are invited to contribute by submitting their abstracts on the following and related topics.

Session Topics

CE-1 Innovative processing of nano- and heterostructures and films of functional materials
Chemical processing of nanomaterials: electrospinning, plasma-assisted chemical vapor deposition, atomic layer deposition and microwave-enhanced synthesis, sol-gel, and chemical solution techniques
Atom- and energy-efficient processing of advanced nanomaterials and nanocomposites
Innovative techniques for characterization and manipulation of nanostructures
Fabrication of interface-driven functionalities and multi-material heterostructures
Synthesis, functionalization and assembly of nanomaterials and nanocomposites
Scaled-up production of nanomaterials

CE-2 Functional metal oxide nano- and heterostructures

Metal oxides nanomaterials for chemical and biological sensors
Transparent conducting oxides and heterostructures for energy harvesting
Nanostructured oxide and nanocomposites for excitonic solar cells
Anisotropic metal oxide nanostructures for photovoltaics
Piezoelectric nanostructures for self-powered systems
Heterostructures for plasmonic energy transfer
Nanodevices: fabrication and large-scale integration

CE-3 Functional materials and sustainability

Nanomaterials for renewable fuels and energy generation
Nanomaterials for energy storage devices
Nanomaterials for high efficiency usage of energy: photocatalysis, solar hydrogen solid-state lighting and thermoelectrics
Nanotechnology for water purification and desalinisation
Integration of functional metal oxide nanostructures in devices
Industrial production, implementation and commercialization of sustainable systems

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Symposium CF

High and Ultra-High Temperature Ceramics for Extreme Environments

Revolutionary improvements in operating efficiency or performance characteristics require increasingly hostile operating environments. For example, handling of molten metals exposes materials to extreme temperatures, reducing conditions, and thermal shock. Other applications of interest include leading edges for hypersonic aerospace vehicles, flow-path components for advanced aerospace propulsion systems, refractories for steel, glass, and specialty metal processing, and many others. Ceramic materials are candidates for many applications that involve severe temperatures, chemical reactivity, or mechanical stresses.

In recent years, a number of oxide and non-oxide ceramic materials have been investigated for use in extreme environments. This symposium will examine the critical aspects in four different areas: 1) Synthesis and Processing; 2) Corrosion, Oxidation, and Testing; 3) Mechanical and Thermal Properties; and 4) Characterization. The materials of interest comprise a wide range of ceramics including conventional oxide ceramics such as alumina and zirconia to more specialized compositions such as boride, carbide, and nitride materials. The materials of interest can be monolithic, single phase ceramics, porous materials, multi-phase particulate ceramics, or composites. Ternary carbide materials (i.e., the MAX phases) are the subject of a separate symposium and are excluded from this one.

Session Topics

CF-1 Synthesis and processing

Powder synthesis
Production of nano-powders, coatings, and engineered architectures
Carbothermal and borothermal reduction
Polymer derived ceramics and solution synthesis routes
Shape forming methods such as pressing, tape casting, etc.
Net shape forming and rapid prototyping

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Densification kinetics
Pressureless sintering
Spark plasma sintering
Directionally solidified eutectics
In-situ reaction synthesis

CF-2 Corrosion, oxidation, and testing
Thermodynamic modelling and computational tools
Analysis of reaction mechanisms and kinetics
Testing in simulated hypersonic flight conditions or other operational environments
Highly energetic reaction environments
Correlation of laboratory testing to application environments
Simulation and modelling of degradation reactions
Phase equilibria and thermodynamic tools
Non-equilibrium reaction analysis

CF-3 Mechanical and thermal properties
Strength and fracture toughness
Elevated temperature properties
Testing above 1600°C
Finite element simulations and other models
Testing under combined loads (e.g., mechanical and electrical)
New test methods
Ab-initio calculations and other predictive tools

CF-4 Characterization and analysis
Advanced characterization methods
In-situ characterization under extreme conditions
Electron microscopy and high resolution imaging
Emerging characterization tools for structural materials
Spectroscopic methods
Thermodynamic and kinetic studies

Symposium CG

Progress in Nano-laminated Ternary Carbides and Nitrides (MAX Phases) and Derivatives Thereof (MXenes)

This Symposium aims at being an international forum in which the different aspects of the MAX phases and their more recently discovered derivative 2D compounds, viz. the MXenes, are discussed. The MAX phases are layered hexagonal machinable ternary early transition metal carbides and nitrides. Currently the MAX phases number over 60, with new ones, especially 413's and solid solutions still being discovered on a routine basis. The recent realization that it is possible to easily etch the Al layers from some of these phases, to produce 2D solids that have much in common with graphene – hence the label MXene - is a new and exciting development that will in turn greatly enhance interest in and research of both the MAX and MXene phases.
The International Symposium *"Progress in Nano-laminated Ternary Carbides and Nitrides (MAX Phases) and Derivatives Thereof (MXenes)"* will focus on the latest advances in understanding the chemistry/processing/properties/micro-structure relationships of the MAX and MXene phases. The proposed sessions will cover the gamut from density functional theory calculations to transport properties, to new phases, both predicted and synthesized, to ambient and high temperature mechanical properties including creep and oxidation. How the MAX phases are converted to MXene and the properties of the latter will also be covered. Lastly, a session will be devoted to current and potential applications of the MAX and MXene phases.

Session Topics

CG-1 Bulk and thin film transport properties of the MAX and MXene phases
CG-2 New MAX and MXene phases
CG-3 Room temperature mechanical properties of the MAX phases
CG-4 High temperature mechanical, thermal and oxidation properties of the MAX phases
CG-5 MAX and MXene composites and their properties
CG-6 Electronic properties, ab initio calculations and structural characterization
CG-7 Synthesis and fabrication of MAX and MXene phases
CG-8 Functional properties and related applications of the MAX and MXene phases
CG-9 MAX phases in extreme environments
CG-10 Application of the MAX and MXene phases

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Symposium CH

Porous Ceramics for Environmental Protection, Energy-related Technologies and Advanced Industrial Cycles

The focus of this Symposium is to discuss innovative approaches to develop, characterize and apply porous ceramics with a high volume of tailored porosity, ranging in size from Angstroms to millimeters.
These porous ceramics include high surface and cellular architectures such as honeycombs, foams, hollow fibers, fiber networks, membranes, nano-, micro- and meso-porous materials, monoliths and coatings possessing hierarchical porosity, as well as structures produced by additive manufacturing technologies or the replication of biological templates.
Such porous components can find use in a wide range of emerging applications in environmental protection, water purification, energy production and saving, molecular scale sensing, optical devices and a number of advanced industrial applications.
The main topics that will be addressed are:
New materials and synthesis mechanisms
Materials optimization at the nano- and meso-scale
Theory and experimental evaluation of physical and chemical processes related to material functions such as transport phenomena, defect chemistry, interface reactions, separation and catalysis mechanisms, etc..
Novel design and fabrication of components and devices
Evaluation of material/component/ device performance
Advances in testing methods
Modeling of structure and properties of porous ceramics
Application engineering of porous ceramics

Session Topics

CH-1 Novel processing and synthesis of porous ceramics (nano to macro)

CH-2 Physics and chemistry of porous systems
Absorption, capillary phenomena, molecular thermo-dynamics of fluids and intermolecular interactions within the porous network

CH-3 Structure and properties of porous systems
Structure and functional, mechanical and thermal properties; structure/transport/functional properties relationships

CH-4 Advances in the characterization of the porous structure
Adsorption and intrusion porosimetry, thermophotometry, high resolution microscopy, image analysis, scattering techniques, computed tomography, etc.

CH-5 Modeling and simulation of porous structure and properties

CH-6 Applications of porous ceramics
gas filtration and separation
micro filtration and ultrafiltration
catalysis and catalysis supports
membrane reactors
functional applications
energy applications
advanced industrial applications

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Symposium CI

Ceramic Thin Films and Coatings for Protective, Tribological and Multifunctional Applications

This symposium focuses on cutting edge experimental, theoretical and manufacturing issues associated with advanced thin and thick film deposition techniques and surface modification processes. These processes allow the realisation of surfaces with enhanced properties and/or novel multi-functionality; thereby enabling them to meet present requirements and future challenges for more efficient, reliable, inexpensive, and clean applications that serve the technological needs of our society. Of interest are materials systems based on oxide and non-oxide ceramics; new carbons; metal-ceramic, organic-ceramic and nano-composites; and hybrid and graded structures.

Focus will be on:

Advances in deposition, surface modification and nano-structuring techniques

Refined characterisation and properties at meso- to nanoscale

Protective coatings aimed at improving the high-temperature thermal, chemical and physical degradation of components in both oxidising and harsh environments

Thermal barrier coatings (TBCs) to increase the operating temperature of static and dynamic components in advanced gas turbines and in a number of other high temperature applications

State-of-the-art tribological thin films and coatings used in, for example, cutting tool and machining, medical devices, electronic displays, hard disks, optical coatings etc.

Smart and multifunctional thin films and coatings: self-cleaning, anti- microbial, anti-smog, catalytic, electrically/magnetically/optically stimuli-responsive etc.

Modelling, simulation and data-base development for coatings

Session topics

CI-1 Advances in deposition, surface modification and characterisation techniques
Thermodynamics and kinetics, heat and mass transfer and in-situ monitoring of the deposition
Process modelling and simulation
Advances in deposition techniques: CVD/PVD, thermal spraying, sol-gel, self-assembly, lithography, etc.
Ion beam, laser and electron-beam surface processing; thermochemical treatments
Substrate materials, substrate treatments; post-deposition treatments
Advances in characterisation techniques and non-destructive testing

CI-2 High temperature protective coatings in oxidising and harsh environments
Corrosion resistant coatings
Abrasion, erosion resistant coatings
Multifunctional coatings
Coating design, processing, performance
Characterisation of reaction scales
Degradation processes, life-time assessment
Effect of applied stress
Advanced applications in gas turbines, diesel engines fuel cells, aerospace industry, coal
gasification, metal casting…

CI-3 Thermal barrier coatings
Design methodologies
Multifunctional and nano-structured coating systems
Hybrid coatings and new processing methods
Interfacial phenomena
Residual stresses, ageing phenomena, failure mechanisms
Testing and non-destructive evaluation
Modelling and life prediction
Smart TBCs (e.g., self diagnostic, self healing, damping coatings)
Advanced applications in gas turbines, aero-engine parts, fuel cells, etc.

CI-4 Tribological thin films and coatings
Hard single-and multi-layer, graded and nanocomposite thin films and coatings
Surface treatments for friction and mechanical improvement
Adaptive self lubricating coatings
Interfaces and interphases
Hardness, toughness, friction, wear and thermal characterisation
Friction and wear mapping
Nanoindentation and small-scale plasticity
Nano- and microtribology of nanostructured and amorphous films
Machining, cutting and forming tools applications

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Hard coating applications in microelectronics, magnetic recording and optical devices, computer disk drives, inkjet printing, precision instruments, medical devices and implants, automotive, aerospace, industry, agriculture etc.
In-situ diagnostics, multiscale modelling and novel design and testing strategies
Lifetime and reliability issues

CI-5 Smart and multifunctional thin films and coatings

Self cleaning, catalytic, anti-microbial, anti-smog, damping coatings and films
Passive and active coatings that respond to electrical, magnetic, and optical inputs
Coatings that respond to bio-based stimuli
Advanced sensor developments for in-situ monitoring of structural health

CI-6 Modelling, simulation and data-bases for coatings and films

Material data bases for materials and their functionality
Modelling of materials performance, relationship of simulations to performance
Image-based and scattering methods for measuring and modelling ceramic coatings and films

Symposium CJ

Advances in Electroceramics

Improvements in basic knowledge and practical exploitation of their unique properties, has established electrical ceramics as a central and fast developing sector in materials research, resulting in a significant impact on several areas of modern technologies. The increasing demand for even more refined or novel properties hardly to be competitively met by other materials is fuelling the interest for improved or new processing routes and deeper understanding of the fundamental materials science to meet requirements coming from a variety of advanced civilian and defence applications.
Materials with unusually high dielectric constant, with low loss and low temperature resonance coefficient at very high frequencies, lead-free piezoelectrics, multifunctional materials such as multiferroic heterostructures are but some examples of the ongoing developments in the area which massively makes use of the opportunities offered by nanoscience and nanotechnology, and by computational modelling and new theory.

Major focus will be on:
Development of new and more efficient processes, better characterisation tools of bulk, crystalline, glassy and amorphous materials, thin films, multilayers, superlattices, nanomaterials, nanostructures and hybrid materials.

Advances in thin-film and related micro/ nano-fabrication techniques and "bottom-up" approaches that offer the potential for high-density integration of nanoscale devices.

Fundamental mechanisms, novel (multi)functional characteristics and behaviour of materials such as electronic structure, quantum effects, phase transitions, transport phenomena, defects, diffusion, domain structure and switching, grain boundary controlled mechanisms, nanosize effects, surfaces and interfaces, dielectric, piezoelectric, magnetic and optical properties, ageing and fatigue, reliability, fractals, modeling and simulation, etc.

New developments in devices including high energy density capacitors, tunable dielectrics for microwave applications, piezoelectric composites, sensors and actuators, and related integration technologies.

A Special Session will address the state-of-the-art development and application of thin film piezoelectric MEMS and NEMS.

Session Topics

CJ-1 Dielectrics and microwave materials

Fundamentals, synthesis, processing, characterisation
Capacitor dielectrics
Mott insulators
Microwave and millimeter wave dielectrics
Tunable dielectrics
LTCC
New thin film materials and integration technologies
Packaging and interconnect issues

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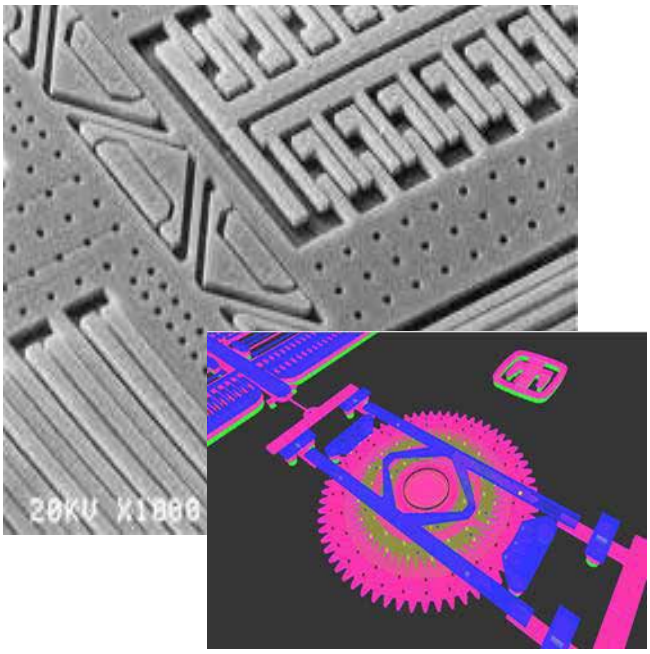
CJ-2 Ferroelectrics, piezoelectrics, pyroelectrics
Synthesis and processing: polycrystalline ceramics and composites, thin/thick films, single crystals, novel materials
Lead-free ferroelectrics and piezoelectrics
Relaxor ferroelectrics
Theory and modelling
Characterisation
Electromechanical behaviour and piezoelectric applications
Thin film devices
Capacitor applications, MLCC
Sensor applications
Novel applications

CJ-3 Multiferroics *
Theory and modelling of magneto-electric phenomena
Advances in materials synthesis and processing
Magneto-electric characterisation
Dynamics of multiferroics
New effects
Devices and applications

CJ-4 Semiconducting ceramics
Amorphous and crystalline semiconducting oxides
Non-oxide semiconductors
Synthesis, processing,characterisation
Defect chemistry, doping mechanisms, carriers origin and dynamics
SnO2-, ZnO-,TiO2-based varistors and sensor applications
NTC/PTC thermistors
Electrochemical applications (sensors, catalysis)
Other ongoing applications
Novel materials and applications

CJ-5 Fast ion-conducting ceramics
Novel synthesis and materials
Ionic and mixed ion-electron conduction mechanisms
Electrochemical characterisation, thermochemical stability
Mechanical and thermal properties
Energy conversion and storage applications
Sensor applications
Other electrochemical applications for, e.g. gas separation processes at high temperature, photocatalysis, electrocatalysis, etc.

**Joint Session with Symposium CK "Functional Magnetic Oxides"*



Special Session CJ-6

State-of-the-art Development and Application of Thin Film Piezoelectric MEMS/NEMS

With the continuous trend of microelectromechanical systems (MEMS) to scaling down to smaller sizes and increased integration density, new materials approaches are explored to meet the demand for newer and more efficient devices. Piezoelectric ceramics thin films and heterostructures, especially those based on wurtzite and perovskite systems, are being identified as promising options to possibly overcome some limits of electrostatically-actuated micro- and nanomechanical structures, in virtue of their effectiveness in providing the adequate linear forces, fast actuation, high displacements at small drive voltages, high integration capability and low power consumption for the realisation of efficient MEMS/NEMS devices.

This Special Session aims at enlightening the state-of-the-art of thin-film piezoelectric MEMS/NEMS, including key materials, growth of piezoelectric thin films and emerging microfabrication techniques for the realisation of highly integrated reliable MEMS/NEMS devices suitable for a broad range of ongoing and prospective applications.

Contributions are expected dealing with the following and related topics:

CJ-6.1 New piezomaterials systems, film growth, multi-layers, heterostructures, characterisation

CJ-6.2 Process modelling, simulation, device design

CJ-6.3 Microfabrication, compatibility issues, packaging, testing, performance, reliability

CJ-6.4 Applications (sensor, actuator, resonator, filter, energy harvesting, piezotronic, ...)

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Symposium CK

Functional Magnetic Oxides

Due to their many active and competing degrees of freedom, functional magnetic oxides show a plethora of phenomena, ranging from complex magnetic ordering to multiferroicity, from fully polarised spin transport to colossal responses to external fields, thus offering a huge potential for both rich basic physics as well as unprecedented technological applications. However, the complexity inherent to various crystal structures, electronic systems, exotic orbital and charge rearrangements, different atomic coordination, relativistic effects, defects, etc. continuously challenge the community working on magnetic oxides. The symposium will therefore gather scientists active in the fields of advanced synthesis and characterization techniques, as well as modeling and "materials-by-design" approaches. The classes of materials addressed will range from manganites to nickelates, from cuprates to ferrites, from cobaltates to other transition metal oxides (including 4d and 5d), from perovskites to spinels. In addition to bulk-related physics, particular attention will be devoted to phenomena occurring under reduced dimensionality (such as oxide-based heterostructures, nanostructures, thin films, superlattices), with emphasis on 2DEG systems, spin transport across oxide interfaces, proximity effects, electronic reconstruction, physics of domains and domain walls. Finally, the symposium will address possible applications of magnetic oxides, in electronics and energy, such as magnetic tunnel junctions, spin torque devices and magnetic refrigerators.

Session Topics

CK-1 Magnetic oxide thin films interfaces and heterostructures
CK-2 Spin transport in magnetic oxides
CK-3 Electronic structure and correlation effects
CK-4 Interplay between spin, charge and lattice degrees of freedom
CK-5 Multiferroic and magnetoelectric compounds
CK-6 Coexistence of superconductivity and magnetism
CK-7 Oxides with diluted magnetic moments
CK-8 Amorphous, nano-crystalline materials and granular materials
CK-9 Novel synthesis and characterization techniques
CK-10 Applications in electronics and energy


Montecatini

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Symposium CL

Inorganic Materials Systems for Optical and Photonic Applications

Optical materials and photonic structures are among the forefront enabling technologies to address successfully social-economical challenges that we are facing in many fields going from health care to security, from energy production and saving to efficient and clean industrial cycles, from environmental protection to fast and efficient communications.
This symposium is to provide insight into the fabrication, characterisation and exploitation of inorganic optical materials and photonic structures based on ceramics (oxides, oxinitrides, fluorides, sulphides, etc..), oxide-organic hybrids, inorganic non-metallic glasses, and ceramic/metal and glass/metal combinations in the form of nanostructured bulk and graded materials and coatings, fibres, thin films and other small confined systems, nanomaterials, nanocomposites and functional nanoparticles.
Focus will be on fundamental principles, modelling, and fabrication technologies of novel adaptive and active material systems for the intelligent management of light including e.g. luminescent and laser materials, smart optical fibres, active plasmonic heterostructures and optical metamaterials, novel confined nano-microstructures, etc. with the aim of underlying possible convergences and interactions among them.

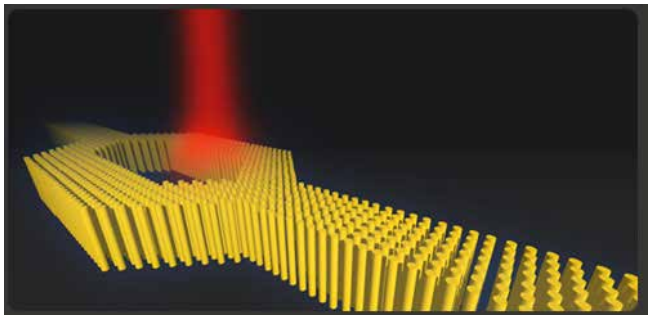
Session Topics

CL-1 Optical materials and photonic structures
- Optically active colloidal nanoparticles, nanowires, nanotubes, nano-micro cavities…
- Nanostructured materials, biomimetic and bio-inspired optically active nanostructures
- Plasmonic nanostructures
- Photonic metamaterials
- Luminescent/chromogenic materials
- Transparent ceramics, electro-optical and magneto-optical ceramics, laser materials, optical fibers, waveguides
- Advanced processing (self assembly, particle beams, colloidal processing…)
- Non linear optical properties, tunability
- Nanosize effects on optical properties
- Theory, modelling and simulation of materials and processes

CL-2 Advances in characterization techniques
- Synchroton radiation based technologies (NEXAFS, XANES, XPS..)
- Scanning Probe microscopies, confocal microscopy, SNOM
- Interferometer techniques for imaging and testing
- SERS, CARS, Raman, Brillouin and optical spectroscopies
- THz spectroscopies
- Advanced imaging techniques
- Innovative tools

CL-3 Light management for active applications
- Scintillators
- Phosphors
- Frequency conversion
- Laser actions, amplifiers
- Integrated optics
- Sensing
- Luminescent systems
- Imaging
- Switches, modulators

CL-4 R& Advances in research and applications
- Solid state lighting, displays
- Optical communications
- Superlensing, cloaking
- Bioimaging
- Healthcare
- Clean energy
- Aerospace, defence, security
- Structural health monitoring
- Laser assisted manufacturing and micro/nano fabrication …



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Symposium CM

Inorganic Polymers (Geopolymers) and Geocements: Environmentally Friendly Ceramic Materials for Low-Technology and High-Technology Applications

Inorganic polymers (geopolymers) are alkali-activated materials, generally aluminosilicates, with ceramic-like properties. Their formation at ambient temperatures from industrial by-products or wastes without the generation of greenhouse gases makes them environmentally-friendly substitutes for Portland cement, while their unique properties of thermal shock resistance, binding capability with silicates or metals, high compressive strength and fire and acid resistance makes them suitable for many other applications. Geopolymers are X-ray amorphous materials which can be heated to 800-1000 oC before being converted to crystalline or semi-crystalline ceramics with almost no shrinkage. The exchange ability of the charge-balancing cations in their structure has opened up a number of new high-technology applications such as the photodegradation of hazardous organic substances, removal of heavy metals and bacterial pollutants in water and new catalysts. The mechanical properties of geopolymers can be improved by reinforcement with inorganic or organic fibres for engineering applications, making these extremely versatile materials.

Session Topics

CM-1 Preparation and characterization

Synthesis and processing
Geopolymerization kinetics
Conversion to ceramics
Composites
Microstructure
Thermal properties
Mechanical properties
Chemical stability and adhesion

CM-2 Applications

Geopolymer concrete
Waste immobilisation
High-technology applications (electronic properties, bioactivity, catalysis)
Commercialization issues

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Symposium CN

Science and Technology for Silicate Ceramics

Traditional ceramics account for over 80% of the overall turnover of the ceramic industry on a global basis. Future expansion is also predicted on increasing demand from construction and domestic uses, driven by improved life standards and demographic growth.
Innovation in technology during the last decades has been a formidable key for growth. Manufacturing cycles underwent drastic changes with progressive quality optimization and development of brand new products and novel processes.
Along with a harsh international competition, the ceramic industry has now to face further challenges coming from increasing energy cost, demand for high performance and/or multifunctional products and contest with innovative composite systems in the building sector.
Purpose of this symposium is to focus interest on ongoing R&D activities aimed at promoting technical progress in wall and floor tiles, sanitaryware and tableware, bricks and roof tiles, ceramic technology and machinery, glazes and pigments, and raw materials. Matter will cover research work directed to improve our knowledge on the properties and behaviour of materials, ensuring quality, developing new products and implementing new technologies in ceramics manufacturing.

Session Topics

CN-1 Functionalized surfaces of silicate ceramics

Industry is looking with increasing interest at technologies able to provide additional properties to ceramic surfaces,

turning them self-cleaning, bacteriostatic, antielectrostatic, stain-resistant or providing high reflectance, controlled grip, wear resistance, magnetic shielding, etc. Industrial applications need further knowledge on factors affecting surface processing and technology scale-up to large surfaces and complex shapes. A workshop will discuss open questions on durability and efficiency of functionalized ceramic surfaces. Contributions to testing procedures of multifunctional silicate ceramics and their standardization are welcome.

CN-2 Sustainability of silicate ceramics manufacturing

Incoming social and technological challanges compel a further reduction of energy consumption and CO2 emissions to get an overall improvement of efficiency in the manufacturing of silicate ceramics. This session will take stock of the situation on best available technologies and processing innovation in ceramic tiles, sanitaryware, glazes, pigments and clay bricks. A special focus will concern health and environmental issues (e.g., emissions, crystalline silica, green certificates) and all aspects of waste management/ recycling in the silicate ceramics industry.

CN-3 New products and challenges for silicate ceramics

The ceramic industry has to take up the challanges regarding raw materials, construction systems and product innovation. This session will overview the transition from product to system in the construction sector and its feedback on the role and design of silicate ceramics. At the same time, the continuous growth in the global output of silicate ceramics is stressing availability and cost of raw materials: contributions reviewing critical industrial minerals and possible alternatives (including new body, glaze and pigment formulations) are expected.

CN-4 Managing the complexity of silicate ceramics

A turning point in product and process innovation is the capacity to manage the complexity of silicate ceramics from in-depth comprehension of ceramic processes and thoroughful characterization of ceramic products to prediction and modelling of performances and behaviours. A workshop will outline the ceramic factory of the future and the overall effects of the digitalization process from inkjet decoration to production controls. Contributions on modelling and detailed description of ceramic processes and products will be highly appreciated.

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Symposium CO

Refractories: Developments in Raw Material, Production and Installation, Modelling, and Testing/Performance

This symposium will focus on advances in refractories used as high temperature insulation and/or containment materials for severe service environments, with emphasis on the following areas: refractory raw materials and product formulations; mixing, installation, drying, firing and/or property development in monolithic refractory materials; refractory performance issues/needs of industry; standardized or specialized testing; environmental or energy conservation issues/needs related to refractory processing/ use; the use of quality control and/or analytical tools to improve refractory performance; modelling refractory wear or user systems to improve refractory performance; and the use of post mortem failure analysis to resolve refractory issues or service life. Improvement in refractory materials are often driven by changes in energy and raw material cost/availability, changes in refractory technology, changes in user system demands, the need for rapid and reliable technology to remove/install refractories that minimize production downtime and costs, and the constant need by refractory users for lower production/material costs and maximized performance.

This symposium will cover research and development advances related to prefired shaped and unshaped monolithic refractories composed of oxide and nonoxide components and their combinations; including additives to refractory mixtures that include binders, cements, carbon, flow modifiers, antioxidants, and set time modifiers. Contributed papers will cover achievements and challenges from the perspective of either the refractory user, installer, or producer.

Session Topics

CO-1 Raw materials

Raw materials characterization
Raw materials (natural, synthetic) selection and product performance criteria in a changing raw material/user environment
Developments in new refractory raw materials
Raw material or additive science impacting material processing, rheological properties, compaction mechanisms, sintering and densification
Raw material phase relationships and reactions during sintering or use that impact microstructure development or product performance
The use of quality control and analytical tools to improve refractory product quality, consistency, and to lower material cost

CO-2 Testing

Standardized/specialized refractory testing in use or needed by industry
Physical property (including thermal shock and spalling, fracture mechanisms, creep, fatigue, hot strength)
Refractory thermal property (including thermal conductivity and high temperature MOE)
Evaluating refractory/molten slag interaction
Evaluating monolithic materials property changes during mixing, installation, drying, and firing - including the relationship to composition and additives
Monitoring key process variables or material properties related to refractory failure in severe service applications
Microstructure analysis related to material performance (including use of SEM, cathodoluminescence, high temperature confocal microscopy, and optical microscopy)

CO-3 Product manufacturing and installation

The role of raw materials and additives on material processing and product properties.
Advances in refractory manufacture
Advances in refractory installation
Advances in refractory repair/maintenance
Monitoring refractory performance to know when repair is necessary

CO-4 Selection, design and use

State-of-the-art refractory products for:
- *Iron and steel metallurgy*
- *Non-ferrous metallurgy*
- *Preheat and hot work furnaces*
- *Cement*
- *Glass and ceramics industry*
- *Petrochemical, gasification, and waste incineration.*
- *Specialized severe service applications*

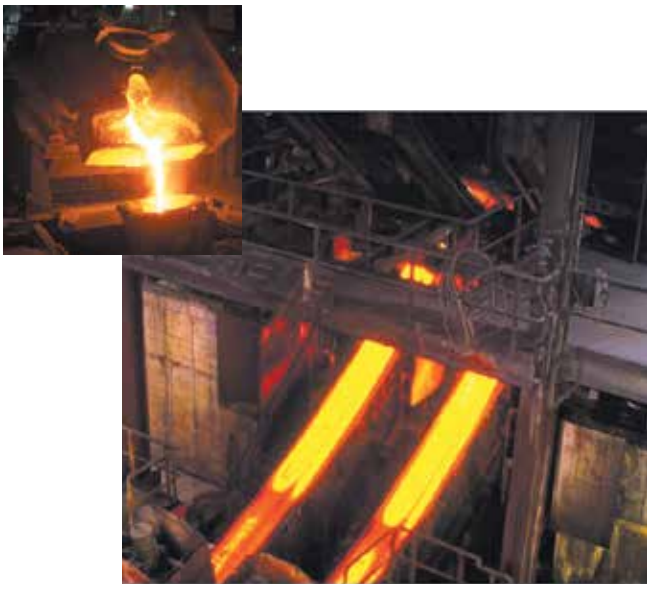
Environmental and recycling issues
Energy conservation
New developments in refractory insulation, including fibers

CO-5 System modeling and simulation

Modelling to improve refractory property/performance
Modelling for service life prediction
Thermal and stress management through modelling
Improved energy management through modelling
Thermodynamic modelling of refractories during use for process control
Slag management to minimize refractory wear

CO-6 Failure analysis

Post mortem analysis to determine causes of refractory failure
Analysis of refractory corrosion and wear caused by by slag, molten glass and metal, hot gases, and or dusts



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CP - 7th International Conference

Advanced Inorganic Fibre Composites for Structural and Thermal Management Applications

Advanced inorganic fibre composites are enabling materials for a number of energy efficient and eco-friendly applications in aerospace, power generation, ground transportation, chemical, and nuclear energy applications. However, despite the considerable progress made in recent years in the fundamental understanding of inorganic fibre composites, a lot still remain to be done to fully utilize the excellent capabilities of these materials. A deeper insight of the mechanisms governing fibre composites behaviour in demanding situations, the development of reliable life prediction methodologies, design tools, and improved or innovative approaches to low cost manufacturing are among the many priorities for research and industry.
This symposium (which follows those on a similar subject held in 1990, 1994, 1998, 2002, 2006, and 2010 in the framework of CIMTEC) will feature latest achievements in the basic physico-chemical principles of inorganic fibrous composite technology and processing science, bulk and interface characterization, property assessment, and fiber composite design and production. Modelling of properties and behaviour, and application engineering studies in severe thermomechanical and aggressive environments are among its scope, as well as exploiting factors affecting reliability and low cost processing.
Ceramic (Refractory, Glass, Glass-Ceramic) Matrix Composites (CMCs), Ultra High Temperature Ceramic Composites (UHTCCs), Carbon-Carbon (C/C) composites, and Metal Matrix Composites (MMCs) are of great interest. In addition, new developments in the processing and manufacturing as well as characterization of reinforcements such as long and short fibres, filaments, nanofibers, nanotubes, and in-situ composites will also be covered.

Session Topics

CP-1 Production and properties of reinforcements, preforms, and matrix materials
Manufacturing, processing, properties.
Fiber architecture: laminates, weaves, braids.
Preforming methods and technologies.
Nanoreinforcements (nanofibers, nanotubes, nanorods, nanowires, etc.)
Development and testing of new inorganic fibers

CP-2 Interfaces/interphase
Fiber coating, interfacial bond control
Structure and microstructure of interfaces

CP-3 Processing and fabrication of MMCS, CMCS, and C/C composites
Solidification processing, extrusion, rolling, electro-deposition, etc.
Reaction bonding, diffusion bonding, chemical vapour infiltration, melt infiltration, sintering, hot pressing, HIPing, spark plasma sintering, colloidal processing, etc.
Net shape processes, computer-aided component design and fabrication, rapid prototyping, process modelling.
Green and eco-friendly processing and manufacturing technologies
Joining, attachment, machining, and repair technologies

CP-4 Ultrahigh Temperature Ceramic Composites (UHTCCs) and Laminated Composite Structures
Processing and fabrication of UHTC composites with refractory boride, carbide, nitride matrices
Interfacial and thermomechanical characterization
Testing and integration technologies for UHTCCs
Design criteria for laminated composites
Structural analysis. Mechanisms of delamination

CP-5 Property, modeling and characterization
Microstructural characterization, influence of processing on the microstructure
Thermomechanical properties, static and dynamic characterization
Micromechanics and interfaces
Fracture, fatigue and creep mechanisms, Plastic and superplastic behaviour.
Wear and friction behavior
Effect of strain, temperature and environment on microstructure and properties
Modelling at micro-, meso- and macroscopic level including environmentally induced damage, mechanical damage, toughness
Environmental durability and life prediction

CP-6 Composites for thermal management
Design, development, and testing of thermal protection systems (TPS)
Light weight, high conductivity materials for thermal management (C/C and CNT composites, Al/SiC, Cu-based systems, Si3N4 in-situ composites, etc.)
Bonding and integration technologies, thermal contact materials
Nondestructive evaluation, quality assessment, health monitoring, etc.

CP-7 Applications
Aeronautics, space transportation systems, and space structures
Aircraft and automobile brakes, friction components
Power generation, fuel cells, microturbines
Automotive and ground transportation, armors and shields
Environmental and waste remediation, nuclear industries
Chemical and process industries

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Symposium FA

Fuel Cells: Materials and Technology Challenges

The high consumption of primary energy is one of the characteristics of our modern society. Deterioration of urban air-quality, growing dependence on insecure energy sources, and global warming are forcing the re-examination of conventional energy conversion systems throughout the world. Although new combustion technologies emit far less toxic pollutants comprising hydrocarbons, nitrogen oxides, carbon mono-oxide and particulates than in the past, the increasing energy demand is resulting in growing insistence to reduce pollution. This has brought in emission legislation all over the world, particularly in the light of the Kyoto Protocol, requiring the introduction of new energy conversion technologies and zero-emission vehicles. Among the various available energy conversion systems, fuel cell technology represents one of the most viable candidate solution to these drawbacks.

Fuel cells deliver energy at high efficiency by consuming electroactive chemicals that are supplied on-demand to the cell as in a conventional thermal combustion system. Fuel cell technology can thus contribute to achieve the targets concerning with reduction of greenhouse gases emissions, increase of renewable power sources and energy efficiency. This complies with the vision for a low carbon economy by 2050. Such vision includes both hydrogen produced through renewable sources fuelling a fleet of fuel cell vehicles and high efficiency distributed power generation with fuel cells providing electrical power and heat.

The International Symposium *"Fuel Cells: Materials and Technology Challenges"*, through the contribution of experiences coming from several different disciplines, will focus major advances in materials science, processing and device manufacturing of the different fuel cells.

Original papers are solicited on all types of fuel cells. Of particular interest are recent developments of advanced materials, novel stack designs, emerging electrochemical cell technologies, fuel cell for portable, automotive and CHP applications, optimization and breakthroughs in performance. Reviews of the state-of-the-art fuel cell performance for specific applications, including consumer devices, electric vehicles, and distributed energy systems, may also be submitted.

The symposium also includes a workshop on Direct Alcohol Fuel Cells promoted through the DURAMET FCH JU Project.

Contributions are invited in the following and related areas:

FA-1 Solid Oxide (SOFCs) and Molten Carbonate (MCFCs) Fuel Cells

- High temperature solid oxide fuel cells
- Intermediate temperature solid oxide fuel cells
- Materials issues in solid oxide fuel cells
  Oxygen ion, proton and mixed conductors: conduction mechanisms
  Ceramic and metallic interconnects; sealing materials
  Mechanical and thermal properties
  Surface and interface reactions
- Direct conversion of organic fuels in solid oxide fuel cells
- Direct carbon fuel cells
- SOFC cell and stack design, electrochemical performance, reliability, degradability, fuel versatility
- Demonstration of SOFC systems
- MCFC materials development
- Corrosion issues in MCFC
- MCFC demonstration plants
- Modelling of materials and devices

FA-2 Proton-conducting (PEFCs) and Alkaline (AFCs) Polymer Electrolyte Fuel Cells

- New and improved proton-conducting polymer membranes
  Hybrid organic-inorganic materials, polyaromatic polymers, nanocomposites....
- Electrode materials and electrocatalysts: poisoning effects
- Electrode membrane assembly
- PEFC stacks for automotive application
- PEFC stacks for stationary generation
- Fuel cell testing
- Modelling of materials and fuel cell performance

FA-3 State-of-the-art application engineering and demonstrations

- Combined heat and power (CHP)
- Distributed power generation
- Transport
- Portable power

Special Session FA-4
DURAMET Workshop on Direct Alcohol Fuel Cells (DAFCs)

- Electrocatalysts for methanol/ethanol oxidation
- Methanol/ethanol tolerant cathode electrocatalysts
- Non-noble metal catalysts
- Methanol/ethanol impermeable membranes
- DMFCs and DEFCs for portable and assisted power unit (APU) applications

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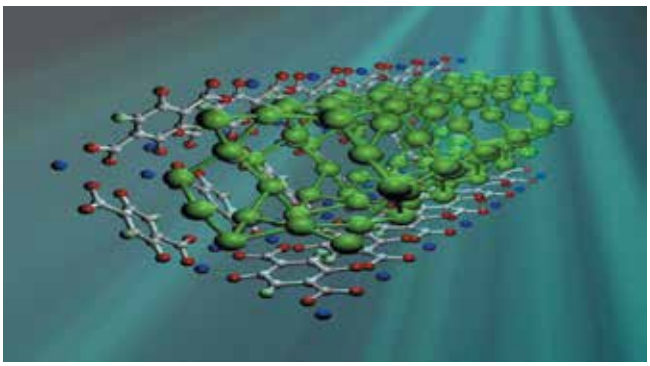
Symposium FB

Hydrogen Production and Storage

Hydrogen obtained from dissociation of water with renewable energy, nuclear or the water-gas shift reaction in advanced gasification technologies provided with CO2 capture and sequestration, has been identified as one of the strategic technologies for an appealing, clean, abundant, safe and cost effective energy carrier for a low carbon economy.
Implementing hydrogen as an environmentally friendly, sustainable and efficient energy carrier, however requires major problems for its production, storage and use to be solved. Breakthroughs in materials research to find effective robust catalysts and new storage techniques that satisfy weight, volumetric, safety and cost requirements are critical for hydrogen to perform competitively. Crucial is gaining a deeper understanding of the phenomena that govern the interactions of hydrogen with materials, to exploit the enormous opportunities offered by nanotechnology and to develop modelling and simulation strategies for predicting reaction pathways, materials properties and systems behaviours in order to minimise lengthy and expensive trial-and-error experiments.
"Hydrogen Production and Storage" will bring together world leading experts from Physics, Chemistry, Materials Science and Engineering to share up-to-date scientific and technical advances in the field, and to highlight outstanding problems and guidelines for future research. Fundamental aspects of catalysis, separation and purification processes; chemistry and physics of hydrogen bonding, adsorption and release mechanisms; materials synthesis, processing and characterisation; system implementation and performance evaluation including safety and economics issues will be featured.



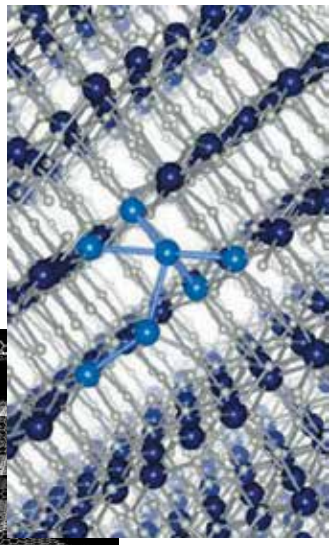
Technical programme areas:

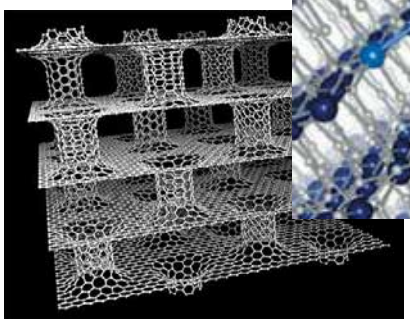
FB-1 Hydrogen production

FB-1.1 - Thermochemical
FB-1.2 - Photoelectrochemical
FB-1.3 - Photobiological and photo-bio-mimetic
FB-1.4 - Biomass/waste reforming
FB-1.5 - Microbial Electrolysis Cells (MEC)
FB-1.6 - Renewable electrolysis
FB-1.7 - HT electrolysis (Hybrid cycles)
FB-1.8 - Water-gas shift in advanced coal gasification

FB-2 Hydrogen storage

FB-2.1 - Metal hydrides
FB-2.2 - Complex hydrides
FB-2.3 - Chemical hydrides
FB-2.4 - Carbon based material e.g. nanohorns, doped nanotubes, nanofibers, fullerenes, activated charcoals, nanostructures
FB-2.5 - Other high surface area adsorbents e.g. metal-organic frameworks, conducting polymers, clathrates, zeolites, glass microspheres
FB-2.6 - Theoretical modelling; advances in characterization methods
FB-2.7 - Storage testing, leak detection, safety, economic issues, etc.





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Symposium FC

Electrochemical Energy Storage Systems: the Next Evolution

The potential of electrochemical energy storage in batteries and electrochemical supercapacitors and pseudocapacitors is enormous, ranging from low storage sizes for mobile electronics and other low-power applications to transportation and electric power sectors where storage sizes may be up to several megawatts. Electrochemical energy storage devices are also essential for the effective utilization and implementation of renewable resources such as solar and wind power.

Understanding, controlling, and predicting the structure and properties of solids and the synthesis of new materials with novel or enhanced properties have driven the energy storage field for the past three decades. Although the level of performance of current generation of storage devices is sufficient for a range of applications, novel intuitive concepts are needed for next-generation high-performing electrochemical energy storage systems at an affordable cost with improved safety to penetrate major new markets. Design and synthesis of new electrode and electrolyte materials, advanced characterization methodologies including in situ techniques to understand at the atomic and nanoscale the surface, bulk, and interfacial characteristics, and computational analysis to predict materials behaviours and guide the design of new materials are among the main challenges for developing new next generation of high-performance materials.

The International Symposium *"Electrochemical Energy Storage Systems: the Next Evolution"* will emphasise breakthroughs in materials and energy storage systems for practical implementation. The Symposium will cover advances in electrode and electrolyte materials including new cell chemistries, novel electrode architectures, in situ and ex situ characterization, advanced computational methodologies, new cell configurations, and system development, along with addressing reliability, lifetime, cost, safety, and environmental issues for practical implementation.

Session topics

FC-1 Batteries
Anode materials
Cathode materials
Electrolytes
New cell chemistries including Li-S, Li-air, Mg-ion, Na-ion, Al-ion, solid-state batteries, etc.
Bulk, surface, and interfacial characterization
Computational modeling
Cell design

FC-2 Supercapacitors
Supercapacitors
Pseudocapacitors and hybrid devices
Electrode materials
Electrolytes
Cell design

FC-3 Application engineering
Case studies: transportation, load-leveling, mobile electronics, etc.
System design
Reliability and lifetime
Safety/environmental /cost issues


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Symposium FD

Advances in Materials and Technologies for Efficient Direct Thermal-to-Electrical Energy Conversion

This symposium will explore state-of-the-art thermoelectric, thermionic and thermophotovoltaic materials and technologies for direct thermal-to-electrical energy conversion. Material and device designs directed to optimise efficiency and cost/performance aspects of direct thermal-to-electrical conversion will be enlightened with emphasis on tailoring electrical, thermal and optical properties to the demand of applications.

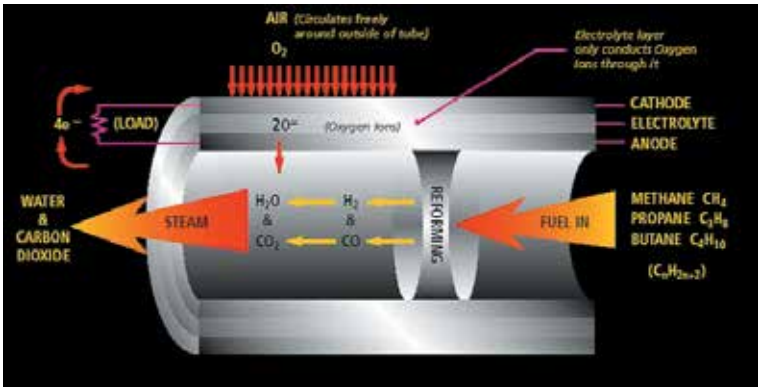
Focus will be on direct conversion into electricity of the waste heat emitted by a number of sources such as industrial furnaces, power plants, automobile exhausts and geothermal heat sources as well as the solar thermal energy. Covered will be materials issues such as: theoretical studies on band structure, crystal chemistry, transport properties, energy transfer processes, etc.; novel synthesis and processing routes for polycrystalline and single crystal bulk materials, nanostructured materials, 3-D architectures, composites and nanocomposites; low dimensionality structures such as thin films, superlattices, quantum dots and nanofibers; advanced characterisation of electrical, optical, thermal and mechanical properties. Device design and performance and system integration will also be enlightened for ongoing or forthcoming applications in direct thermal-to-electrical energy conversion technologies. Emerging ideas and proposal studies of novel concepts for direct thermal-to-electrical energy conversion working in tandem with other energy conversion technologies (i.e. fuel cells, PV-TE hybrid systems, etc.) will be interesting topics to enrich the debate.

Session topics

FD-1 Theoretical concepts and basic approaches for high efficiency thermal-to-electrical energy conversion
- Band structure
- Crystal chemistry
- Transport properties
- Energy transfer processes
- Modeling and simulation

FD-2 Novel materials for high efficiency thermal-to-electrical energy conversion
- New thermoelectric compounds
- Nano-composite and nanostructured thermoelectric materials
- Materials for thermionic applications
- Emitter materials and PV diode materials for thermophoto-voltaics
- Functionally graded materials
- Structural and mechanical characterisation
- Process modeling and simulation
- New testing methods

FD-3 Devices technologies and applications for thermo-electrics, thermoionics, and thermophotovoltaics
- Device design, fabrication, integration and testing
- Cost/performance and reliability issues
- System simulation and demonstration
- Novel and emerging approaches for thermal-to-electrical conversion systems
- Commercialisation and market prospects



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Symposium FE

Advances in Photocatalytic Materials for Energy and Environmental Sustainability

Photocatalytic materials are becoming a key element for the future of society. Sustainable energy supply and environmental concerns are emerging among the humanity top issues and challenges where innovative materials are essential enablers. Photocatalysts are widely utilized to clean and remediate our environment, with their use in advanced devices to convert sunlight and produce solar fuels in an exponential growth of interest. Semiconducting photocatalytic materials possess multi-functional properties which allow their use in various areas from photocatalytic environmental remediation, water splitting for hydrogen fuel, CO_2 reduction, self-cleaning coatings, electrochromic devices and sensors, and low cost solar cells. The nano-architecture design of these materials is of critical relevance to achieve these different functional characteristics and realize an efficient energy conversion. There is the need to gather together multiple competences to accelerate the development of these nanomaterials for solar energy and environmental applications.

This Symposium aims to provide a multi-disciplinary forum for scientists, engineers and industry experts to break new ground in the discussion, and realize a cross fertilization and progress in the understanding of the design criteria for their use. Among the recent developments that will be highlighted in the symposium are advances in synthesis of novel materials with tailored nano-architecture; the preparation of thin films and nanostructures; the advanced characterization by experimental and theoretical methods of these materials and of their structure-performance relationships; processing techniques, device fabrication and stability; advances in environmental applications and in air quality improvement; novel concepts, technologies and materials for photocatalysis.

Contributions may be proposed in the following indicative sessions:

FE-1 Tailored synthesis of nanostructured materials for photofunctional properties
Band-gap engineering of photocatalysts: optical, electronic, and catalytic modifications
Superhydrophilic, amphiphilic, and antifogging surfaces
Development of new photocatalytic materials
Hybrid photocatalytic nanomaterials
Porous photocatalytic materials

FE-2 Advances in fundamental mechanism understanding
Charge transfer and recombination
Theoretical and computational investigation
Photonic materials
Photofunctional materials
Photoelectrochemical devices
Heterojunctions
Antenna effects

FE-3 Design approaches for advanced applications
Innovative materials for third generation solar cells (Dye sensitized solar cells, quantum dotc ells, tandem/multi-junction cells, hot-carrier cells, etc.)
Photocatalytic solar fuel (H_2, CO_2 reduction) generation
Selective photo-oxidations for organic synthesis
Environmental applications: air /water treatment, anti-bacterial surfaces
Photo-catalytic fuel cells


San Gimignano

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Symposium FF

Magnetic Materials for Energy

Magnetic materials are widely used in several important applicative sectors related to energy conversion, electric power generation, transportation, power electronics and information technology and can play a crucial role in the realization of technologies aimed at energy saving and CO2 emission reduction.
Hard and soft magnetic materials find for example different applications in permanent magnets, and in the generation and conversion of electric power. Their optimisation could benefit different strategic sectors, e.g. hybrid and electric vehicle motors, wind power generation, energy harvesting. Among energy-efficient magnetic technologies an important role is also played by magnetocaloric materials for their possible exploitation in magnetic refrigeration, a clean technology alternative to conventional vapour compression. Moreover micro/nano structures based on magnetic thin films and obtained with CMOS-compatible technologies pave the way to new classes of devices, sensors and components (converters, inductors…) that can give a strong impact to energy efficiency in important technological sectors such as information technology and the consumer electronics.
This Symposium will highlight recent developments in the realization of novel magnetic materials and devices and in their properties optimisation for ongoing and foreseeable energy applications.

The sessions will welcome contributed papers related to the design, simulation and theory, preparation, processing, characterization and properties optimisation of:

FF-1 Hard magnetic materials

FF-2 Soft magnetic materials

FF-3 Magnetocaloric and multifunctional magnetic materials

FF-4 Magnetic devices and components for energy applications

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Symposium FG

Photovoltaic Solar Energy Conversion: Silicon and Beyond

The direct conversion of solar energy to electricity by photovoltaic devices has already emerged as a technologically and economically viable solution to reduce the consumption of fossil fuels for power generation. At the end of May 2012 Germany became the first industrialised country where the total amount of power generated by photovoltaic plants exceeds 50% of the electricity distributed by the national grid at peak time.
Wafer-based crystalline Si is still the dominant technology for solar cells and it is expected to retain a dominant position for at least 5 to 10 more years thanks to the impressive acceleration in production capacity and cost reduction (<0.5€/Wp) achieved by top Chinese manufacturers.
However thin film technologies based on CdTe, Cu(InGa)Se_2 (CIGS), amorphous/micromorph Silicon and nano/micro/poly-Si are becoming increasingly competitive from the economic point of view and might rapidly secure a significant share of the market thanks to their superior performance in building integrated applications.
Dye-sensitized and organic solar cells are also progressing in terms of efficiency and lifetime and are expected to pave the way to very-low-cost and *do-it-yourself* photovoltaics.
Finally, to push the current efficiency limit from 43% towards and possibly beyond the 50% mark nano-architectured solar cells have been proposed to exploit a whole range of new physical effects like intermediate bands, multiple exciton generation, hot carriers and up/down conversion.
In all these fields the unprecedented synergy between industrial and basic research over the last 10 years have boosted the whole photovoltaic sector. As a result cost targets set in 2008 where achieved 5 to 10 years earlier than expected and grid parity is already happening in many parts of the world.
The International Symposium *"Photovoltaic Solar Cell Conversion: Materials and Technology Challenges"* will focus on the most recent advances in the photovoltaic technologies.
Materials science, synthesis, deposition techniques, device architecture and physics, characterisation and tests,

process and product innovation, large-area deposition and diagnostics and manufacturing will be the top scientific and technological keywords of the symposium.
A Special Session will be devoted to Building Integrated Photovoltaics with particular attention to product innovation, multifunctionality and to the technical issues related to the integration of photovoltaic modules in architectural structures. With the end of the feed-in tariff incentives, this sector is expected to take off and become soon a major segment of the overall PV market as domestic and commercial buildings are responsible for about 2/3 of the electricity demand in industrialised countries.
Contributions are invited in the following and related areas:

FG-1 Wafer-based silicon and high-efficiency solar cells
Mono and poly-crystalline Silicon solar cells
Multi-junction solar cells for concentrators

FG-2 Thin-film photovoltaics
CIGS (and related compounds) and CdTe solar cells
Silicon thin films and multi-junction Si solar cells
Kesterites and other novel materials/concepts for thin film PV

FG-3 Emerging technologies and new concepts
Organic photovoltaics,
Dye-sensitized, nanomaterial-sensitised and hybrid solar cells
Intermediate band solar cells, Hot-carrier solar cells, Up/down conversion and devices
Plasmonics and nanophotonic-enhanced photovoltaic devices
Multi-exciton generation and other novel concepts
FG-3.1 Materials
FG-3.2 Physics and devices

Special Session FG-4
Building Integrated Photovoltaics

Product innovation
lintegration issues
Multifunctionality
Performance analysis
Economic analysis and market trends

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Symposium FH

Recent Developments in the Research and Application of Transparent Conducting and Semiconducting Oxides

New amorphous and crystalline metal oxide materials with complex composition as well as wide band-gap nonoxide materials including e.g. nanotube networks and quantum dot structures are extending device designer's palette of transparent conductors and semiconductors by addressing a variety of cutting edge applications in flexible electronics, new active optoelectronics, even spin photonics. Advances in materials and processing are also extending the range of the more experienced use of transparent conducting oxides in large area flat-panel displays, thin-film solar cells, antistatic coatings, functional and smart glasses and a number of other applications.
However, primary requirements for a continued and expanded application of TCOs and related transparent conducting materials including organic and nanotube based TCs is a clearer understanding of basic materials science such as the electronic structure, carriers origin, mobility and scattering, and doping mechanisms which govern conductivity and transparency, coupled with a better insight into interfacial and chemical compatibility issues and the development of models of the performance limits of materials and devices.
Objective of this Symposium is to gather specialists from academia and industry to highlight updated developments in the area from fundamental science to materials synthesis, processing techniques device development and advanced/novel/prospective applications.

Contributions may be proposed in the following or related topics:

FH-1 Fundamentals
Electronic structure
Doping mechanisms
Carriers origin and dynamics
Optimizing band structure
Surfaces and interfaces in hybrid structures
Amorphous vs crystalline materials basic physics
Theory and computational approaches

FH-2 Material design and device development
Advanced crystalline materials
ZnO based materials
p-type transparent conductors
Indium-free TCOs
Amorphous metal-oxide materials
Non-oxide transparent conductors
Nanowire/nanotube arrays and Q-dot based transparent structures
Other novel materials/concepts
Materials characterisation and properties
PVD/CVD
Atomic layer deposition
Spin coating, spray pyrolysis and other chemical techniques
Direct writing/printing/patterning
Novel tools and equipment for device fabrication
Chemical compatibility issues
Modeling and simulation of materials and devices

FH-3 Applications
Flexible electronics (e.g. roll-up displays, electronic paper)
Transparent devices (TTFTs) and applications including TC active layers
Photovoltaics
OLEDs
Advances in smart /functional applications e.g. photo-catalytic/active/protective coatings,
smart windows, etc.
Other advanced/novel/emerging applications

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Symposium FI

Materials and Technologies for Solid State Lighting

High-efficiency solid state lighting is a topic of large importance to the materials research community because of the globally increased need for energy savings. Significant recent advances in the understanding of materials and devices are driving the development of alternative light sources. Full spectrum all colors and white LEDs are ready to be used for many indoor and outdoor displays as well as for illumination purposes. GaN and its alloys with InN and AlN exhibit green, blue and UV high brightness light emission that combined with available red emitters or RGB phosphors used for LEDs and lasers. High-brightness organic LEDs (OLEDs) based on organic molecules emitting from red to blue are also promising for new high-brightness solid state light sources.
Nevertheless, a number of technical and scientific issues need to be addressed for capitalizing on the advantages

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and potential of these unique materials, devices and related processes, including a better scientific understanding to achieve control in tailoring their properties.
The purpose of this Symposium is to provide a forum for scientists, engineers and industry experts to break new ground in the discussion, cross fertilization and advancement of solid state lighting materials, technology and applications by bringing together communities of the three main materials areas of compound semiconductors and organic materials. Among the recent developments that will be highlighted in the symposium are advances in synthesis of novel materials as bulk crystals, thin films and nanostructures; characterization of layers and interface properties on the nano- and micro-scale; device fabrication; and innovative light out-coupling.

Topics of interest include (but are not limited to):

- Methods for the growth or synthesis of bulk materials and thin-film
- Design and synthesis of novel LED (OLED) materials and relative synthesis
- Novel synthesis and nanofabrication techniques for nanophotonic structures
- Optical and electronic properties
- Charge injection and transport
- Device physics and modeling
- Defect characterization and modeling
- Surfaces, interfaces, and defects
- Structure, microstructure, and inhomogeneities
- Manufacturing issues and analysis

Abstracts may be submitted in one of the following sessions:

FI-1 Material growth and processing

FI-2 Electro-optical characterization

FI-3 Device structures and manufacturing

Symposium FJ

Materials Challenges for Future Nuclear Fission and Fusion Technologies

Nuclear energy, both fission and fusion, will provide a clean, safe, and cost-effective sustainable energy resource, and is expected to grow significantly in order to meet future energy demand globally. This growth should proceed without adverse impacts to global environmental and climate change. To meet this grand challenge several nuclear initiatives were proposed aiming to develop advanced nuclear energy technologies and systems that would meet future needs for safe, sustainable, environmentally responsible, and economical energy. Materials technologies will play a key role to improve economics and long-term reliability of any new advanced nuclear systems. The superior structural material performance will allow higher temperature design and operation for higher thermal efficiency, longer lifetimes, and improved reliability with reduced down time. In addition to the high temperature mechanical properties, resistance to radiation damage is also a key obstacle to improve materials performance and reliability.
The International Symposium on *"Materials Challenges for Future Nuclear Fission and Fusion Technologies"* provides an exciting melting pot to foster the international collaboration and crosscutting coordination to advance the science and technology of future nuclear fission and fusion energy. The symposium will focus up-to-date advances in materials research and development, nuclear components and systems design, irradiation effect and damage, and theoretical modelling for both advanced nuclear fission and fusion technologies and applications. Advanced materials such as high-temperatures metals, superalloys, ceramics, metal- and ceramic-matrix composites, and functional materials and coatings will be of interest. Basic scientific understanding of radiation effect and damage to the materials microstructure and properties via theoretical modelling and experiments relevant to fission and fusion application environment will also be covered.

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Contributions are invited in the following and related areas:

FJ-1 Structural components for nuclear fission and fusion applications
High-temperature metallic alloys and superalloys
Metal-matrix composites
Ceramics
Ceramic-matrix composites

FJ-2 Low activation structural materials for nuclear fusion systems
Ferritic and martensitic alloys
Vanadium alloys
SiC and SiC matrix composites

FJ-3 Materials for first wall components of nuclear fusion systems
Plasma facing materials
Blanket materials

FJ-4 Functional materials
Insulators
Superconducting magnets
Coatings

FJ-5 Nuclear fuel materials
Processing, microstructure, and properties relationship
Oxide-base nuclear fuels
Metal-base nuclear fuels
Thermomechanical modelling
Recycle of nuclear fuels
Fuel cladding materials

FJ-6 Radiation effects
Defect production and properties
Microstructure evolution
Mechanical property changes
He and H effects
Theoretical modelling

FJ-7 Materials modelling and database
Modelling of performance
System design and modelling
Materials and mechanical properties database

FJ-8 Crosscutting materials issues for nuclear fission and fusion systems

FJ-9 Systems integration and interface design and components

Special Session FJ-10

Materials Technology for Nuclear Waste Treatment and Disposal

This session will focus on the treatment and disposal of low and high level nuclear wastes from commercial power generation, fuel reprocessing, and defense operations. Technologies for interim, short-term, and long-term storage and disposal are of interest, including mature processes as well as new and innovative technologies. The goal of the session will be to identify and provide solutions to materials issues in the global integration of waste treatment technologies.
Specific topics will include:

FJ-10.1 Waste form development, including glass, ceramic, and metallic waste forms
FJ-10.2 Challenging waste constituents, such as actinides, noble metals, and volatile species
FJ-10.3 Waste form modeling, performance testing, and advanced characterization techniques
FJ-10.4 Design and operation of waste immobilization facilities
FJ-10.5 Repository design, requirements, and licensing

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Siena - Piazza del Campo

FK - 5th International Conference

Novel Functional Carbon Nanomaterials

The 5th International Conference *"Novel Functional Carbon Nanomaterials"* (which follows the conferences named "Diamond and Other New Carbon Materials" held in the frames of previous CIMTEC editions) will highlight recent achievements and challenges in the synthesis, structural control and modeling at the meso- and nano-scales of the variety of low-dimensional carbon allotropes including nano-diamonds, DLCs, buckyballs, nanotubes, graphene and graphene oxides which are credited with large opportunities and promises for a range of emerging or forecast applications in high-speed nanoelectronics, optoelectronics, quantum information processing, quantum computing, energy conversion and storage, biosensors, drug delivery, medical imaging, thermal management, catalysis, nano-lubrication, etc. Major aspects related to new chemistry, science and technology of growth, functionalisation, characterisation, and electronic, optical, mechanical, thermal and biomedical applications will be approached. Of special interest will be the creation of multifunctional hierarchical architectures based on nanocarbons as building blocks and on integration technologies of carbon-based nanostructures with other inorganic or organic materials to realize micro/nanodevices encouraging novel viable approaches in interfacing materials science, engineering and biology.

Session Topics

FK-1 Growth and processing
Nanodiamond: synthesis, deagglomeration, purification, functionalisation
DLC and nanodiamond coatings: CVD and epitaxy for large area growth, roll-to-roll processing and layer transfer techniques
Hybrid and multilayer materials
Top-down and bottom-up growth techniques for CNTs, graphene and other carbon-related nanostructures
Assembly into hierarchical architectures and heterostructures
Core-shelll structures and devices
In-situ monitoring of growth
Characterisation methods at single nanoparticle level
Ion implantation, annealing, doping and surface processing
Theory, modeling and simulation
FK-1.1 New diamonds
FK-1.2 Graphene and related materials
FK-1.3 Carbon nanotubes and other new carbon nanomaterials

FK-2 Structural characterization
Structure, texture and topography
Surfaces and interfaces
Solid state, electronic, vibrational structure
Structural defect states and impurities
sp^2-sp^3 bonding distributions
Spectroscopic techniques (Raman, NEXAFS, etc.)
Surface characterization (STM, AFM, NSOM, RAS, etc.)
X-ray optics and detections
FK-1.1 New diamonds
FK-1.2 Graphene and related materials
FK-1.3 Carbon nanotubes and other new carbon nanomaterials

FK-3 Properties
Electron transport (bulk, injection, junction)
Surface conductivity
Electron emission (field, photo and electron stimulated)
Superconductivity
Doping and defects
Non-linear optics, photonics and optoelectronics of carbon nanostructures
Thermal and mechanical properties
Graphene and carbon nanotube mechanics (fracture, tearing, exfoliation)
Catalytic properties
Biological activity
FK-1.1 New diamonds
FK-1.2 Graphene and related materials
FK-1.3 Carbon nanotubes and other new carbon nanomaterials

FK-4 Applications
Active and passive devices (field effect transistors, field emitters, displays, electron multipliers, radiation detectors, sensors, magnetic and electronic data storage)
Nanoelectronics, spintronics, quantum information processing
Energy and electrochemical applications: solid state lighting, solar cells, energy harvesting, fuel cells, batteries and supercapacitors, thermoelectrics, novel electrode materials, catalysis, and other
Thermal and mechanical applications (heat sinks, heat spreaders, nanolubrificants, etc.)
Saw devices
MEMS/NEMS for mechanical, electrochemical, sensor etc.. devices
Biosensors, gas sensors
Biomedical applications: bio imaging, drug delivery, regenerative medicine
FK-1.1 New diamonds
FK-1.2 Graphene and related materials
FK-1.3 Carbon nanotubes and other new carbon nanomaterials

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FL - 4th International Conference

Mass, Charge and Spin Transport in Inorganic Materials

Fundamentals to Devices

The evolution of the structure and properties of materials during processing and their degradation and working lifetime is often controlled by mass and charge transport processes. Further on, diffusion of electrons, spin-polarized carriers, ions, atoms, molecules or of more complex entities such as dislocation loops, grain boundaries, pores and gas bubbles either in crystalline solids or in less ordered or amorphous media may be critical for the feasibility and operation of a vast array of advanced applications, from, for example, high temperature structural components, to microelectronic, microionic, optical, superconducting and memresistive and switching devices.

Main objectives of this conference which follows the ones on the same subject held in the frames of CIMTEC Conferences are to update recent achievements in the fundamentals of transport mechanisms in inorganic materials and the role of transport in materials reactivity, synthesis, processing, properties, and device design and performance.

Covered are crystalline ionic/covalent materials, metals and metal alloys, intermetallic compounds, semiconductor materials, and amorphous solids, glasses and melts.

Special focus will be on transport phenomena in small confined systems and in nanostructures for their challenging relevance, as well as on novel theories and computational modeling and simulation approaches for defect formation, interaction, aggregation and diffusion, capable to direct or complement experiments.

Application engineering studies addressing the role of mass and charge transport as enablers for the design of new high performing devices, and/or the efficient operation of engineered components under service conditions of high temperature, thermo-mechanical stress and strain, corrosive environments, radiation, electrical and magnetic fields also will be suitable topics for discussion.

Session Topics

FL-1 Mass and charge transport mechanisms

Transport in prevalently ionic crystalline materials (single and mixed oxides, halides, minerals) including superconducting metal oxides and fast ion conductors
Transport in non-ionic crystalline materials (carbides, borides, nitrides...)
Transport in crystalline metals, metallic alloys and in ordered intermetallic compounds
Transport in topological insulators
Transport in amorphous solids, glasses, melts, and in gas/vapor phase
Transport in small confining systems (grain boundaries, surfaces, interfaces, thin films, multilayers and porous media)
Transport in semiconductor materials
Transport in nanostructures and nanoscale systems, quantum transport, ballistic transport, electron spin dynamics and transport
Interactions of intrinsic point defects and impurities with clusters, extended defects, grain boundaries and interfaces
Effects of ion implantation, irradiation, thermal and thermodynamic potential gradients, thermal, magnetic and electric fields, pressure and strain on transport
Theory, simulation and new techniques for transport studies

FL-2 Role of transport in materials development, properties and behaviour

Solid state reactions, gas solid reactions, liquid solid reactions
Nucleation, crystallization, phase separation, phase transformations, solute segregation, amorphization
Synthesis of powders, fibers and nanomaterials; self assembly; bioinpired materials; sintering of dense or porous materials, hybrids, composites; functionally graded materials; multilayers, multilattices, etc...
Joining, coating and surface modification (e.g. diffusion bonding, thin/thick film deposition, ion implantation, laser irradiation, pack cementation, nitridation...)
Materials properties and behavior as related to transport phenomena (mechanical, chemical, electrochemical, physical)
Mass/charge transport-induced degradation

FL-3 Role of mass and charge transport in application engineering

Examples of sectors of interest include:
Micro(nano)electronics, micro(nano)ionics, spintronics
Energy (fuel cells, batteries, supercapacitors, thermoelectrics, photovoltaics, hydrogen storage, nuclear fission, fusion...)
Catalytic processes, separation technologies
Metallurgy and other materials processing industries
High temperature structural applications

FM - International Conference

Novel Non-volatile Inorganic Memory Devices: materials, concepts and applications

Non-volatile memory devices are currently key elements of several electronics and portable systems (digital camera, solid state disks, smartphones, computers, e-books, tablets,..) and their market has been increasing exponentially in the last decade. Even though the Flash memory represents today the leading technology, to allow its scalability down to the 16 nm technology node and beyond, increased costs and new architectures are necessary. Therefore, several emerging non-volatile memory concepts, also exploiting new storage mechanisms, are under investigation to achieve better performance, higher scalability, density and speed than Flash, as well as to address low power consumption, 3D/cross bar architecture, low thermal budget, and compatibility with flexible substrates and embedded systems. For the high-density non-volatile memories toward a 3D cross-point architecture it is also necessary to develop an appropriate two-terminal selector device, such as mixed ionic electronic conductor, oxide-based and polysilicon diodes or threshold switch. Finally, the new paradigm is not only to pursue the standard downscaling of non-volatile memories in terms of minimum size and integration density, which is approaching physical limits, but also to address new strategies towards functional diversification of electronics devices. One important aspect will be to develop memory storage concepts that can integrate multiple functionalities provided by novel materials, and to fabricate devices that in addition to non-volatile storage are able, for instance, to perform reconfigurable operations and emulating brain functions.
This conference, that follows and enlarges the sessions held on the subject in the frames of previous CIMTEC Conferences, will address recent advances on inorganic non-volatile memory devices with focus on innovative storage concepts beyond Flash and charge based memories, new materials and devices, integration schemes and selectors for the storage elements, understanding and modelling of new physical mechanisms for data storage, down to the nanoscale.

SessionTopics

FM-1 Resistance switching memories (ReRAM)
- Electrochemical metallization (EMC) and valence change (VCM) memories
- Atom switch
- Mott transition
- Interface Schottky switching
- Nanowire-based ReRAM
- Nanometallic ReRAM
- Correlated electron memory
- Mechanisms and modelling

FM-2 Phase change memories (PCM)
- New materials for PCM
- Theory and modelling
- Low power devices
- Nanostructure-based PCM
- Interfacial phase change memories
- Integration schemes

FM-3 Magnetic, ferroelectric and multiferroic materials for memory devices
- MRAM
- Spin transfer torque (STT)-MRAM
- Magnetic nanostructures
- Racetrack concept
- FeRAM
- Ferroelectric FET
- Novel materials for FeRAM

FM-4 Memristive concepts, novel architectures, and emerging applications
- Storage class memories
- Neuromorphic circuits
- Reconfigurable electronics and cognitive applications

FM-5 Selector devices for high-density memories
- Mixed ionic electronic conductor (MIEC)
- Oxide-based and polysilicon diodes
- Tunnelling diodes
- Vertical transistors
- Threshold switches
- Self-rectifying memory concepts
- Complementary resistive switches

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FN - 7th International Conference

Science and Engineering of Novel Superconductors

Superconductivity is a complex and fascinating macroscopic quantum phenomenon with a variety of useful applications, and it is of major interest both for its fundamental aspects as well for its prospective impact on future technology. Since the discovery of superconductivity in the cuprates and huge outburst of research activity that it generated, a key challenge remained 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, 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-structured technologies.

In recent years novel families of unconventional superconductors have been discovered and have stimulated strong scientific interest: the Fe-based pnictides REFeAsO, MFe_2As_2, Fe(SeTe), where high-Tc superconductivity is occurring without the Cu ions (characteristic element in cuprates) and in the presence of Fe ions, suggesting in turn that magnetic interactions are the essential ingredients for the underlaying microscopic mechanism. Furthermore, superconductivity in topological insulators related and non-standard quantum fluids have recently also attracted some attention.

This Conference follows those on the analogous topics in 1990, 1994, 1998, 2002, 2006 and 2010 organized in the frame of CIMTEC. On one side it will highlight the progresses achieved along the last years in the various issues of fundamental and technological character of the already known superconducting materials. On another side, the Conference will be focused on the recently discovered materials, their characterization, synthesis and processing and the prospective applications. Following the mission of the previous conferences of this type, the focus will be on novel aspects, issues and systems, but attention will be paid as well to all superconducting-related topics, including fundamental aspects of theory, advances in synthesis, functionalization and processing and the latest progresses in the areas of the devices at small scale and large scale ranges.

Session Topics

FN-1 Materials, structure, physical chemistry and general properties
- Oxides (cuprates, insulating cuprates, cobaltates, ruthenates and other oxides)
- Borides and borocarbides (MgB2 and other borides)
- Carbon-based superconductors (fulleride, nanotubes, organic superconductors, intercaled graphite)
- Heavy-fermions superconductors and quantum-critical materials
- Superconducting topological insulators
- Interface superconductivity
- New phases and metastable superconducting high-Tc materials

FN-2 New superconductors of the pnictides and related families
- Structural properties (XRD, neutron scattering, electron diffraction, EXAFS, XANES, STM, SEM, TEM)
- Material processing (powder synthesis, single crystal and film growth)
- Order parameters, pseudo-gap, tunnelling, point-contact Andreev-reflection and related experiments
- Phase competitions, quantum critical points and other mechanisms for superconductivity
- Multiband character and related effects
- Superconducting fluctuations and related effects

FN-3 Properties of superconductors (of any type)
- Spectroscopic techniques (optical spectroscopy, IR, Microwave, Raman, NMR, ESR, μSR, inelastic neutron scattering, Mossabuer, AFM, XAS, acoustic spectroscopy)
- Photoemission and ARPES
- SQUID and tunneling spectroscopies
- Thermal, magnetic and electrical properties
- Electric field effect, structures and devices

FN-4 Theory and mechanisms (for normal and superconducting states)
- Correlation effects, spin liquids and quantum criticality
- Phonons, spin excitations and strong coupling
- Inhomogeneous order parameters
- Stripes, phases separation and granularity effects

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Pressure induced superconductivity
CDW, SDW and superconductivity competition; coexistence of magnetism and superconductivity
Unconventional superconductors: phenomenology and theory

FN-5 Vortex lattice physics
Vortex dynamics
Understanding and control of flux pinning
Electromagnetic characterization of superconductors over wide parameters ranges
Vortex-defect interactions, defect structures, vortex penetration
Complex vortex phases and related phenomena

FN-6 Synthesis and processing
Films, multilayer, wires, tapes and coated conductors
Heterostructures and interface nanoengineering
Josephson junctions and JJ arrays
Nanostructured superconductors
Proximity and interface effects, hybrid structures

FN-7 Power applications
Cables, transformers, motors and generators, current limiters and magnets
Magnetic energy storage, high field magnets and accelerator technology
MRI and MEG novel devices
New prospective applications

FN-8 Low power applications and superconducting electronics
Microwave filters and passive devices
Josephson and digital devices
Novel SQUID systems, hybrid electronic devices
Superconducting qubits
Single photon nanosized detectors

FO - 10th International Conference

Medical Applications of Novel Biomaterials and Nano-biotechnology

The current capability to image and manage matter at the atomic and molecular levels enabled by a number of nanoscale tools such as scanning probes, self and directed assembly, single molecule techniques, nanolithography and DNA-based technologies, coupled with advances in biomedical informatics, biophotonics, novel theory, multiscale modeling and simulation are fuelling advanced therapeutic approaches and entirely new perspectives in medicine.
Furthermore, the convergences of biomaterials, electronics and biological systems at the nanoscale not only stimulate unprecedented opportunities through the development of novel diagnosis and imaging methods and minimally invasive targeted therapies for the early detection and treatment of disease, but also offer new opportunities in regenerative medicine, pharmaceutical technology and biomolecular analysis.
The scope of this symposium, which follows the several ones held in previous CIMTEC conferences, is to provide a synergetic, multidisciplinary forum covering applied chemistry and physics, materials science, electronics, biochemistry and medicine to enlighten how the deeper insight into biological events and their interplay with nanotechnology may support the development of a new generation of bioresponsive materials, micro-nano-devices and molecular level approaches suited to solve relevant biomedical problems providing responses to current medical needs.
Specific areas of interest include: new and bioinspired engineered materials; multi-scale cell engineering for functional tissue regeneration and drug and gene delivery systems; design strategies for new (nano)materials and systems for medical diagnostics, nanotheranostics and neural interfaces; minimally invasive implantable devices and prostheses, bioactive functional tissue scaffolds as well as systemic interaction in the body environment including side effects, biocompatibility and biofunctionality issues.
The technical programme is complemented by the two Special Sessions *"Smart Polymers for Biomedical Applications"* and *"Wearable and Implantable Sensors and Body Sensor Networks"*.

Session Topics

FO-1 Advances in biomaterials
Synthesis, constitutive behavior, bio-functionality, bio-compatibility, design, modeling, simulation
Electroactive, and stimuli responsive polymers, elastomers, dendrites, hydrogels, hydrocolloids
Shape memory polymers and alloys, smart textiles, functionalised metal alloys
Bioactive and resorbable ceramics and glasses, smart optical fibres
Mineralization processes, biomimetic materials, self-organized biomaterials
Nanobiomaterials, smart nanoparticles, functionalised nanotubes, nanowires, graphene,
Q-dots and plasmonic structures
Nanostructured materials, thin films, coatings for degradable or permanent medical devices
Nanobiocomposites, hybrids, heterostructures
Surface analysis, structure/property relationships
Design strategies for bio-enabled materials systems
Therapeutic ion releasing biomaterials
Soft matrices for tumor models
Antibacterial materials

FO-2 Enabling tools
Biosensors, bioactuators, BioMEMS/NEMS (see also Special Session FO-9)
DNA/RNA technologies
AFM, optical tweezers, molecular probes and devices
Self-assembly, bioinspired processes
Micro/nano lithography
Templating, molecular imprinting
Surface modification techniques for bio functionalisation
Theory, modelling and numerical simulation of processes and devices
Bioprocessing technologies
Cell-biomaterial interaction characterization tools

FO-3 Medical diagnostics and imaging

Sensors (chip devices and wearables) (see also Special Session FO-9)
In-vitro diagnostics: microfluidics, lab-on-a-chip
Non invasive imaging probes and markers:
Nanoparticles for targeted imaging
Multimodal nanoparticles
Molecular imaging: MRI, FMT, PET, Tomography, etc.
THz technology
Minimally invasive implantable devices for diagnosis and imaging

FO-4 Tissue engineering and regenerative medicine

Bio-artificial skin, cardiovascular tissues, bio-artificial organs nervous and musculoskeletal system
Scaffolds and substrates for tissue and cell engineering
Cell bioengineering by multiscale manipulation
Bioactive signalling molecules
Intracellular signalling
Cell activation mechanisms in tissue regeneration
Cell printing biomaterials
In-situ tissue regeneration and control
Bioreactor technology
Self repair mechanisms
Power systems: nanorobots, EAPs, nanoengineered biofuel cells
Biomechanics of soft and hard tissues
Biofunctionality, bio compatibility and toxicological issues
Theory, modelling and numerical simulation
Biomaterials with controlled bioresorbable behavior
Soft matrices for cell encapsulation and delivery

FO-5 Targeted delivery, controlled release systems and nanotheranostics

Molecular, cellular and higher levels targeting
Systems for targeted delivery of drugs, peptides, proteins, growth factors,
gene therapy agents and vaccines
Carrier materials: liposomes, micelles, dendrimers, micro/nanocapsules, hydrogels,
molecularly imprinted polymers, macromolecular conjugates, mesoporous inorganic materials
Drug targeting and targeting and imaging agents to site/specific delivery
Antibody targeting
Controlled release systems
Bioinorganics and metal ion releasing systems
Theranostic nanoparticles: synthesis and characterisation
Pharmacokinetics and pharmacodynamics
In-vitro and in-vivo studies and models for drug transport, absorption metabolism and retention mechanisms
Clinical applications
Biocompatibility and safety issues
Nanotheranostic platforms for cancer, cardiology, CNS disorders

FO-6 Materials for neural interfaces and implantable neural devices

Electrical neural interfaces, multi-electrode arrays
Optical neural interfaces
Neural signal sensing and processing
Neuromodulation (peripheral nervous system, brain)
Materials for neural interfaces (soft hydrogels, ECM polymers, nanotubes, nanowires,
bioinspired smart nanocomposites, thin film based electrodes, functionalised optical fibres…)
Micro and nano surface engineering for neural devices
In-vitro studies
Neuroprosthetic devices (hearing, vision, neural disorder..)
Implant-nervous tissue interactions, biocompatatibility, degradability, long term functionality

FO-7 Progress in implant prosteses

Craniofacial, dental, orthopaedic, cardiovascular
Selection criteria for materials
Modelling of tissue/implant systems
Micromechanics of tissue/implant interface
Models of macromechanical behaviour of prostheses
Computer aided design of prostheses
Biofluid mechanics
Molecular biomechanics and simulation
Biomaterials degradation (interface and systemic effects; swelling and leaching, corrosion and
dissolution, friction, wear, etc..)
Biological mechanisms of implant failure-
In-vitro test methods
In-vivo implant models
Infection combating systems
Lifetime testing and simulation
Case studies of clinical experience

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Special Session FO-8

Smart Polymers for Biomedical Applications

This Special Session succeeds the successful Focused Session A-15 of CIMTEC 2012 whereby concentrates on biomedical applications.
Smart polymeric materials, which have the ability to response to an external stimulus e.g. by moving actively, found their way into several application areas such as packaging, textiles, or aerospace. These materials are as an enabling technology of high scientific and technological significance especially for biomedical applications. In general two categories of such intelligent materials can be distinguished: shape-memory polymers and shape-changing polymers. The progress in material chemistry, characterization techniques, computer-aided modeling, as well as in the understanding of biomaterial tissue interaction enables scientists today to develop active polymer systems in a knowledge based approach. Fundamental research is directed to the application of other stimuli different from heat (e.g. electric current, humidity, light, or alternating magnetic fields), to enable more complex movements on demand, to memorize even other macroscopic properties different from shape, or to realize the effect in polymer systems whose structural characteristics match those of tissue. A strategy aiming at soft smart materials is the creation of swollen polymer systems. On the other hand the creation of composites can be used to strengthen soft materials or to integrate additional functionalities resulting in multifunctionality, which is necessary to fulfill the challenging and complex demands of biomedical products based on smart polymers. A longterm goal is the integration of the different functionalities on the molecular level. The combined expertise of chemists, physicists, biologists, pharmacologists, and materials engineers in interdisciplinary approaches is required to encounter the challenges of innovative material concepts, which will be presented, discussed, and published to foster the scientific exchange of this growing community.

Session Topics

FO-8.1 Shape-memory polymers for biomedical applications
FO-8.2 Shape-changing polymers for biomedical applications
FO-8.3 Light-sensitive polymers for biomedical applications
FO-8.4 Smart composites for biomedical applications
FO-8.5 Biomedical applications based on degradable, stimuli-sensitive polymers
FO-8.6 Multi-material systems for biomedical applications
FO-8.7 Smart, swollen systems for biomedical applications
FO-8.8 Smart polymers in polymersomes and vesicles for biomedical applications
FO-8.9 Smart polymers in biomedical applications

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Special Session FO-9

Wearable and Implantable Sensors and Body Sensor Networks

Economic and social changes are playing a fundamental role on the development of healthcare systems so like they led to the transition from desktop computing and communication tools to portable devices. Thanks to these rapid advances in physiological sensors, microsystems, low power integrated circuits and wireless communication capability, portable devices for healthcare monitoring have become practically feasible. A wide range of research fields are interested in wearable wireless and implantable body sensor technologies from the civilian to military area. In particular, in the healthcare domain wearable/wireless body sensor network systems (BSNs) can lead to develop services such as medical monitoring, control of medical data management and emergency communication. A continuous monitoring and possible control of the health status will lead to early detection of emergency situations especially for people suffering from chronic diseases. However, in order to develop systems which provide high-quality care services further progress is needed in terms of unobtrusiveness, multi-sensory data integration, scalability, energy efficiency and security.

Contributions are welcome on the following or related topics:

FO-9.1 Sensor technology, reliability, long-term stability, biocompatibility
FO-9.2 Smart fabrics and wearables
FO-9.3 Wearable and implantable sensor systems
FO-9.4 Energy harvesting and management
FO-9.5 Low power electronics, interconnects, antennas
FO-9.6 Sensor network architecture, techniques and modeling
FO-9.7 Signal processing and data transmission
FO-9.8 Applications and case studies

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INFORMATION TO AUTHORS & PARTICIPANTS

Venue

Montecatini Terme is an internationally renown Spa and tourist resort in the environments of Florence, the historical centre of the European Renaissance. The town is placed in a strategic position to reach the most renowned historical and tourist places in Tuscany, such as Florence, Pisa, Siena, Pistoia, "Le Cinque Terre (Five Lands)", and several others.
The congress will be held at the Palazzo dei Congressi, located in the heart of Montecatini Terme, within walking distance from the hotels.
Due to the need for a very large number of parallel sessions, some Symposia will possibly be held in additional meeting rooms, very close to the Palazzo dei Congressi (2-4 min walking distance).

Scientific Programme

The scientific programme will consist of Opening (Key-Note) Lectures, Invited Lectures and Oral and Poster contributions. English will be the official language of the conference.

Abstract Submission

Abstracts are to be submitted on-line by the *Presenting Author* and prepared according to the on-line Abstract Instructions available at the Conference web site:

www.cimtec-congress.org

Electronic submission ends on October 15, 2013.
Acceptance notification will be provided by December 15, 2013.
Multiple abstracts from the same *Presenting Author* are not accepted, in order to open opportunities for the broadest possible participation. Abstracts of previously unpublished matter shall only be submitted.
Abstracts of all scheduled oral and poster presentations will be made available on the conference web site to all registered participants at least 15 days in advance of the Conference.

Presentation Formats

Oral Presentations

Electronic presentation (Power Point) facilities will be available including LCD high resolution projector, PC and laser pointer. Slide projectors will not be available. Cost for any special audio-visual request will be the responsibility of the individual speaker.

Poster Presentations

Authors are kindly asked to follow carefully the guidelines for Poster Preparation available at the conference web site. Attendance by at least one of the authors is requested for poster presentation and publication in CIMTEC 2014 Proceedings.

Proceedings

Official Proceedings (about 20-25 volumes) of CIMTEC 2014 will be published by Trans Tech Publications (Switzerland) in the Techna Group series "Advances in Science and Technology" as Volumes 87 onwards.
Submission and uploading instructions will be provided by Trans Tech Publications in February 2014 to the Presenting Author of each paper. Submission of the written text for the Proceedings is not mandatory. Free access to the on-line edition is included in the registration fee.

Social Programme

The Social Programme will include various social activities. Details will be given in the Final Announcement.

Companions Programme

Guided visits to Florence, Pisa, Siena and other places of high historic, artistic and tourist interest will be available to companions. Detailed programme and registration information will be provided in the Final Announcement.

Provisional Registration

Prospective participants are kindly requested to **Pre-register** at CIMTEC 2014 website.
Presenting Authors shall not Pre-Register as they are automatically filed when submitting the Abstract.
The Final Announcement including the Provisional Programme, the Final-Registration Form and the Hotel Booking Form will be made available by **March 15, 2014**.

Registration Fees

Early *(by April 20, 2014)*	**Ceramics Congress**	**Forum**
Full Member	690.00 EUR	670.00 EUR
Student under 27	420.00 EUR	400.00 EUR
Late and on site		
Full Member	740.00 EUR	720.00 EUR
Student under 27	470.00 EUR	450.00 EUR

Fees include 21% VAT, general and secretariat costs, participation in the scientific sessions, coffees, printed booklet of the final programme, Book of Abstracts and other conference material, participation in the Social Programme and the free access to the on-line Proceedings.

Accommodation

Hotels for all pockets are available in Montecatini Terme. Half Board (HB) prices range from about 50 EUR/day for two-stars hotels to about 160.00 EUR/day for five-stars luxury hotels. Further information and hotel booking forms will be provided with the final announcement and in the web.

INFORMATION TO AUTHORS & PARTICIPANTS

Visa Application

All travel, lodging and registration expenses will be the responsibility of the individual participants. Special letters of invitation to be used for Visa application will be provided upon written request to the Conference organizers.

Weather

The weather in Montecatini Terme at the beginning of June is usually fine with temperatures ranging from 20 to 25 °C during the day and 12 to 15 °C during the night. Clothing suitable for (early) summer is recommended.

How to reach Montecatini Terme

By plane:
To Florence International Airport "Amerigo Vespucci"
To Pisa International Airport "Galileo Galilei".

By train:

From Florence: train connections to Montecatini Terme are excellent and very frequent (every hour). Travel time from the Florence Central Railway Station to Montecatini Terme railway station (Montecatini Centro) is about 50 minutes .

From Pisa: line Pisa-Lucca, then line Lucca-Montecatini Centro. Travelling time from the Pisa Airport or downtown Pisa railway station to Montecatini Terme (via Lucca) is about 90 minutes.

By car:
Montecatini Terme can be reached easily by car from any direction via the network of Italian highways. The exit to Montecatini Terme is located midway between Florence and Pisa on the Firenze-Pisa (Florence-Pisa) express-way which is connected directly with the Central Italian expressway the "Autostrada del Sole" ("Sun Highway").

SUMMARY OF DEADLINES

October 15, 2013
Submission of Abstract

December 15, 2013
Notification of Abstract acceptance

April 20, 2014
Paper uploading for Proceedings Volumes

April 20, 2014
Registration at reduced rate

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