CALL FOR PAPERS

Astract Deadline • October 15, 2017

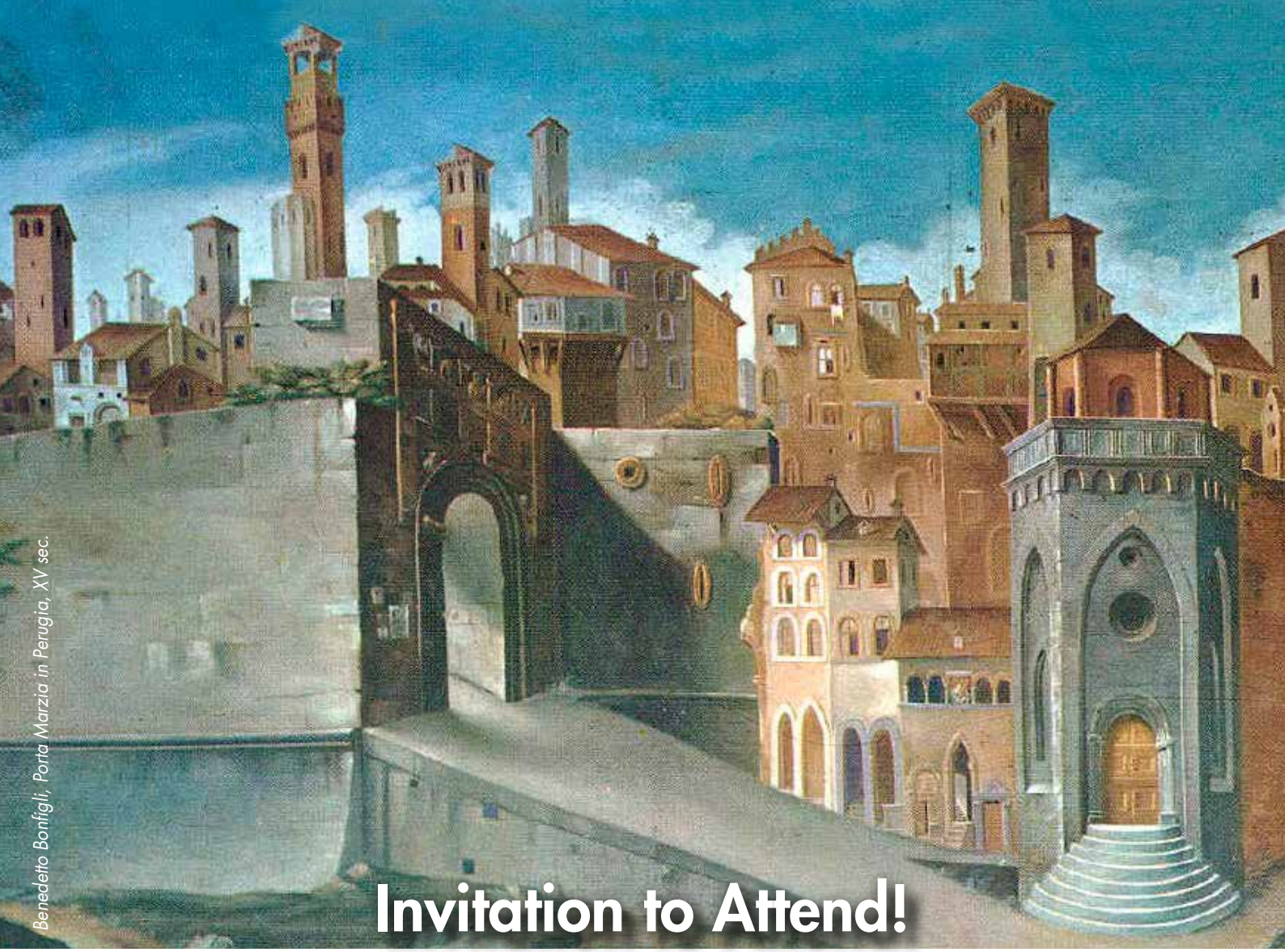
Perugia - Italy • June 4-14/2018

CIMTEC 2018

14th International Ceramics Congress
June 4-8/2018

8th Forum on New Materials
June 10-14/2018

www.cimtec-congress.org



Benedetto Bonfigli, Porta Marzia in Perugia, XV sec.

Invitation to Attend!

CIMTEC 2018 - 14th International Conference on Modern Materials and Technologies - will be held in Perugia, Italy, June 4 to 14, 2018. CIMTEC 2018 will consist of the 14th International Ceramics Congress (June 4-8) and of the 8th Forum on New Materials (June 10-14), each of them including a number of Symposia, Special Sessions, and Conferences. As a major longstanding event for the international materials community, CIMTEC will again gather together a large and qualified audience of materials scientists, physicists, chemists and engineers and 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 National Research Council of Italy (CNR), the Italian National Agency for New Technology, Energy and the Environment (ENEA) will act as major endorsers of CIMTEC 2018 together with the World Academy of Ceramics (WAC), The International Ceramic Federation (ICF) and the International Union of the Materials Research Societies (IUMRS).

The Chair, Co-Chairs and CIMTEC 2018 Committees invite you to foster the progress in the field by contributing with your expertise to what promises to be a very comprehensive and exciting meeting, and to enjoy the immense unique artistic heritage and wonderful landscape of Umbria district.

Pietro Vincenzini
General Chair CIMTEC Conferences
National Research Council, Italy

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CIMTEC 2018

CIMTEC 2018

Perugia, June 4-14, 2018

14th International Ceramics Congress
June 4-8, 2018

8th Forum on New Materials
June 10-14, 2018

Symposium CA

Progress in Powder Processing Science and Manufacturing for Advanced Ceramics and Composites

The classical route based on powder synthesis, processing and sintering keeps up its relevant role in the mass production of advanced ceramics. This despite the increasing palette of available emerging processing methods.
R&D in this area is especially focused on innovative synthesis of high performing (e.g. nano) powders and their processing with highly reliable, predictable, cheaper and clean production cycles.
Of interest to this symposium, that follows the ones on the same subject of previous CIMTEC Conferences, are oxide and non oxide dense or porous bulk materials and particulate composites that find extensive use in an expanding range of room and high temperature civilian, industrial and defense applications.
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 and nano structure for desired performance in the final products are main topics for this symposium. In all focus areas of interest to this symposium, developments in both experimental and theory and simulations will be the topics of discussion. Innovations in manufacturing allowing a more rational use of raw materials and less labour and energy may also be discussed.

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
Freeze drying
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

CA-3 Shape forming and green body processing and characterization

Surface chemistry in ceramic forming
Role of and new processing aids
Improved mixing/granulation procedures
Conventional and microwave drying
Advances in shape forming (pressing, moulding, injection moulding, slip/tape casting, plastic forming,..)
Emerging forming methods (freeze casting, gel casting, additive free forming…)
Forming of large/complex shape components
Green body characterisation and processing
Debinding processes
Computer-aided processing
Modelling and simulation of forming and consolidation

CA-4 Sintering

Free sintering (solid state, liquid phase, transient-liquid sintering, reactive sintering)
Constrained sintering
Pressure-assisted synthesis (HP, HIP, gas pressure synthesis)
Atmosphere-controlled sintering
Grain growth and micro/nanostructure evolution and control
Refined interfaces characterisation
High fidelity characterization of the sintered microstructures
Control of porosity during sintering

Simulation of sintering and interface dynamics
Effects of sintering additives
Nano/micro structure control by powder processing
Structural and functional properties characterization and property/structure relationships

CA-5 Innovation in fabrication and technology

Novel powder processing approaches for energy efficiency and environmental compatibility
Recent trends in powder based ceramic manufacturing processes
Challenges in lab to factory transitions for ceramics
Case studies of industrial practice from powder synthesis to final product

Symposium CB

Non Conventional and Emerging Routes to Advanced Ceramics

This symposium will cover recent progress and emerging novel approaches in a number of non conventional or novel processing techniques capable of embodying ceramic materials with unique properties not possible 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 and hierarchical nanostructures, fibers, thin and thick films, and laminated, composite, graded and hybrid structures. 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 for a range of ongoing and potential applications will be enlightened as well as advances on the state-of-the-art computation applied to the design of materials and processing, and novel characterization and imaging tools..
Sessions will encompass solution based processing routes, non conventional and novel forming and sintering techniques with particular emphasis on electric field- and pressure-assisted techniques and microwave processing, latest advances in polymer derived ceramics and in layered, functionally graded materials and hybrid structures. A session will offer place to contributions highlighting general issues related to energy, environmental and material saving aspects for sustainability. Finally, three Focused Sessions on *"Bio-inspired and Bio-enabled Processing"*, *"Additive Manufacturing"* and *"SHS Ceramics"* will substantiate the Symposium programme.

Session Topics

CB-1 Solution-based processing

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

CB-2 Polymer derived ceramics

Design and synthesis of novel preceramic polymers
Conversion mechanisms to oxide and non-oxide ceramics
In situ formation
Advanced and innovative fabrication techniques for precursor-derived monoliths, fibers, metal-ceramics and ceramic-ceramic composites, hybrid materials, coatings, membranes, foams
Nanostructure characterisation
Structural and functional properties
Modelling of materials, processes and functions
Engineering and industrial applications

CB-3 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

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CB-4 Electrical field and pressure assisted synthesis and sintering

Fundamental mechanisms and control of SPS and FS
Modeling and simulation of electrical field and flash activated densification
Consolidation phenomena, phase constitution
Property evaluation
SPS hybrid techniques

CB-5 Functionally Graded Materials

Design criteria synthesis and processing of FGM bulk materials, composites and hybrids
Functionally graded thin films and coatings
Characterization, structure and functionality
GMs for (and in) mechanical and thermomechanical applications
FGMs for (and in) functional and multifunctional applications
Modeling and simulation of materials and processes

CB-6 Other non traditional or novel routes

Cold sintering
Electrophoretic forming
Ultra-high Pressure Materials Synthesis
Shock materials synthesis and compaction
Microgravitational Processing
Directional Solidification from Eutectics
Fluxs synthesis
Controlled crystallization of Undercooled Glasses
Others

CB-7 General Issues on Green and Sustainable Manufacturing of Advanced Ceramics

Energetic and environmental aspects of green ceramic processing
Rare and strategic materials substitution, conservation, recovery and recycling
Life-cycle assessment for sustainability

Focused Session CB-8

Bio-inspired and Bio-enabled Processing

Complex multifunctional nano structured materials with peculiar and specially designed electrical, magnetic, electro chemical, bioresponsive and structural properties resulting from bio inspired processing routes are stimulating growing research as they involve such diverse areas as molecular recognition and self assembly, self healing, hierarchical patterning, biotemplating and microorganisms-mediated materials synthesis.
Covered by this Session, that follows the ones on the same topics held in previous CIMTEC Conferences, will be topics ranging from the biomolecular- directed growth and microstructure pattern formation of ceramic meso/nanostructures in bulk and thick/thin film, organic-ceramic composites and hybrids, ceramic-metal heterostructures to their embodying with special functionalities for a number of potential applications in, e.g., high performance light-weight structures, efficient biosensing materials and catalysts, improved biomedical materials with stimuli-adaptive, self-assembly and self-repairing properties and in electronic, optical and photonic devices.

Session Topics

CB-8.1 Self-assembly, mineralization and hierarchical organization; hybrid structures
CB-8.2 Structure and mechanics of bioinspired materials
CB-8.3 Bioinspired functional surfaces
CB-8.4 Smart bioinspired materials (e.g. self healing, adaptive, stimuli-responsive)
CB-8.5 Bioinspired cellular materials and lightweight structures
CB-8.6 Bioinspired materials for biomedical applications
CB-8.7 Modeling and simulation of processes and structures
CB-8.8 Application and performance of bioinspired materials

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Focused Session CB-9

Additive Manufacturing

Additive manufacturing (AD) includes a very different range of green and cheap fabrication techniques in which a solid physical model of the part is made directly from a 3-D Computer-Aided Design (CAD) file so offering a new freedom to shape complex parts without the constraints imposed by forming, machining, or joining. Depending on the specific AD technique, (multi)layered ceramics, membrane-like ceramic structures, complex shaped bulk dense or porous ceramics may be fabricated by versatile, client customizable, cost effective and environmentally conscious procedures.
This Focused Session, which follows the ones on a similar subjects held in previous CIMTEC Conferences, will address recent achievements e perspectives in AD technologies, applicability, advantages and shortcoming of each particular technique and manufacturing issues, properties and reliability of products and components.

Session Topics

CB-9.1 Selective Laser Sintering
CB-9.2 Laminated Object Manufacturing
CB-9.3 Fused Deposition Modelling
CB-9.4 Stereolithography
CB-9.5 Direct writing
CB-9.6 Powder bed fusion
CB-9.7 Other/emerging AD routes

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Special Session CB-10

SHS Ceramics

The remarkable improvements in the SHS process underwent within the last several 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 Focused 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-10.1 Theory and modeling of SHS processes and structural transformations

CB-10.2 SHS of powders from the micro- to nano-scale. Consolidation of the SHS-powders (sintering, HP, SPS, HIP, etc.)

CB-10.3 SHS of bulk materials (functional and structural ceramics, composites, metal/ceramic composites, foams...)

CB-10.4 Solution combustion synthesis of ceramic nanopowders and materials

CB-10.5 Application and industrialization

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CIMTEC 2000 - The delegation from ISMAN, Russia: A.S. Rogachev, late Alexander Merzhanov, I. Borovinskaya, V.I. Yukhvid and Yu.G. Morozov.

Symposium CC

Ceramics and Composites for Enhanced Tribologic and Corrosion Performance in High-demanding Applications

Several developments in materials science have expanded the quest for corrosion and wear resistance of ceramics. Examples are the advance of biomaterials and biomimetics, which necessitate finely engineered surface and volume structures, causing new problems for their reliability due to contact mechanics and/or chemical attacks already in mild wear conditions. Likewise, the higher performance capabilities of new material classes such as hybrid composites from organic and ceramic materials shifts the application limits to be defined by tribologic and corrosion resistance. Environmental barrier coatings have become an important subject for corrosion and wear studies. Revisions of old concepts bring new life to the development of applications for cement-based materials with according demands for the characterization under wear and adverse environmental conditions. New lightweight structures from 3D generative manufacturing and other porous, structured and multiphase materials bring new challenges for the modelling of materials under chemical and mechanical loading.

This symposium, that follows the ones on the same subject of previous CIMTEC Conferences, will update progress in fundamental aspects and mechanistic understanding at micro- and nano-scale of the corrosion, friction and wear behaviour in a variety of high demanding conditions. It shall also outline basic criteria and technical achievements in devising routes for improved corrosion and tribologic resistance.

Materials covered include: i) oxide and non-oxide ceramics in form of thin films, coatings, composites and bulk material; ii) hybrid materials: metal-ceramic and polymer-ceramic based composites and nanocomposites; iii) fullerenes, graphene, diamond, DLCs and other carbon-based materials.

Furthermore, we seek for contributions which demonstrate state-of-the-art and improvements in the modelling and simulation of corrosion and wear across the different orders of time and length scales and covering structural and microstructural studies linked to property changes.

Session Topics

CC-1 Friction and wear

Fundamentals of friction, contact mechanics, wear, adhesion, and lubrication
Coatings, surface engineering and nanostructuring
Self-lubricating surfaces, solid lubricants
Friction and wear at micro/nanoscale
Theoretical studies and computer simulations
Testing and characterization
Tribology related applications

CC-2 Corrosion

Basics of corrosion processes: thermodynamics and mechanisms
Measuring corrosion: testing methods and evaluation strategies
Simulating corrosion: kinetic laws, analytical and numerical description
Corrosion of porous materials and powders
Corrosion by fluids: gases, water, solutions, hydro/solvothermal conditions, physiological fluids
Melt corrosion: hot corrosion, natural and artificial slags and metal melts
Relations between erosion, wear and corrosion
Corrosion damage: mechanical and physical property changes and lifetime prediction
Corrosion protection: Surface structuring, barrier coatings and their interaction

CIMTEC 2006, Acireale, Sicily. Carlo Montemagno, UCLA, USA, delivers his Keynote Lecture on "Molecular Engineering Biomimetic Materials and Systems".

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Symposium CD

Joining of Inorganic Materials: From Macro- to Nano-length Scales

The demand for joints of ceramics, glasses and their composites is still growing. New applications ranging from nano- and micro-mechanical systems to space components are continually being innovated. They require specialised joining solutions that enable the utilisation of the materials´ unique properties to meet complex end-product requirements. Challenges arise when components of differing materials with often incompatible behaviour must be joined. The understanding across length scales and research disciplines is thus crucial for the development of, reliable, fast and energy-efficient routes for inorganic materials integration in nano-, micro- and macro-scale devices and systems. The nano-scaled surfaces and interfaces of the materials need to be understood well and functionalized, as their properties ultimately control the reliability of material joints and systems at macroscale.

This symposium, which follows the ones held on similar subjects at previous CIMTEC Conferences, will discuss fundamental and practical issues of the joining of inorganic materials, at different 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; joining techniques (soldering, brazing, solid state and transient liquid phase diffusion bonding and microwave/laser/electron beam welding, nano-bonding and sintering, femtosecond laser irradiation joining, ultrasonic nano-welding..); joint characterisation and testing; lifetime and reliability predictions of joints, and their in-service performance.

Contributions to every aspect of materials joining, from nano-materials science, theory of interfaces to practical issues of joining techniques are welcome. Specific matters on which the authors are encouraged to submit contributions include: i-Nano-materials science for joining inorganic materials; ii-Modelling of materials joints and processes at different length scales (from atomic scale modelling of interfaces to engineering scale simulations); iii-Experimental and theoretical studies on thermodynamics, diffusion kinetics, wetting and adhesion; iv-Control of the structure and properties of joint surfaces and interfaces; v-(Nano-/Micro-/Macro-)Joining of ceramics, glasses, composites; vi-Application engineering from micro- to macro-scale.

CIMTEC 2010, Montecatini Terme. Sumio Iijima, Mejo University, Japan, Plenary Speaker at the Inaugural Session, delivers his talk on "Nanoscience and Nanotechnology".

A special focus will be put onto the development of joining processes by controlling the surface and interface properties at the nano-scale.

Session Topics

CD-1 Nano-scale interface of dissimilar materials
Interface science for integration of inorganic materials
(Nano-)Thermodynamics and kinetics of interface formation
Mechanisms of wetting and adhesion
Characterisation and control of interfaces for high quality joints

CD-2 Micro-/nano-joining
Mechanisms and materials science of micro-/nano-joining
Nanoscale effects
Micro-/nano-joining techniques
Development of nanostructured joining materials

CD-3 Macro-joining
Advances in joining methods and materials
Joints of dissimilar materials
Prediction, measurement and control of residual stresses
Joint behaviour (strength, thermal and chemical stability, reliability...)
Joint modelling, design, characterisation and analysis

CD-4 Application engineering
Joining and integration issues at the macro-, micro- and nanoscales in diverse areas
Joining of nanostructures and their integration into devices and systems
Joining techniques for microelectromechanical systems and microelectronic packaging
Space, automotive, energy, biomedical and other ongoing or forecast applications

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Symposium CE

Frontiers in Nanostructured, Nanocomposite and Hybrid Functional Materials for Energy and Sustainability

Advances in synthesis and engineering of functional nanomaterials now provide the possibility of fabricating powders and thin films with atomically precise structures and defined phase boundaries. Such interfacial materials can generate electronic systems that nature does not produce in the bulk and can therefore complement existing technological concepts and invent new ones. Functional nanostructures and hetero-structures with hybrid compositions and interfaces offer unique platform for designing materials architectures for device applications. The possibility of creating well-defined interfaces and the opportunity of connecting different materials can generate novel electronic phases and lead to unprecedented phenomena at oxide-oxide junctions, for instance, two dimensional electron gas behavior. Besides the size and surface effects, the modulation of electronic behaviour due to junction properties leads to new synergies and concepts for purpose-driven synthesis of multimaterial architectures. The growing possibilities of engineering nanostructures of various compositions (pure, doped, composites, heterostructures) on different substrates has intensified the research on the integration of different compositions in multi-layers and stacked systems, which warrants an intensive exchange of information among materials developers and device engineers.

Moreover, advancement in the controlled synthesis and processing of nanostructured, nanocomposite and hybrid functional materials offers the greatest potential to efficiently contribute to essential goals of environmental sustainability, for instance, by discovering processes that are ecological and will enable both energy and resource efficiencies to offer a circular materials economy.

This symposium will focus on the multifunctional 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. 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 nano-materials 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 and Composites 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 and ceramic matrix composites 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

New materials and novel synthesis routes
Production of nano-powders, coatings, and engineered architectures
Carbothermal and borothermal reduction
Polymer derived ceramics and solution synthesis routes
In-situ reaction synthesis
Shape forming methods such as pressing, tape casting, extrusion, etc.
Additive manufacturing and net shape forming
Densification kinetics
Pressureless sintering
Spark plasma sintering
Directionally solidified eutectics
Ultra-high temperature ceramic matrix composites

CIMTEC 1998, Florence. A.J. Bement Jr. delivering the Keynote "Benchmarking National Leadership in Materials Science and Engineering"

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 and in-operando characterization under extreme conditions
Electron microscopy and high resolution imaging
Emerging characterization tools for structural materials
Spectroscopic methods
Thermodynamic and kinetic studies

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Symposium CG

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

This Symposium aims at being an international forum in which the different aspects of the MAX phases and other layered carbides and nitrides and their 2D derivative 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 70, with new ones, especially 413's and solid solutions still being discovered on a routine basis. The recent discovery of out of plane ordering, (o-MAX) and in-plane ordering (i-MAX) phases and their 2D derivative have greatly enriched and invigorated the field. The re-discovery of layered transition metal borides (MAB) phases that share some, but not all, similarities with the MAX phases is also a new and exciting

The International Symposium *"Progress in Nano-laminated Ternary Carbides Nitrides and Borides (MAX/MAB) Phases and Derivatives Thereof (MXenes)"* will focus on the latest advances in understanding the chemistry/processing/properties/microstructure relationships in the MAX/MAB 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 these novel, exciting and unusual phases.

Session Topics

- **CG-1 Bulk and thin film transport properties of the MAX/MAB/MXenes**
- **CG-2 New MAX/MAB/MXenes**
- **CG-3 Room temperature mechanical properties of the MAX/MAB/MXenes**
- **CG-4 High temperature mechanical and oxidation properties of the MAX/MAB/MXenes**
- **CG-5 MAX/MAB and MXene composites and their properties**
- **CG-6 Electronic properties, *ab initio* calculations and structural characterization**
- **CG-7 Synthesis and fabrication of MAX/MAB/MXenes**
- **CG-8 Functional properties of MAX/MAB/MXenes**
- **CG-9 Energy storage**
- **CG-10 Applications of the MAX/MAB and MXene phases**

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CIMTEC 2006, Acireale, Sicily.

Symposium CH

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 nanostructuring 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

CH-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

CH-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

CH-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.

CH-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
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.

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In-situ diagnostics, multiscale modelling and novel design and testing strategies
Lifetime and reliability issues

CH-5 Smart and multifunctional thin films and coatings
Self cleaning, catalytic, anti-microbial, anti-smog, antireflection, self-healing damping coatings and films
Passive and active coatings that respond to electrical, magnetic, and optical inputs
Coatings that respond to chemical and bio-based stimuli

CH-6 Modelling and simulation of coatings and films
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

CH-7 Industrial processing in advanced surface technologies
Robotics and robot kinematics, manufacturing and industrial engineering

Symposium CI

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

CI-1 Novel processing and synthesis of porous ceramics (nano to macro), including Additive Manufacturing

CI-2 Absorption, capillary phenomena, molecular thermodynamics of fluids and intermolecular interactions within the porous network

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

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

CI-5 Modeling and simulation of porous structure and properties

CI-6 Progress in applications of porous ceramics in:
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 CJ

Advances in Electroceramics: Processing, Structure, Properties, and Applications

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 and ionic and mixed ionic electronic conducting ceramics 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 fuel cells, batteries, high energy density capacitors, gas separation membranes, tunable dielectrics for microwave applications, piezoelectric composites, sensors and actuators, MEMS/NEMS devices, and related integration technologies.

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

CJ-2 Ferroelectric, piezoelectric, pyroelectric, and ferroelastic ceramics
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 and magnetoelectric ceramics
Theory and modeling of single phase and composite multiferroics
Non-oxide, organic-inorganic and 5-d oxide multiferroics
Advances in materials synthesis and processing
Magnetoelectric characterization and electric field control of magnetization
Domain walls and dynamics of multiferroics
New effects
Devices and applications

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CJ-4 Semiconducting ceramics
Amorphous and crystalline semiconducting oxides
Non-oxide semiconductors
Synthesis, processing,characterisation
Defect chemistry, doping mechanisms, carriers origin and dynamics
Devices 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
Applications (e.g. energy conversion and storage, sensors, HT gas separation, catalysis, etc.)

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 hetero-structures, 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 hetero-structures

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

"Manipulation of a Magnetic Moment by Spin Transfer" was the Invited Lecture delivered by Nobel Prize Albert Fert at CIMTEC 2006, Acireale, Sicily.

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Symposium CL

Inorganic Materials Systems for Advanced Photonics

The fruitful exploitation of optical ceramics and glasses and related photonic structures and devices as crucial pivots for the development of several enabling technologies provides a large spectrum of functionalities that allow us to face successfully socio- economic challenges in many fields going from energy production and saving to efficient and clean industrial cycles, from environmental protection to fast efficient novel communication systems, from structural monitoring to quantum technologies and to healthcare applications.

This Symposium, that follows the several ones on similar subject held at previous CIMTEC conferences, is to provide latest insights on fabrication, characterization and exploitation of photonic structures based on ceramics (oxides, oxynitrides, fluorides, sulphides, chalcogenides, etc...) inorganic non-metallic glasses, glass- ceramics, and ceramic/metal and glass/metal combinations in the form of nanostructured, bulk and graded materials and coatings, fibres, thin films, superlattices and other small confined systems, nanomaterials, nanocomposites and functional nanoparticles.

Focus will be on theory, modelling and simulation of materials and processes, green and advanced fabrication protocols (self assembly, particle beams, light irradiation, micromachining, colloidal processing...) and up-to-date characterization of structure, non-linear optical properties, tunability, nanosize effects etc. of novel inorganic photonic materials systems for light generation, detection, and manipulation including e.g. luminescent and laser materials, smart optical fibres, active plasmonic heterostructures, novel confined nano-micro structures etc. covering the UHV-IR electromagnetic spectrum.

Contributions from Academia and industry on upgraded or novel application and prospective new approaches to photonic-based technologies are also firmly encouraged.

Session Topics

CL-1 Photonic nanomaterials and nanostructures
- Optically active colloidal nanoparticles,nanowires,1D and 2-D nanomaterials, nano/micro cavities...
- Optically active nanostructured materials
- Plasmonic nanostructures

CL-2 Luminescent and chromogenic ceramics and glass systems
- Phosphors
- Scintillators
- Other luminescent materials
- Chromogenic materials

CL-3 Transparent conducting and non-conducting ceramics
- Transparent Conducting Oxides (TCOs)
- Non-Oxide transparent conducting ceramics
- Insulating/dielectric transparent ceramics

CL-4 Electro-optical and magneto-optical materials
- Electro-optical and magneto-optical ceramics
- Electro-optical and magneto-optical functionalized glass systems

CL-5 Laser materials
- Fiber laser
- UV-Vis-NIR-MIR-laser materials
- Photonic crystals for laser applications
- Novel laser crystals

CL-6 Inorganic optical fibers
- Passive, low-loss optical fibers
- Active and smart optical fibers

CL-7 Photons management
- Lasers
- Waveguides
- Luminescent systems
- Frequency conversion
- Switches, modulators
- Sensing
- Imaging
- Single photon sources and detectors
- Integrated optics

CL-8 Advances in characterization techniques
- Synchroton radiation based technologies (NEXFAS, 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 and innovative tools

CL-9 Ongoing applications and forecasts
- Solid state lighting, displays
- Optical communications
- Quantum technologies
- Bioimaging
- Healthcare
- Clean energy
- Aerospace, defense, security
- Structural health monitoring
- Laser-assisted manufacturing and micro/nano fabrication

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Symposium CM

Science and Technology for Silicate Ceramics

Silicate ceramics account for over 80% of the ceramic industry turnover 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. In such a competitive and dynamic landscape, process and product innovation proved to be the key for growth. Ceramic technologies have been continuously upgrading and manufacturers are looking to industry 4.0 processing systems. The purpose of this symposium is to focus interest on ongoing R&D activities on silicate ceramics: 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 on the properties and behaviour of materials, quality assurance, development of new ceramic products and manufacturing technologies.

Session Topics

CM-1 Smart silicate ceramics
There is an increasing industrial concern on technologies able to provide additional properties to silicate ceramic surfaces, turning them capable of reacting with the environment, so that the ceramics become an active element contributing to the control of the environment and to the energetic sustainability. Contributions on functionalized surfaces (self-cleaning, bacteriostatic or providing high reflectance, controlled grip, wear resistance, magnetic shielding, thermo-hygrometric comfort or energy harvesting) as well as durability, efficiency, scale-up to large surfaces, and testing procedures of multifunctional silicate ceramics are welcome.

CM-2 Green silicate ceramics
Social and technological challanges require a further effort to improve the sustainability of ceramic manufacturing. This session will take stock of technological solutions and processing innovation in the silicate ceramic industry (tiles, sanitaryware, glazes, bricks, etc). A special focus will concern health and environmental issues (e.g., CO2 emissions, crystalline silica, green certificates, reduction of wastes originated during processing) and all aspects of valorization of residues as raw materials in the manufacture of ceramics.

CM-3 Coating and decoration of silicate ceramics
The new scenario drawn by the advent of digital technologies is continuously evolving from decoration towards application of special effects, glazes and functional coatings. The last advances in surface coating and decoration by ink-jet printing and further drop-on-demand technologies will be reviewed. This session deals with materials development and behaviour (ceramic inks, engobes, effects, glazes, etc) including environmental sustainability and green chemistry in colorant manufacturing.

CM-4 Innovative processing in silicate ceramics
The ceramic industry has to tackle the challenges coming from evolving market demand, new construction systems and product standards. This session will focus on innovative manufacturing of silicate ceramics (e.g., large slabs, 3D printing, novel granulation systems, etc) and progress in the processing of composites and geopolymers.

CM-5 Geopolymers
Preparation and characterization: Synthesis and processing; Geopolymerization kinetics; Conversion to ceramics; Composites; Microstructure; Thermal properties; Mechanical properties; Chemical stability and adhesion. *Applications:* Geopolymer concrete; Waste immobilisation; High-technology applications (electronic properties, bioactivity, catalysis); Commercialization issue.


CIMTEC 2012 - Montecatini Terme. Poster Session.

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Symposium CN

Refractories: Meeting Refractory Industry Needs of Today and It's Future Challenges

This symposium will focus on the current "state of the art" in refractory liner materials and on the advances needed in material performance for existing and/or new processes, or by needs caused by modifications of existing ones. Drivers for change; such as rapid changes in raw material availability, environmental concerns, technology changes, or the need for relevant information on refractory material properties or causes of failure; will be discussed. Symposium topics will range from the refractory raw material formulation, manufacture, testing and installation; to analysis of refractory wear/failure causes; to controlling refractory wear and improving liner material performance using existing and/or advanced analytical tools or thermodynamic process modelling; to the increased energy, environmental, and education needs of refractory users and manufactures. Contributed papers will cover achievements and challenges from the perspective of either the refractory user, installer, or producer; and will focus on shaped and unshaped (monolithic) refractory materials composed of natural and/or synthetic materials.

Session Topics

CN-1 Raw Materials Needs

Natural raw material, their characterization and performance – including changing industry needs and material sustainability

New/improved refractory raw materials and additives (natural and synthetic) to meet shifts in refractory performance needs

Raw material phase relationships and reactions occurring during product installation, sintering, or use that impact microstructure development and/or product performance

CN-2 Product Testing and Quality Control

Testing and improving physical properties; such as thermal shock, spalling, hot strength, fracture resistance, creep, thermal conductivity, and MOE

Quality control and analytical tool use to improve refractory product quality, consistency, performance, or that reduce unit cost

Evaluating and controlling monolithic materials property changes that occur during storage, mixing, installation, drying, and firing; including those caused by composition and additives

Continuously monitoring variables and/or material properties related to refractory failure in severe service applications

Microstructure analysis as it relates to material performance (using SEM, TEM, cathodoluminescence, high temperature confocal laser microscopy, optical microscopy, or other analytical tools)

CN-3 Product Manufacturing and Installation

Advances in refractory manufacture, installation, and/or system repair/maintenance

Monitoring refractory performance as it relates to material repair/replacement

CIMTEC 2012 - Montecatini Terme. Closure Dinner at "Le Panteraie".

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CO - 8th 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 the several ones on a similar subject held at previous CIMTEC Conferences) 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
Computational modeling of interfaces/interphases

CP-3 Processing and fabrication of MMCS, CMCS, and C/C composites
Solidification processing, extrusion, rolling, electrodeposition, 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.
Additive manufacturing technologies
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

Materials Issues in Flexible and Stretchable Electronics

Flexible and stretchable electronics is empowering unprecedented approaches to ubiquitous electronics: owing to its mechanical compliance, it offers opportunities for many new applications in energy transformation and storage, deformable displays, wearable electronic systems, memory devices, compliant large area electronics and in bioelectronics.
Major challenges for research is to achieve both excellent long-term reliable mechanical soundness and electronic performance, joined with compatibility with living tissues and low-toxicity when biomedical applications are involved. The intrinsic mechanical properties of molecular and polymeric organic semiconductors in principle render them ideal candidates for a range of flexible and conformable devices. Nevertheless, when very high performing active electronic components are required, inorganic materials and novel nanomaterials may be the preferred options, demanding alternative device architectures to accommodate for the respective mechanical properties.
This symposium aims at presenting timely research in materials, their mechanics, designs, modelling, novel phenomena and techniques enabling the fabrication of flexible, stretchable and ultra-conformable electronics for the diverse fields of ongoing or potential applications, with special focus on demand on materials and prospective solutions.

Session topics

FA-1 Materials and fabrication processes
Emerging Organic, Inorganic and Hybrid active device materials (conductors, semiconductors, dielectrics)
Functional electronic inks for flexible and stretchable electronics
Advanced growing, printing and patterning technologies for flexible and stretchable electronics
Nonplanar fabrication processes
Substrates and encapsulating/barrier materials and methods

FA-2 Device physics, mechanics and design
Charge injection, transport and generation phenomena in materials for flexible/stretchable electronics
Design of highly stretchable/deformable and conformable electronics
Mechanics of thin film deposited on (or embedded in) plastic substrates
Biomechanics of soft biological tissue/device interfaces
Mechanical, thermal and electronic modelling of flexible/stretchable hybrid electronic systems and components

FA-3 Applications of flexible/stretchable electronics
Electronics and optoelectronics: flexible/stretchable thin film transistors, bendable/stretchable/conformable electronic circuits, sensors, light emitting diodes
Flexible energy conversion/storage: solar cells, thermoelectric generators, fuel cells, batteries, supercapacitors, energy harvesters
Biomedical: conformable neural interfaces, implantable soft devices, bioMEMS, prosthetic skin
Transducers: e-textiles, wearable electronics, cyber-skin, flexible MEMS, microsensors, microactuators, etc
Bio-inspired systems in organic electronics for biotechnology and medical applications

CIMTEC 2016, Perugia. Zhong Lin Wang, Georgia Tech, USA, delivering his Plenary on "Nanogenerators for Self-powered Sensors and Piezotronics for Smart Systems".

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Symposium FB

Towards Next Generation Solar Cells: Emerging Materials, Phenomena and Device Architectures

Driven by the recent advances in production capacity and cost reduction, emerging thin film photovoltaic technologies based on chalcogenide semiconductors, amorphous/micromorph silicon and nano/micro/poly-Si are becoming of increasing interest for market segments especially due to their superior performance in integrated applications. Copper zinc tin sulphide/selenide solar cells (CZTS) and their derivatives based on abundant and non-toxic element also are an attractive option, as well as a number of alternative inorganic materials systems that are being actively explored. Dye and nanomaterial-sensitised and organic solar cells are also progressing in terms of efficiency and lifetime and are expected to pave the way to very-low-cost photovoltaics, whereas hybrid organic-inorganic solar cells based on perovskite compounds, being credited for very promising low-cost, high efficiency solar cell technology, will be the object of a Focused Session "Perovskite Photovoltaics".
In order to push the current efficiency limit from 43% towards and possibly beyond the 50% mark, next generation nano-architectured solar cells are being addressed to exploit a whole range of new physical effects like intermediate bands, multiple exciton generation, hot-carriers and up/down conversion.
Success of the above emerging and prospective solutions calls for the availability of reliable materials systems and device architectures capable of efficiently harvesting the full spectrum of solar energy.
The Symposium *"Towards Next Generation Solar Cells: Emerging Materials, Phenomena and Device Architectures"*, which follows those on similar topics held in previous CIMTEC Conferences, provides a forum for materials scientists and experts from industry to discuss major advances in the afore mentioned fields, from latest developments in inorganic thin film/dye sensitized/organic/hybrid devices to new findings and approaches for next generation solar cells, focusing on fundamental materials science and processing, on new concepts and theories for light management, and on device physics, manufacturing, reliability and long-term stability.

CIMTEC 2010, Montecatini Terme, Nobel Laureate Andre Geim giving his Plenary talk "Graphene: Magic of Flat Carbon".

Session topics

FB-1 Thin-film photovoltaics

FB-1.1 Silicon thin films and multi-junction Si solar cells
FB-1.2 CIGS (and related compounds) and CdTe solar cells
FB-1.3 Kesterite and other novel materials/concepts for inorganic thin film PV

FB-2 III-V solar cells

FB-2.1 III-V tandem solar cells (inc. III-V tandems on Si)
FB-2.2 III-V QW and QD solar cells

FB-3 Organic, dye sensitised and nanoparticle photovoltaics

FB-3.1 Small organic molecule and polymeric solar cells
FB-3.2 Dye-sensitised and nanomaterial-sensitised solar cells
FB-3.3 Quantum dot solar cells

FB-4 Multiple energy level devices

FB-4.1 Intermediate band solar cells
FB-4.2 Up or down conversion for solar cells

FB-5 Excited state enhanced solar cells

FB-5.1 Hot-carrier solar cells
FB-5.2 Multi-exciton generation
FB-5.3 Hot luminescence devices
FB-5.4 Other novel concepts

FB-6 Advanced light trapping for photovoltaic devices

FB-6.1 Plasmonic coupling
FB-6.2 Photonic and nanophotonic light trapping

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Focused Session FB-7

Perovskite Photovoltaics

Hybrid and organic solar cells are very promising power sources of renewable energy due to significant progress achieved in their conversion efficiency and processing technology. Among them, perovskite-based hybrid solar cells is an emerging and fastest advancing field capable of combining simple and low cost manufacturing with very high performance, reaching an efficiency beyond 20% and competing silicon-based solar cells. Short-term and long-term stability, potential environmental impact related to the use of lead, innovative device designs, reliable and reproducible processing for large area modules and adequate measurement protocols for solar cell efficiency are among the important R&D issues for this challenging interdisciplinary research area which presents fascinating opportunities across chemistry, solid-state physics, and electronics. The main topics of this Focused Session are related to material preparation and characterization, modelling, device performance, and manufacturing of perovskite-based photovoltaic devices, including lab-made single cells, tandem cells and large area modules. The fundamental properties of hybrid perovskite as semiconductor and ionic crystal will also be important topics for discussion.

Session topics

- **FB-7.1** Material synthesis and processing
- **FB-7.2** Theoretical modelling of materials and devices
- **FB-7.3** Device architecture and optimization
- **FB-7.4** Material and device stability
- **FB-7.5** Design of lead-free new materials
- **FB-7.6** Scale up and module development
- **FB-7.7** Life cycle, environmental study, solar cell efficiency measurement protocols

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CIMTEC 1998, Florence, Palazzo Vecchio “Salone dei Cinquecento” - Inaugural Session.

Symposium FC

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 challenges 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 penetrate the market. 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 effectively implement the hydrogen technology. Furthermore, hydrogen as an intermediate energy carrier for the CO2 reduction to synthetic hydrocarbons is increasingly important especially for mobile and seasonal storage of renewable energy.
"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:

FC-1 Hydrogen production

FC-1.1 Thermochemical
FC-1.2 Photoelectrochemical
FC-1.3 Photobiological and photo-bio-mimetic
FC-1.4 Biomass/waste reforming
FC-1.5 Microbial Electrolysis Cells (MEC)
FC-1.6 Electrolysis from renewable energy
FC-1.7 HT electrolysis (Hybrid cycles)
FC-1.8 Water-gas shift in advanced coal gasification
FC-1.9 Hydrogen quality assessment

FC-2 Hydrogen storage

FC-2.1 Metal hydrides
FC-2.2 Complex hydrides
FC-2.3 Chemical hydrides
FC-2.4 Organic hydrides
FC-2.5 Physisorption of hydrogen on high surface area adsorbents e.g. carbon based material, metal-organic frameworks and nanostructures
FC-2.6 CO2 reduction with hydrogen to synthetic hydrocarbons
FC-2.7 Theoretical modelling
FC-2.8 Storage testing, leak detection, safety, economic issues, etc.

CIMTEC 2010, Montecatini Terme. Takuzo Aida, The University of Tokyo, Japan presents his Plenary Lecture "Programmed Molecular Assembly for Tailored Functional Materials".

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Symposium FD

Materials Demands Towards New Generation Electrochemical Energy Storage Systems

The potential of electrochemical energy storage in batteries and supercapacitors is enormous, ranging from small sizes for mobile electronics to medium sizes for transportation to large sizes for electric grid storage. Electrochemical energy storage is also the most appealing option for the effective utilization and implementation of renewable energy sources such as solar and wind to establish a cleaner environment.
Understanding, controlling, and predicting the structure and properties of solids and the development of new materials with novel synthesis approaches and enhanced properties have driven the energy storage field for the past three decades. Although the performance level and cost of the current generation of storage devices are acceptable for mobile applications, novel intuitive concepts are needed for next-generation of high-performing electrochemical energy storage systems at an affordable cost with improved safety to penetrate the 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 for rechargeable batteries, 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

FD-1 Batteries
Rechargeable batteries: anodes, cathodes, and electrolytes
Cell chemistries: Li-ion, Li-S, Li-air, Na-ion, Mg-ion, Al-ion, all solid-state, redox flow, etc.
Bulk, surface, and interfacial characterizations
Computational modeling
Cell design

FD-2 Supercapacitors
Supercapacitors
Pseudocapacitors and hybrid devices
Electrodes and electrolytes
Cell design

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

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CIMTEC 2010 - Montecatini Terme.

Symposium FE

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, in particular the legally binding treaty on climate action as outcome of the 2015 Paris Climate Conference (COP21), 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.

Contributions are invited in the following and related areas:

FE-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

FE-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

FE-3 Direct Alcohol Fuel Cells (DAFCs)

- Electrocatalysts for alcohol 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

FE-4 State-of-the-art application engineering and demonstrations

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

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Symposium FF

Progress in Materials and Devices for Direct Thermal-to-Electric Energy Conversion

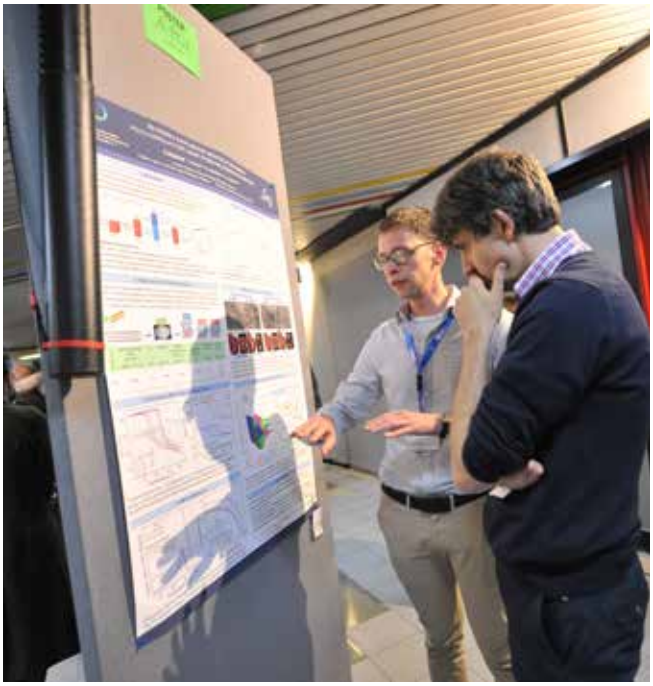
This symposium will explore state-of-the-art thermoelectric, thermionic and thermophotovoltaic materials and technologies for direct thermal-to-electrical energy conversion. Material and device designs directed to optimise efficiency and cost/performance aspects of direct thermal-to-electrical conversion 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, and 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

FF-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

FF-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 thermophotovoltaics
Functionally graded materials
Structural and mechanical characterisation
Process modeling and simulation
New testing methods

FF-3 Devices technologies and applications for thermoelectrics, thermionics, 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 FG

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 technologies an important role is also played by magnetocaloric materials for their possible exploitation in solid-state refrigeration and power generation.

In addition, micro/nano structures based on magnetic thin films pave the way to new classes of devices, sensors and components (e.g. 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:

FG-1 Hard magnetic materials

FG-2 Soft magnetic materials

FG-3 Magnetocaloric and multifunctional magnetic materials

FG-4 Magnetic devices and components for energy applications

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Xavier MOYA, UK
Dimitris NIARCHOS, Greece
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CIMTEC 2014, Montecatini Terme, Terme Tettuccio: Gala Concert.

Symposium FH

Advanced Photocatalytic Materials for Energy Transition, Solar-driven Chemistry and Environmental Applications

The use of solar energy to driven the chemical and energy processes, and the chemical storage of solar energy are the key elements to move to a low-carbon economy, sustainable society and to foster energy transition. For this reason, there is a fast-growing scientific interest on this subject, which is part of the general effort for a solar-driven chemistry and energy, the chemistry of the future. Realize this challenge requires the development of new ideas, concepts and innovative photocatalytic materials. Photocatalysts are widely utilized to clean and remediate our environment and their use in advanced devices to produce electrical energy or solar fuels in rapidly expanding. Semiconducting photocatalytic materials possess multi-functional properties, which allow their use in various areas from photocatalytic environmental remediation, water splitting for hydrogen fuel, CO2 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.

Session topics

FH-1 Design elements and advanced concepts for photofunctional materials
Band-gap engineering of photocatalysts: optical, electronic, and catalytic modifications
Multiphoton band-gap engineering, photonic materials
Superhydrophilic, amphiphilic and antifogging surfaces
Hybrid photocatalytic nanomaterials, Heterojunctions
Optimizing interfaces in multilayer systems
New types of quantum-dots and robust sensitizers, antenna effects

FH-2 Understanding fundaments of photoinduced processes and charge transport
Charge transfer and recombination
Theoretical and computational investigation
Computational screening of new materials
Relation between nanostructure and photofunctional behavior
Photoelectrochemical devices

FH-3 Design approaches for advanced applications
Development of high surface area and porous photocatalytic materials and photoanodes
Photoactive nanodevices, hierarchical photoactive materials
Innovative materials for third generation solar cells (dye sensitized solar cells, quantum dot cells, tandem/multi-junction cells, hot-carrier cells, etc.)
Photocatalytic solar fuel (H2, CO2 reduction) generation
Selective photo-oxidations for organic synthesis, tandem systems
Environmental applications: air / water treatment, anti-bacterial surfaces
Photo-catalytic fuel cells, artificial leaf

CIMTEC 2014, Montecatini Terme. Joanna Aizenberg, Harvard University, USA, presents her Plenary Lecture "Multifunctionality of liquid-filled Porous Ceramic Coatings: From Encryption to Anti-fouling".

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Symposium FI

Materials and Technologies for Next Generation Solid State Lighting

There is a stringent demand world-wide for the development and adoption of highly efficient solid state lighting technologies to achieve radical energy savings. LED is now a technology that is finding its path towards the general lighting market, both indoor and outdoor. Significant advances in the understanding of materials, devices and systems are driving the development of novel light sources and light integration concepts.
Despite performances of organic LEDs (OLEDs) are still lower and costs still higher than LED lighting technologies, OLED lighting devices start to benefit from their strong advantages (large surface, lightness, thinness, ability to be color-tunable, flexible and transparent, recyclability). To fully develop its potential and capitalize on its highly desirable figures of merit, OLED technology must address a number of technical, scientific and technological issues related to materials, manufacturing processes, device architecture and system integration. These issues specifically include the development and use of performing phosphorescent emitters and transport materials compatible with dry and wet processes, the development of low cost methods to prepare the substrate – rigid or flexible - with the needed interconnections, the deposition and patterning of the electrodes and the organic stack, the inclusion of photonic structures to tailor the optical properties.
The purpose of this Symposium is to provide a highly cross-disciplinary forum for scientists, engineers and industry experts for ground-breaking cross-fertilization between the different area of expertise in the field of solid state lighting. The symposium will highlight recent advances in the synthesis of novel materials, thin films and nanostructures; characterization of layers and interface properties on the nano- and micro-scale; novel optoelectronic device architectures such as planar and vertical OLETs (organic light-emitting transistors); advanced manufacturing of materials and devices; and innovative photonic structures for tailored light out-coupling.

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

- Design and synthesis of novel LED materials
- Design and synthesis of molecular materials, nano-structures and thin-film
- Nanofabrication and assembly techniques for photonic structures
- Advanced optoelectronic device architectures – OLED and OLET
- Optical and electronic properties
- Charge injection and transport
- Modeling of optoelectronic properties of materials
- Device physics and modeling
- Thin films, heterostructures, interfaces
- Structure-properties relationship
- Dry, wet and hybrid processing and manufacturing
- Device and system integration

Abstracts may be submitted in one of the following sessions:

FI-1 Material design and processing

FI-2 Optoelectronic and photonic processes

FI-3 Electro-optical-structural characterization

FI-4 Device architectures and system integration

CIMTEC 2014, Montecatini Terme. Pulickel M. Ajayan, Rice University, USA, delivers the Plenary Lecture "Nanoscale Engineering - Challenges and Opportunities".

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Symposium FJ

Development and Application of New Functional Transparent Conducting and Semiconducting Inorganic Materials

Oxide based electronics are seeing an increasing set of applications based on new materials and the ability to tailor structure and functionality to enable new functionality. This includes improved TCs new semiconductors for high speed and wide bandgap electronics, new piezoelectric materials and photovoltaic absorbers. Achieving this requires an increasingly broad materials set but also structural diversity from amorphous to expitaxial and the inclusion of new hybrid materials. Increasingly diverse structures with complex composition including amorphous and crystalline metal oxide materials as well as wide band-gap nonoxide materials including e.g. nanowire 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. New advanced 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.

Underlying the development of new functional materials for example organic and nanotube based TCs is the need for a clearer and predictive understanding of basic materials science such as the electronic structure, carrier and trap 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 the International Symposium *"Development and Application of new Functional Transparent Conducting and Semiconducting Oxides"* , which follows the discussions on related subjects held at previous CIMTEC Conferences, 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:

FJ-1 Fundamentals

- Basic Theory of functional electronic oxides
- Materials Genomics of functional oxides including
  - Electronic structure
  - Doping mechanisms
  - Carriers origin and dynamics
  - Optimizing band structure
  - Surfaces and interfaces in hybrid structures
- Amorphous vs crystalline materials basic physics and application considerations
- Characterizations of basic TC properties including inoperando

FJ-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
- Device characterisation and properties
- Growth Approaches
  - PVD/CVD
  - Atomic layer deposition
  - Spin coating, spray pyrolysis and other chemical techniques
  - Direct writing/printing/patterning
- Novel tools and equipment for device fabrication
- Interfaces and chemical compatibility issues
- Modeling and simulation of materials and devices

FJ-3 Applications

- Flexible electronics (e.g. roll-up displays, electronic paper)
- Transparent devices (TTFTs) and applications including TC active layers
- Photovoltaics
- Piezoelectrics
- Wide Bandgap Power Electronics
- OLED/OPV
- Advances in smart /functional applications e.g. photocatalytic/ active/protective coatings,
- smart windows, etc.
- Other advanced/novel/emerging applications
- Building Applications
- Multifunctional materials including porous materials

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Symposium FK

Materials Challenges for Sustainable 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 enabling 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 Sustainable Nuclear Fission and Fusion Technologies"* will provides an exciting melting pot to foster 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.

Contributions are invited in the following and related areas:

FK-1 Structural components for nuclear fission and fusion applications
- High-temperature metallic alloys and superalloys
- Metal-matrix composites
- Oxide-based and non-oxide-based ceramics
- Ceramic-matrix composites

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

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

FK-4 Functional materials
- Insulators
- Superconducting magnets
- Coatings

FK-5 Nuclear fuel materials
- Processing, microstructure, and properties relationship
- Oxide-base nuclear fuels
- Non-oxide-based nuclear fuels
- Metal-base nuclear fuels
- Thermomechanical modelling
- Recycle of nuclear fuels
- Advanced fuel cladding materials and coatings

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

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

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

FK-9 Systems integration and interface design and components

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Focused Session FK-10

Materials Issue in 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:

FK-10.1 Waste form development, including glass, ceramic, and metallic waste forms

FK-10.2 Challenging waste constituents, such as actinides, noble metals, and volatile species

FK-10.3 Waste form modeling, performance testing, and advanced characterization techniques

FK-10.4 Design and operation of waste immobilization facilities

FK-10.5 Repository design, requirements, and licensing

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CIMTEC 1990 - Montecatini Terme.

Symposium FL

Biological, Biohybrid and Bioinspired Materials: From Electronics and Photonics to Medicine

Along the evolutionary timescale, living organisms have perfected a widespread diversity of highly sophisticated structures, from the molecular to the macroscopic scale, to perform diverse and complex biological functions. These includes not only chemical and biological processes, but also interactions with light and charge transport relevant to many physiological processes.
Only recently material scientists have started to explore photonic, electronic and biomedical devices based on biological and bio-inspired materials. Groundbreaking results have also been shown by the direct use of living organisms to produce materials in situ or as scaffolds for the direct in vivo construction of devices. Hybrid architectures of artificial components (e.g. polymers, nanoparticles) with biological structures can be obtained either by self-assembly and chemical synthesis / modification or directly produced by living organisms.
The symposium *"Biological, biohybrid and bioinspired materials: from electronics and photonics to medicine"* will cover many classes of biological and bio-inspired materials for a number of applications. These will include photosynthetic pigments and reaction centers, biosilica, calcite, silk, melanins, DNA, and various structural proteins. The symposium will mainly focus on the materials side; it aims to combine the fundamental understanding of physical mechanisms underlying the biological and bio-inspired materials with devices applications, emphasizing the key role of chemical and physical aspects.
This approach is meant to enlarge the community of researchers traditionally involved in materials science, including the contribution of biologists and biotechnologists, thus eyeing up new directions and languages in the future directions of development.

Session topics

FL-1 Classes of materials and their synthesis and chemical modification
biological photonic crystals
plant and bacteria photosystems
biosilica, calcite and other inorganic materials
silk
DNA
melanins
cellulose
structural proteins

FL-2 Electronic devices with biological and bio-inspired materials
sensors
photodetectors
memory devices
transistors
electronic interfaces with living cells and tissues

FL-3 Photonic devices with biological and bio-inspired materials
photonic crystals
waveguides
lasing
structural colors

FL-4 Bio-medical devices with biological and bio-inspired materials
materials for drug release
platforms for regenerative medicine
neuronal interfaces

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FM - 3rd International Conference

Emerging Materials, Technologies and Applications for Non-volatile Memory Devices

Non-volatile memory devices are currently key elements of several electronic and portable systems (digital cameras, solid state disks, smartphones, computers, e-books, tablets,..) and their market and potential applications are expected to continuously increase in the next years. Several advanced non-volatile memory concepts (RRAM, PCM, MRAM, STT-MRAM, FRAM, memristive devices,....), exploiting innovative materials and storage mechanisms, are under investigation to achieve better performance, higher scalability, and to address novel applications for more efficient, intelligent and secure computing systems. Besides pursuing the downscaling of non-volatile memories in terms of minimum size and integration density, the new paradigm is also directed to devices that can integrate multiple functionalities, such as computing and storing information at the same time. This approach will enable the fabrication of novel nanoelectronics circuits with potential applications in several fields, including computation schemes emulating the brain functionality, flexible electronics and non-volatile logics.
This symposium will address recent advances on non-volatile memory devices, with focus on innovative storage concepts, new materials and devices, integration schemes and selectors for the storage elements, understanding and modelling of the physical mechanisms for data storage down to the nanoscale, memristive devices and novel applications for von Neumann Computing and beyond.

Session Topics

FM-1 Magnetic, ferroelectric and multiferroic materials for memory devices
MRAM and spin transfer torque (STT) MRAM memories
Racetrack memory and emerging three terminal magnetic device materials
FeRAM and Ferroelectric FET
Memory based on ferroelectric tunnel junctions
Novel materials including organic ferroelectric and magnetic nanostructures for memories

FM-2 Resistance switching (RRAM) and Phase Change (PCM) Memories
Advances in materials and technologies for resistive memories (RRAM and PCM)
Advanced characterization techniques, theory and modelling of resistive memories
New materials and concepts for PCM, including low-dimensional cells, layered and super-lattice phase change materials
RRAM based on graphene and 2D materials
Polymer-based and hybrid organic & inorganic memory devices
3D architectures, cross-bar arrays and advanced selectors

FM-3 Emerging applications for non-volatile memories
Memristive devices and novel memristive-based circuits
Materials and devices for neuromorphic-engineering and brain-inspired computing
Non-volatile logics based on resistive memories and hybrid CMOS/non-volatile memory circuits
Flexible electronics, radiation-hard memories, space applications

CIMTEC 2014, Montecatini Terme. Paul K. Chu, City University of Hong Kong, Hong Kong, gives the Plenary Lecture "Plasma-based Materials Engineering and Surface Modification".

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FN - 6th International Conference

Novel Functional Carbon Nanomaterials

The 6th International Conference *"Novel Functional Carbon Nanomaterials"* 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 nanodiamonds, diamond-like carbon, fullerenes, nanotubes, graphene and graphene-related structures, as well as high surface area carbon networks, which are promising for a range of emerging applications in energy conversion and storage, water purification, high-speed nanoelectronics, optoelectronics, photonics, quantum information processing, quantum computing, biosensing, drug delivery, medical imaging, thermal management, catalysis, lubrication, etc.
All aspects of new chemistry, science and technology of growth, functionalisation, characterisation, and electronic, optical, mechanical, thermal and biomedical applications will be covered. Of special interest will be the development of multifunctional and 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

FN-1 Growth and processing

- 2D structures – graphene and beyond
- 1D structures – nanotubes and nanofibers
- Nanodiamond: synthesis, deagglomeration, purification, functionalisation
- DLC and nanodiamond coatings: CVD and epitaxy for large area growth
- Solution processing of carbon nanomaterials
- Roll-to-roll processing and layer transfer techniques
- Hybrid and multilayer materials
- Top-down and bottom-up growth techniques for CNTs, graphene and other nanocarbons
- Assembly into hierarchical architectures and heterostructures
- Core-shell structures
- In-situ monitoring of growth
- Ion implantation, annealing, doping and surface processing
- Carbon-based nanocomposites
- Theory, modeling and simulation

FN-2 Structural characterization

- Structure, texture and topography
- Surfaces and interfaces
- Characterisation methods at single nanoparticle level
- Solid state, electronic, vibrational structure
- Structural defect states and impurities
- sp2-sp3 bonding distributions
- Spectroscopic techniques (Raman, NEXAFS, etc.)
- Surface characterization (STM, AFM, NSOM, RAS, etc.)
- X-ray optics and detections

FN-3 Properties

- Electrochemical properties
- Electron transport (bulk injection junction)
- Ionic transport in carbon nanostructures
- Surface conductivity
- Electron emission (field, photo and electron stimulated)
- Superconductivity
- Doping and defects
- Non-linear optical, photonic and optoelectronic properties of carbon nanostructures
- Thermal properties
- Mechanical and tribological properties
- Graphene and carbon nanotube mechanics (fracture, exfoliation)
- Catalytic properties
- Biological activity

FN-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
- Optics and photonics
- Energy harvesting: solar cells and other methods
- Energy storage and conversion (batteries, supercapacitors, fuel cells, thermoelectrics, solid state lighting)
- Water desalination and purification
- Catalysis
- Thermal and mechanical applications (heat sinks, heat spreaders, nanolubricants, etc.)
- MEMS/NEMS for mechanical, electrochemical, sensor etc. devices
- Biosensors, gas sensors
- Biomedical applications: bio imaging, drug delivery, regenerative medicine

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FO - 8th 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, heavy-fermion superconductors, and recently hydrides and related materials. They are all 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, MFe2As2, 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, latest progress in hydride superconductors will receive due attention as the latest progress is very encouraging.

This Conference follows those on the analogous topics in 1990, 1994, 1998, 2002, 2006, 2010 and 2014 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

FO-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
- Hydrides and related materials

FO-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
- Superconductivity under pressure

FO-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
- Pressure, strain and dimensionality effects

FO-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

FO-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

FO-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
High pressure materials

FO-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

CIMTEC 1990, Montecatini Terme. Nobel Laureate J. Bednorz delivered the Keynote "Developments in High Tc Superconductivity". In the photo he receives a ceramic from Faenza in "Raffaellesco" style from the President of CIMTEC Conferences Pietro Vincenzini.

FP - 12th International Conference

Medical Applications of Advanced Biomaterials and Nano-biotechnology

The convergences of materials, electronics and biological systems at the nanoscale are fuelling unprecedented opportunities in the biomedical field through groundbreaking inventions / innovations in diagnosis and therapy. Major objectives of this conference, which follows the conferences on the same subject held in previous CIMTEC editions, is to provide a synergic approach covering applied chemistry and physics, materials science, electronics, biochemistry and medicine to enlighten how deeper insights into biological events and their interplays with nanotechnology can support the development of new generations of materials, micro- or nano-devices, molecular level approaches and advanced characterizations to address major medical problems.
The conference particularly aims to report recent progress in the synthesis and characterization of new or creatively modified stimuli-responsive, active and multifunctional metals, ceramics, polymers, gels; smart nanoparticles, functionalized I-D and 2-D nanostructures, Q-dots; hybrids, composites, self-organized materials, hierarchical bio-nanostructures; as well as the potential for their implementation in selected challenging areas of nanomedicine such as (i) multi-scale approaches to regenerate and engineer new soft tissues and hard tissues, (ii) innovative targeted drug delivery and release platforms, and (iii) new materials and systems for medical diagnosis and therapy including multi-modal theranostics. Progress on more "traditional" clinical implants and devices that make use of new microstructured, smart, high strength materials, ultra-low friction and wear materials, high performance bioactive coatings, etc. will also be covered.
Overall, the study of systemic interactions in the body environment such as side effects, biocompatibility and biofunctionality will be essential issues to promote the discussion for bioinspired strategies in materials and device design to be effectively implemented into clinical practice.

Session Topics

FP-1 Advances in biomaterials
Biodegradable polymers
Bioactive and biodegradable ceramics, glasses and glass-ceramics

Biodegradable metals
Hydrogels and hydrocolloids
Nanophase and nanostructured biomaterials, thin film, coatings, fibres
Functional nanoparticles, l-D and 2-D nanostructures
Stimuli-responsive polymers and gels, liquid crystalline elastomers
Shape-memory and shape-changing polymers and metal alloys
Multifunctional thin films and coatings, multilayer constructs
Antimicrobial materials
Active or stimuli-responsive hybrids and composites, self-organized hierarchical nanostructures
Supramolecular materials, natural or bio-inspired materials, self-assembled materials
Synthesis, characterization, modelling of structures and functions

FP-2 Tissue engineering and regenerative medicine

Biofabrication of cells and tissue constructs
Additive manufacturing, bio-printing
3D scaffold design, fabrication and evaluation
Layered or graded scaffold structures
Microfabrication techniques (microfluidic tools, bioimprinting, micro/nanopatterning)
Growth factors delivery vehicles
Biomaterials for modulating stem cell microenvironment
Vascularization of tissue-engineered constructs
Self-healing mechanisms
Biomimetic materials for engineering load-bearing tissues
Biomechanics of soft tissues and hard tissues
Evaluation of tissue engineering constructs in laboratory and/or in pre-clinical settings
Mechanobiology of tissue regeneration

FP-3 New therapeutics and intelligent drug/biomolecule/gene delivery systems

Advances in system-responsive materials for delivery systems
Drug targeting, targeting and imaging agents to site-specific delivery
Controlled release systems, triggering mechanisms
Biomaterials constructs for temporally controlled release of multiple factors
Progress in imprinted recognition release systems and implantable micro- or nano-delivery devices
In vitro and *in vivo* studies, models for drug transport, absorption metabolism, retention mechanisms and toxicological issues

FP-4 Nanomaterials systems for bio-imaging and theranostics

Synthesis and characterization of inorganic and organic nanoparticulate systems for bio-imaging: metallic, metal oxide, QDs, nanotubes, nanowires, polymers, liposomes, dendrimers, ...
Functionalized agents/devices for in vitro and in vivo imaging, diagnostics and therapy (magnetic, photoacoustic, thermal, radiological, multimodal, ...)
Theranostic nanocarriers, multimodal theranostic agents
Mutifunctional theranostic nanoplatforms
Biomedical imaging (MRI, MPI, PET, SPECT, ...)

FP-5 Clinical translations in diagnosis and therapy, and in implantable prostheses and micro-nano devices

Muscoloskeletal, cardiovascular, dentistry, ENT surgery, ophthalmology, dermathology, post-traumatic, etc.)
Implantable neural interfaces
Modelling of tissue/implant systems
Cellular mechanics, micro- and nano-mechanics of tissue/implant interface, biofllluid mechanics, numerical simulations
Biological performance: biocompatibility, biodegradation and biological mechanisms of implant failure, host response
Qualification and testing methods
Studies on retrivial implants
Computer aided design and additive manufacturing

CIMTEC 2014, Montecatini Terme. Luisa De Cola, Strasbourg University, France, gives the Plenary Lecture "Nanomaterials for Biomedical Applications".

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Hua ZHANG, Singapore

INFORMATION TO AUTHORS & PARTICIPANTS

Venue
CIMTEC 2018 will be held in Perugia, splendid chief town of Umbria region, placed in the middle of Central Italy. The city is about 170 km from Rome and is placed in a strategic position to reach the most interesting historical and tourist places in Umbria, such as Assisi, Orvieto, Spoleto, Todi, Spello, Gubbio, Montefalco, Trevi, Trasimeno Lake and several others.
CIMTEC 2018 includes the *"14th International Ceramics Congress"* (June 4-8, 2018) and the *"8th Forum on New Materials"* (June 10-14, 2018).

Conference Venue
Centro Congressi Hotel Quattrotorri
Via Corcianese 260
06074 Perugia - Italy

Technical Sessions of the Ceramics Congress will start Tuesday June 5 morning and continue until Friday June 8 evening.
Technical Sessions of the Forum on New Materials will start Monday June 11 morning and continue until Thursday June 14 evening.
The Conference Venue is about 8 km outside Perugia center and cannot be reached easily with public services. A complimentary transfer service between the Conference Hotels and the Conference Venue will be made available for Conference Members.

Scientific Programme
The scientific programme will consist of Plenary, Key-Note, Invited, 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 Congress web site:

http://2018.cimtec-congress.org

Electronic submission ends on **October 15, 2017**.
Acceptance notification will be provided by December 15, 2017.
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. 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 that will be made available at the conference web site. Attendance by at least one of the authors is requested for poster presentation.

Publication Policy
CIMTEC organizers will NOT retain the copyright of the contributions presented at the whole CIMTEC 2018. Therefore Authors may submit their contribution to any journal or other media sources they find appropriate.

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

Companions Programme
Guided visits to Perugia, Assisi, Todi, Gubbio, Orvieto 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 2018 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, 2018**.

Registration Fees

Early *(by April 20, 2018)*	**Ceramics Congress**	**Forum**
Full Member	720.00 EUR	720.00 EUR
Student	420.00 EUR	420.00 EUR
Late and on site		
Full Member	800.00 EUR	800.00 EUR
Student	470.00 EUR	470.00 EUR

Fees include 22% VAT, general and secretariat costs, participation in the scientific sessions, coffees, lunches, printed booklet of the final programme and other conference material, participation in the Social Programme.

Accommodation
Hotel accommodation (B&B) prices range from about 160 EUR/day for 5-stars hotel to about 70-75 EUR/day for 3-stars hotel. Further information and hotel booking forms will be provided with the final announcement and in the web.

Weather
The weather in Perugia 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.

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 addressed well in advance to the Conference organizers, *info@technagroup.it* including the following information: date of birth, place of birth, nationality, affiliation, full postal address, passport number, issue and expiring dates of the passport.

INFORMATION TO AUTHORS & PARTICIPANTS

How to reach Perugia

Perugia is located in Central Italy about 170 km from Rome, and can be reached:

By plane:

To Rome - International Airport "Leonardo da Vinci".
To Perugia - International Airport of Umbria-Perugia "San Francesco d'Assisi"

A complimentary bus transfer from the airport to Perugia will be available to Members accommodated in Conference Hotels on arrival days (June 4 and June 10, 2018).

By train:

From Rome: Reach the Roma Central Railway Station (Stazione Termini), take the line Rome-Ancona and go down to Foligno Station (about 120 min). Then take the local train to Perugia (30-35 min).

By car:
Perugia can be reached easily by car from any direction via the network of Italian highways.

SUMMARY OF DEADLINES

October 15, 2017
Submission of Abstract
December 15, 2017
Notification of Abstract acceptance
April 20, 2018
Registration at reduced rate

INFORMATION AND CORRESPONDENCE

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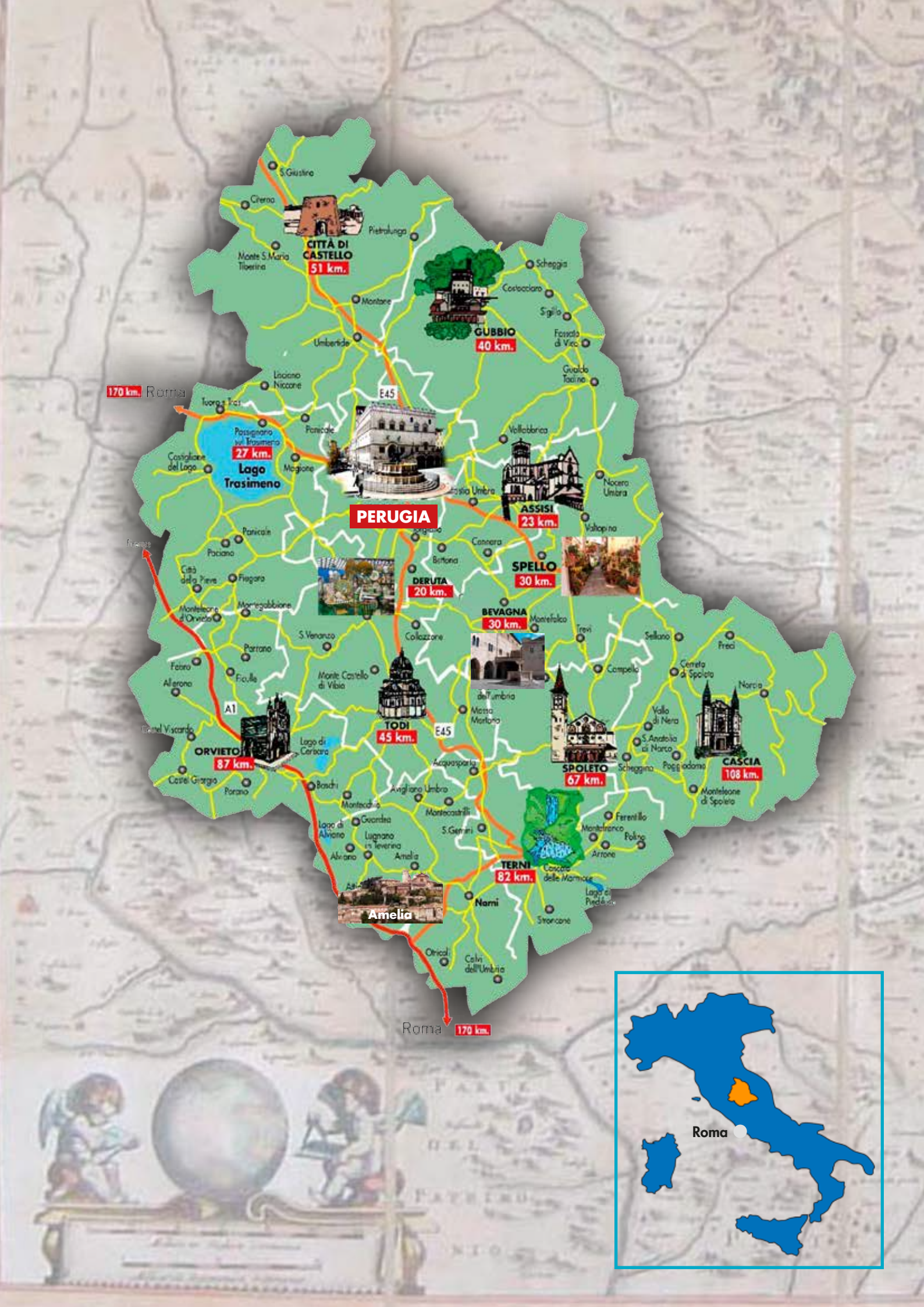
S.Giustino
Cinerea
Pietralunga
CITTÀ DI CASTELLO
51 km.
Monte S.Maria Tiberina
Scheggia
Costacciaro
Montone
Sigillo
GUBBIO
40 km.
Fossato di Vico
Umbertide
Gualdo Tadino
Lisciano Niccone
170 km. Roma
E45
Tuoro sul Trasimeno
Panicale
Passignano sul Trasimeno
27 km.
Lago Trasimeno
Castiglione del Lago
Magione
Vallobbrica
Nocera Umbra
ASSISI
23 km.
PERUGIA
Valtopina
Panicale
Paciano
Città della Pieve
Piegaro
Bettona
Cannara
SPELLO
30 km.
DERUTA
20 km.
Montelepre d'Orvieto
Montegabbione
BEVAGNA
30 km.
Montefalco
Trevi
Sellano
Preci
S.Venanzo
Collazzone
Parrano
Ferro
Ficulle
Monte Castello di Vibio
Campello
Cerreto di Spoleto
Norcia
Allerona
A1
TODI
45 km.
Massa Martana
Vallo di Nera
Castel Viscardo
Lago di Corbara
ORVIETO
87 km.
E45
S.Anatolia di Narco
Acquasparta
SPOLETO
67 km.
Scheggino
Poggiodomo
CASCIA
108 km.
Casel Giorgio
Porano
Baschi
Montecchio
Avigliano Umbro
Montecastrilli
Montefranco
Ferentillo
Lago di Alviano
Guardea
S.Gemini
Polino
Lugnano in Teverina
Alviano
Amelia
Arrone
TERNI
82 km.
Cascata delle Marmore
Lago di Piediluco
Amelia
Narni
Stroncone
Otricoli
Calvi dell'Umbria
Roma 170 km.
Roma

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