

## F: MATERIALS FOR HEALTHCARE

healthcare applications. There is continuous and growing of medical devices, permanent and temporary implants, drug delivery systems, and tissue engineering. Research in the field targets both the improvement of established or conventional biomaterials (e.g., being used as orthopedic or cardiovascular implants) and the synthesis and characterization of a novel, cellresponsive and bioactive materials. Emerging areas like surface responsive materials with antibacterial capability and bioinks for 3D bioprinting of tissue mimicking structures will also be covered. The topic area will thus include a series of symposia in which recent scientific advances in biomedical materials will be presented and discussed, showcasing broadly this exciting challenges in the biomaterials area, in particular in relation to the translation of scientific achievements to the clinic, will also be addressed. The symposia within Area F will offer an excellent platform for presentation and discussion of the most recent and relevant results in this highly interdisciplinary field. We expect representatives to discuss the latest advances and challenges in the field of materials serving healthcare.

# **AREA COORDINATORS**



Prof. Dr. **Aldo R. Boccaccini**Friedrich-Alexander-Universität

Erlangen-Nürnberg (DE)



Prof. Dr. **Sandra Van Vlierberghe** *Gent University (BE)* 

## **SYMPOSIA**

**F01:** Biopolymers in Medicine: Advanced Applications

**F02:** Bioactive Glasses and Composites for Tissue Engineering and other Advanced Healthcare Applications

**F03:** Biomaterials for Therapeutic Delivery

F04: Antibacterial Materials

**F05:** Structural and Bio-inspired Bioceramic Materials and Implants

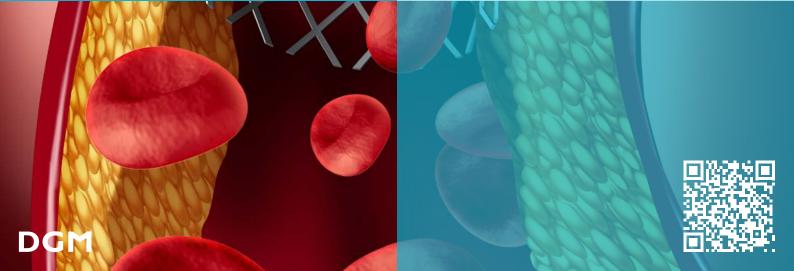
**F06:** Additive Manufacturing of Biomaterials and Biofabrication

**F07:** Metals in Medicine: Traditional and New Alloys, Permanent and Bioresorbable Metals

F08: Surface Modification of Biomaterials and Coatings

DEADLINE FOR ABSTRACT SUBMISSION
31 January 2023

EUROMAT2023.com





# DEAR MATERIALS SCIENCE AND ENGINEERING COMMUNITY, DEAR COLLEAGUES.

We cordially invite you to join the 17<sup>th</sup> European Congress and Exhibition on Advanced Materials and Processes - FEMS EUROMAT 2023, which will be held in Frankfurt am Main, Germany, 03 - 07 September 2023. The congress venue will be the Frankfurt Goethe-University's new Westend Campus with its park-like ambiance and beautiful travertine-faced buildings, one of Germany's most attractive ones.

Our ambition is to organize a memorable and successful congress in the tradition of previous FEMS EUROMAT congress to offer delegates many opportunities to engage in discussions, build new and strengthen existing partnerships and collaborations within and outside Europe.

Germany has a long tradition in Material Science and Engineering. The German Materials Society - DGM - was founded in 1919 and is one of the founding members of FEMS.

DGM's proprietary congress platform will serve as a proven interface allowing delegates to participate on-site or connect from another location via internet. As the first hybrid FEMS EUROMAT, we will offer the best of both worlds – physical and virtual

We hope that you'll participate in the congress to share with us your experience and views in the field of Materials Science and Engineering.

On behalf of the Scientific Committee



**Prof. Dr. Ehrenfried Zschech** deepXscan GmbH, Dresden, Germany *Chair of FEMS EUROMAT 2023* 

## EUROMAT2023.com



Congress Office
Deutsche Gesellschaft für Materialkunde e.V.
Marie-Curie-Straße 11-17
53757 Sankt Augustin, Germany
T +49 (0) 69 75306 750
euromat@dgm.de

### ABOUT FRANKFURT AM MAIN

Frankfurt's skyline is truly unique. From the Main Tower's rooftop observation platform, situated some 200 meters above the city streets, one has a spectacular view of the surrounding region. Nearby, in the historical old town, Römer City Hall, the Frankfurt Cathedral and St Paul's Church are all must-sees.

Old town flair in the heart of the big city: A old part of Frankfurt has been brought back to life. Completed in 2018, the New Frankfurt Old Town consists of 15 faithfully reconstructed buildings and 20 brand-new dwellings connected by a series of winding laneways. Many of the buildings feature structural ornaments dating back to the Middle Ages – thankfully saved from the destruction of World War II and now returned to their places of origin. A series of museums, restaurants, bars and shops combine to breathe new life into the old quarter, nestled between Frankfurt Cathedral and the Römerberg, turning it into a lively new urban space.

#### **CONGRESS VENUE**

Goethe University was founded in 1914 as a unique "citizens' university," financed by wealthy citizens in Frankfurt, Germany. Named in 1932 after one of the city's most famous natives, Johann Wolfgang von Goethe, today the university has over 48,000 students. Goethe University is the third largest university in Germany.

#### **Goethe University**

Westend Campus Seminar Building Theodor-W.-Adorno-Platz 5 60323 Frankfurt, Germany





# 03 - 07 Sep 2023 (Frankfurt am Main)

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Area F: Materials for Healthcare

# F01: Biopolymers in Medicine: Advanced Applications

The symposium will include natural polymers (e.g., proteins and polysaccharides), synthetic proteins and peptides, and bio-based synthetic polymers. A variety of chemistries and architectures will be highlighted, thereby designing a broad range of structural and functional properties in line with the envisaged biomedical application and specific needs. Possible innovative crosslinking approaches and/or chemical modification strategies for an improvement in biopolymer characteristics will be dealt with, also considering possible drawbacks. Physical and chemical crosslinking strategies will be addressed, highlighting their pros and cons with regard to biopolymer processing (deposition- versus light-based additive manufacturing, electrospinning) and applicability.

The realization of devices for healthcare applications ranging from conventional replacement strategies (e.g., biodegradable implants) to more advanced systems such as advanced hydrogels and biomimetic scaffolds for tissue engineering, controlled drug delivery, smart/bioinstructive surfaces, organoids, in vitro models will be considered. In addition, innovative applications of biopolymers in the biomedical fields to better mimic the characteristics of human health or/and pathological tissues will be considered and discussed. In fact, biopolymers show great promise as candidate materials for this task, and fine-tuning of their properties for injury-specific and tissue-specific applications is the subject of much research that will be considered in the present symposium.

#### Symposium Organizer



Prof. Dr. Silvia Farè Politecnico di Milano



Dr. João F. Mano University of Minho



Prof. Dr. Sandra Van Vlierberghe Gent University





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#### Area F: Materials for Healthcare

# F02: Bioactive Glasses and Composites for Tissue Engineering and other Advanced Healthcare Applications

This symposium will cover bioactive ceramics, glasses, and composites used in tissue engineering and regenerative medicine fields. The focus will be the scientific and technological aspects related to the design, fabrication, and characterization of innovative biomaterials for new emerging applications. The challenges and future research in this growing area will be addressed, including the search for the most effective cell types, scaffolds, and signals to achieve living tissue regeneration. The actual efforts looking for more cost-effective systems will also be addressed. The symposium will offer an excellent platform for the presentation and discussion of the most recent and relevant results in this highly interdisciplinary field.

Topics to be covered by the symposium:

- Animal models
- Bioactive and biodegradable materials
- Bioactive glasses/ceramics for bioactive inks and 3D bioprinting, for example
- Bioactive glass with therapeutic ion delivery
- Biomimetic Scaffolds
- Bone Healing
- Bone regeneration and reconstruction
- Cell behavior in regeneration
- Material testing
- Nanomedicine
- Wound healing and soft tissue repair

#### **Symposium Organizer**



Prof. Dr.-Ing. Aldo R. Boccaccini Friedrich-Alexander-Universität Erlangen-N...



Dr. Daniela Carta University of Surrey



Prof. Dr. Antonio Jesús Salinas Sánchez Universidad Complutense de Madrid





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#### Area F: Materials for Healthcare

# F03: Biomaterials for Therapeutic Delivery

Biopharmaceutical drawbacks of therapeutic agents, such as poor aqueous solubility, physicochemical instability in the biological environment, low bioavailability in the target tissue/organ, and inconvenient biodistribution and off-target toxicity challenge the treatment of disease. The design of advanced drug delivery systems based on the combination of active agents with biomaterials of fine-tunable features such as chemical composition (e.g., ceramics, polymers, and composites) and structure, biodegradability, size, shape, and morphology has revolutionized the field of pharmaceutical R&D and improved the diagnosis and treatment of disease. The ability to localize the release by capitalizing on the presence of biological barriers (e.g., mucus), control the release rate, and target drugs to specific body sites are key challenges that are under development. This translation of innovative biomaterials-based pharmaceutical products from the laboratory to the market is just emerging to appear. The understanding of the relationship between the structural properties of the biomaterials and the biological effects of the resulting innovative products is critical to rationalize their design and production. In addition, the implementation of advanced scalable and standardized processing technologies that ensure maximum quality and stability is fundamental for regulatory approval and to enable production in an industrial setting, and thus, pave the way for their clinical translation.

This symposium will serve as a forum for the discussion of the new advances in the field of biomaterials for drug delivery applications with a translational vision. It aims to make a significant contribution to the understanding of the main challenges faced by the field in the years to come. The symposium will gather experts from academia, industry, and regulatory agencies and promote the discussion on the fundamental milestones to realize innovative delivery systems into products.

#### Target topics:

- Smart biomaterials
- nanoparticles, microparticles, composites, and hierarchical particulate biomaterials
- advanced production technologies
- diagnosis, treatment, theranostics
- targeting strategies

### **Symposium Organizer**



Prof. Dr. Hélder Santos University of Helsinki



Prof. Dr. María Vallet-Regí University Complutense of Madrid





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# Area F: Materials for Healthcare F04: Antibacterial Materials

Infection of biomaterials and subsequent biofilm formation can be catastrophic and significantly reduce patients' quality of life, representing an increasing concern in healthcare. Eliminating bacterial infection and simultaneously providing a bioactive environment for tissue regeneration is one of the most significant challenges in the clinic. Tissue engineering strategies might provide some hope. In this area, the development of multifunctional biomaterial scaffolds may have the potential to address this complex clinical goal. The most common approach consists of the local delivery of antibiotics from biomaterials. Still, the increasing problem of antimicrobial resistance to antibiotics (AMR) requires the exploration of non-antibiotic strategies that either prevent the attachment of bacteria (anti-fouling) or directly kill the pathogen (bactericidal). This could be achieved by either modifying inherent physicochemical features of biomaterial scaffold or by incorporating and local delivery of non-antibiotic agents (e.g., metal ions, peptides).

In this symposium, we aim to cover a wide range of advanced strategies to design novel antibacterial materials capable of inhibiting bacterial colonization and overcoming the limitations of the current strategy. The symposium will discuss the development of antibiotic and alternative, non-antibiotic approaches applied to existing materials. Non-antibiotic-based materials will encompass bactericidal topographies, antimicrobial peptides, smart stimuli-responsive materials, and biomaterial-based delivery platforms for antimicrobial enzymes, lysins or quorum-sensing drugs. Moreover, particular focus will be put on antibacterial and cell instructive strategies, thus providing multifunctional approaches that do not compromise eukaryotic cell functions.

The symposium thus focuses on a major topic of research for the biomaterials community, which will attract interest from young and experienced researchers alike. Given the relevance and timeliness of the topic, we expect to attract a large number of researchers working with antibacterial biomaterials and tissue regeneration from different disciplines and perspectives.

#### Symposium Organizer



Dr. Carles Mas-Moruno Technical University of Catalonia (UPC)



Dr. Joanna Sadowska RCSI Royal College of Surgeons





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Area F: Materials for Healthcare

# F05: Structural and Bio-inspired Bioceramic Materials and Implants

The symposium aims to explore the most recent advances in the design, synthesis, and processing of bioceramic materials and implants, ensuring wider applications in medicine with enhanced safety and effectiveness over time, thus stimulating discussion among active researchers, medical device manufacturers, and clinicians, particularly in orthopedics, dentistry, spinal and cranio-maxillofacial surgery.

In spite of several bioceramics that have been successfully used in clinics, some critical factors still limit their performance, mainly when weight-bearing applications are demanded. Such clinical cases are very challenging and relevant for their socio-economic impact in view of the current population's aging and lifestyle. Hence, new bioceramic design, development, and processing concepts to achieve improved compositional and microstructural control are relevant research focus today. The symposium will give particular emphasis to new processes such as additive manufacturing or bio-inspiration, today considered the last frontier of material science, aiming to reproduce natural assembling/consolidation processes or to copy biological structures into new materials with superior functional properties, such as without being exhaustive:

- Bioactive, functionally graded composition and/or hierarchic pore architecture
- Novel approaches and mechanisms for mechanical reinforcement
- Surface modification and bio-functionalization to tailor specific biological interactions such as antibacterial effects or improved wear performances.

In addition, results and protocols of in vitro and in vivo assessment of structural bioceramics and implants (including clinical trials) are welcome.

#### Targeted Topics:

- Bio-inspired and low-temperature approaches for bioceramics development
- Additive manufacturing of bioceramics
- Bioceramics for hard tissue reconstruction/regeneration
- Bioceramics for load-bearing applications
- Structural and mechanical characterization of bioceramics
- Green manufacturing of bioceramics

#### **Symposium Organizer**



Prof. Dr. Jérôme Chevalier INSA Lyon



Prof. Dr.-Ing. Håvard J Haugen University of Oslo



Dr. Simone Sprio CNR – ISTEC



Dr. Anna Tampieri CNR – ISTEC





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Area F: Materials for Healthcare

# F06: Additive Manufacturing of Biomaterials and Biofabrication

The possibility of generating complex structures, together with the concept of personalized medicine, has allowed the success of Additive manufacturing (AM) in the medical sector. Advances in radiological imaging techniques have enabled the use of medical imaging data to print 3D models and reconstruct anatomical parts of patients using computer-aided design (CAD). Bioprinting of tissues and artificial organs, 3D-cell-culture and biofabrication (e.g., printing of osteochondral scaffolds), customized 3D tools (e.g., patient-specific surgical guide), 3D anatomical models and personalized implants (e.g., orthoses, hearing aids, restorative dentistry), will be some of the future growth drivers in the field of biomaterials AM

Major bottlenecks that limit the widespread acceptance of additive manufacturing are the lack of diversity in biomaterials for AM processes as well as insufficient standardization and regulatory aspects. Although a wide range of biomaterials, including metals, polymers, ceramics, hydrogels, and composites, have been developed, the processing of these materials into parts and devices with tenable structural (e.g., mechanical properties) or functional properties (degradation behavior, bioactivity, ...) is still challenging.

This symposium will review recent developments in biomaterials for AM technologies that can be processed into personalized implants, scaffolds, biosensors, drug delivery devices, and medical devices. Materials of interest include biocompatible and biodegradable polymers (e.g., biophotopolymers, hydrogels, thermoplastics) as well as ceramics (e.g., tricalcium phosphates, alumina, zirconia, bioactive glasses, ...) and metals (e.g., titanium, magnesium). Fabrication, characterization, and surface functionalization of composite and digital materials (e.g., gradient materials, materials with spatial functionalization ...) will also fall into the scope of this symposium, as well as specific AM process optimizations and adaptions for processing biomaterials (including design and simulation). Another important topic is development in the field of innovative materials for biofabrication.

The goal of this symposium is to bring together material researchers of diverse backgrounds (experimental, characterization, analysis, and computational) with medical experts to address together the multidisciplinary challenges of this emerging field. Graduate students, post-docs, and early-career researchers are encouraged to submit abstracts.

#### **Symposium Organizer**



Prof. Dr. Lorenzo Moroni Maastricht University



Prof. Dr. Cecilia Persson Uppsala University



Prof. Dr. Jürgen Stampfl TU Wien





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Area F: Materials for Healthcare

# F07: Metals in Medicine: Traditional and New Alloys, Permanent and Bioresorbable Metals

The aim of this symposium is to present a critical overview of the latest achievements in the field of metals in medicine and health, including biodegradable metals. Besides key existing and emerging strategies for surface and bulk modifications, new concepts for advanced manufacturing, imaging, and computational approaches will give a complementary view of this exciting field of research.

For many decades, metals and alloys have played an important role in medicine, including in orthopedics, dentistry, vascular surgery, neurosurgery, and sports medicine. In recent years a number of new advanced metals have been introduced, including new Ti-based alloys, new TWIP, and TRIP metallic systems, high entropy new alloys, metallic glasses, and bioresorbable metals. Altogether, metallic biomaterials are getting more and more attention and push surgery on a daily basis. New fabrication technologies, including additive, computational material design, specific characterization techniques (analytics, in situ technologies, etc.), and artificial intelligence-enhanced processing, will enable us to produce patient-specific metallic implants which will be able to treat patients worldwide in a specific and even personalized clinical approach. From a biological point of view, biodegradable metals generate a growing understanding of interaction with cells and living tissues.

#### Targeted Topics:

- Metallic alloys for biomedical devices, implants, and new strategies
- Biodegradable metals from all horizons, produced by conventional, additive, electrochemical approaches
- Computational material design for new designing and manufacturing technologies
- In vivo imaging of metallic implants and degradable metals
- Biomechanics, degradation under physiological conditions, and biological investigations
- Surface modification and coatings
- Non-destructive controls for in situ clinical follow-up
- others

#### **Symposium Organizer**



Prof. Dr. Diego Mantovani Université Laval



Prof. Dr. Regine Willumeit-Römer Helmholtz-Zentrum hereon GmbH





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Area F: Materials for Healthcare

# F08: Surface Modification of Biomaterials and Coatings

The main objective of this call is to cover a broad spectrum of up-to-date topics related to surface modification of biomaterials and coating deposition for healthcare applications. Surface modification of biomaterials and coatings are applied for many biomedical and bioengineering applications in order to impart important characteristics, such as biocompatibility, tissue integration, resistance to corrosion, bioactivity, antimicrobial and antivirus properties, etc. New advanced materials and technologies are rapidly being developed for this purpose, and with this session, we aim to discuss the recent advances in surfaces and interfaces for health at the micro-/nano-scale level. A special focus will be given to the development of coatings for biomedical implants and devices. Additionally, challenging clinical issues such as infections have recently drawn significant attention to the development of infection-free surfaces. Therefore, designing surfaces and coatings having the ability to eradicate microbes and viruses is of outmost importance, especially in clinical settings, where such properties are highly requested.

Abstracts are expected to focus on the design, preparation, processing, characterization, properties, and performances of such surfaces and coatings. A variety of surface modification and deposition methods will be considered. Modeling and theoretical investigations contributing to the understanding of phenomena occurring at the surfaces and interfaces in the multidisciplinary field involving physics, chemistry, engineering, and biology will be considered. To summarize, all challenges and breakthroughs connected to surface modification and coatings for health are welcome.

The topics of interest of this symposium include, but are not limited to:

Coatings, Coatings Deposition, Laser Assisted Techniques, Electrophoretic Deposition, Plasma-assisted Techniques, Thin films, Biomaterials, Nanomaterials, Calcium phosphates, Bioactive Glasses, Ceramics, Biodegradable Materials, Biomedical Implants, Material-Implant Interface, Osseointegration, Biomimetic Surface, Biodegradable Surfaces, Surface Functionalization, Micro- and Nano-scale Topographies, Modeling of Surfaces and Interfaces, Surface Characterization, Self-assembling, Anti-microbial Surfaces, and Coatings.

## Symposium Organizer



Prof. Dr. Annabel Braem KU Leuven



Prof. Dr. Dušan Galusek Alexander Dubček University of Trenčín



Prof. Dr. Julietta V. Rau Italian National Research Council (CNR)



#### **ARFAS**



#### A: Functional Materials

#### **Bernhard Bayer-Skoff**

TU Wien, Austria

#### Luis Pereira

UNINOVA, Portugal



#### **B: Structural Materials**

#### Francisca Caballero

Spanish National Research Council, Spain

#### **Pawel Zieba**

Polish Academy of Sciences, Poland



## C: Processing

#### **Eduard Hryha**

Chalmers University of Technology, Sweden

#### **Ioanna Zergioti**

National Technical University of Athens, Greece



### **D: Characterization and Modeling**

#### **Eva Olsson**

Chalmers University of Technology, Sweden

#### **Christophe Pinna**

The University of Sheffield, UK



## **E**: Energy and Transportation

#### **Vito Di Noto**

University of Padova, Italy

#### **Dirk Lehmhus**

Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM, Germany



#### F: Materials for Healthcare

#### Aldo R. Boccaccini

Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

### Sandra Van Vlierberghe

Gent University, Belgium



# G: Education, Strategy and Technology Transfer

#### **Marco Falzetti**

APRE - Agenzia per la Promozione della Ricerca Europea, Italy

#### Paloma Fernández Sánchez

Universidad Complutense de Madrid, Spain



# H: Materials for Circularity and Sustainability

#### **Gesa Beck**

SRH Berlin University of Applied Sciences, Germany

#### Artur Brau

Swiss Federal Laboratories for Materials Science and Technology (EMPA) , Switzerland

Deadline for abstract submission: **31 January 2023**. Contribution submissions from Young Scientists are welcome.

# **KEYDATES & DEADLINES**

#### **31 JANUARY 2023**

**DEADLINE FOR ABSTRACT SUBMISSION** 

#### **31 JANUARY 2023**

**DEADLINE EARLY BIRD TICKETS** 

#### **MAY 2023**

**AUTHORS CONFIRMATION** 

#### **JUNE 2023**

PRELIMINARY PROGRAM

#### **03 SEPTEMBER 2023**

START OF EUROMAT 2023

# **EARLY BIRD TICKETS**

#### **ON-SITE TICKETS\***

These tickets cannot be booked separately without a catering package!

FEMS MEMBER - FULL CONGRESS	805€
FEMS MEMBER - HALF CONGRESS	515€
REGULAR - FULL CONGRESS	950€
REGULAR - HALF CONGRESS	610€
REGULAR - ONE DAY	380€

#### ON-SITE TICKETS - YOUNG SCIENTISTS\*

Full Congress only. Bachelor, Master and PhD Students up to 30 years (proof required). These tickets cannot be booked separately without a catering package!

YOUNG SCIENTISTS - FEMS MEMBER 433€ YOUNG SCIENTISTS - REGULAR 510€

### **ONLINE TICKETS\*\***

Full Congress only

FEMS MEMBER	325€
REGULAR	380€

#### \*On-site tickets include:

the possibility to watch all contributions on-demand for 14 days after the congress | catering package:

- Coffee breaks (Monday, Tuesday, Wednesday, Thursday,
- Lunchtime snack
- Welcome reception

#### \*\*Online tickets include:

the online participation through a browserbased web congress plattform and the possibility to watch all contributions on-demand for 14 days after the congress

#### **Congress Office**

Deutsche Gesellschaft für Materialkunde e.V. Marie-Curie-Straße 11-17 53757 Sankt Augustin, Germany T +49 (0) 69 75306 750 euromat@dgm.de

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