

EUROMAT 2019 / Area F: Materials for Healthcare

SYMPOSIUM: F5

Title: Structural and bio-inspired bioceramic materials and implants		
Organizer	Institution	Contact email
Jerome Chevalier	Institut National des Sciences Appliquées de Lyon (INSA Lyon) , France	jerome.chevalier@insa-lyon.fr
Simone Sprio	Institute of Science and Technology for Ceramics, ISTECCNR, Italy	simone.sprio@istec.cnr.it
Håvard J. Haugen	University of Oslo, Norway	h.j.haugen@odont.uio.no
Abstract		
<p>The aim of this symposium is to explore the most recent advances in bioceramics design, synthesis and processing, together with assessment protocols to obtain implants with improved and mechanically-competent performance, ensuring wider applications in medicine with enhanced safety and effectiveness over time. The aspects of translation of research innovations towards implementation in ceramic medical devices will also be considered.</p> <p>Bioceramic materials and composites are widely considered for the treatment of bone and joint defects in orthopedics, dentistry, spinal and cranio-maxillofacial surgery. However, in spite several bioceramics have been successfully used in clinics, some critical factors still limit their performance, particularly when weight-bearing applications are demanded. Such clinical cases are, indeed, the most challenging for surgeons and among the most relevant for their socio-economic impact, also in the view of progressive ageing of the population and more active lifestyles.</p> <p>To avoid failures, promote long-lasting effectiveness and a lower recourse to revision surgery, materials scientists are still today called to develop structural bioceramics concurrently showing various relevant features, such as without being exhaustive:</p> <ul style="list-style-type: none">- Textured multi-scale porosity, to favor bone in-growth while keeping acceptable strength and stiffness adapted to the bone site,- Ceramics with complex compositions and structures (architectures) to improve their mechanical properties. This includes composites with reinforcement mechanisms and bio-inspired materials.- Surface modification and bio-functionalization to tailor specific biological interactions or improved wear performances- Ceramics with gradients, of porosity or composition, to answer complex		

clinical needs.

For this reason, new concepts for bioceramic design, development and processing to achieve improved compositional and microstructural control, are a clear research focus today. Particular emphasis will be given to new processes such as additive manufacturing or bio-inspiration, today considered as the last frontier of material science aiming to reproduce natural assembling/consolidation processes, or to copy biologic structures into new materials with superior structural properties.

With this, the symposium proposes as a platform aiming to stimulate discussion among active researchers, medical device manufacturers and clinicians involved in the development and use of bioceramics. Results and protocols of *in vitro* and *in vivo* assessment of structural bioceramics and implants (including clinical trials) are welcome.

Targeted Topics

- Bio-inspired approaches for ceramics development
- Additive manufacturing of structural bioceramics
- Low temperature bioceramic processing
- Bioceramics for dental reconstruction
- Bioceramics for load-bearing applications
- Structural and mechanical characterization of bioceramics
- Translation toward ceramic products development: from concepts to clinic