EUROMAT 2019 / Area F: Materials for Healthcare

SYMPOSIUM: F1

Title: Biopolymers in medicine: advanced applications

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Abstract

The symposium will cover both natural polymers (e.g. proteins and polysaccharides, including glycosaminoglycans) and biobased synthetic polymers as well as derivatives thereof. A variety of chemistries and architectures will be highlighted thereby creating a broad range of structural and functional properties in line with the envisaged medical application. This could enable the production of devices for healthcare applications ranging from conventional replacement strategies (e.g. biodegradable implants) to more sophisticated systems such as advanced hydrogels and biomimetic scaffolds for tissue engineering, controlled drug delivery, as well as smart/bioinstructive surfaces.

Particular attention will be paid to biopolymer design in line with the specific processing needs. In addition to rapid prototyping (laser-, nozzle- and printer-based), alternative biopolymer processing techniques such as electrospinning, microfluidic-assisted, or other liquid-based methods, will also be covered, to be able to fabricate devices with a variety of shapes and sizes. Current trends will be highlighted together with solutions to tackle existing processing limitations, in particular when we intend to encapsulate cells in the structure during the fabrication process.

Strategies to control the mechanical properties of biopolymer-based scaffolds and devices will be highlighted as well. Indeed, maintaining and improving the mechanical integrity of processed scaffolds is a key issue regarding 3-dimensional biopolymer structures. This limitation can either be overcome during or after processing, depending on the applied technology and materials. Novel crosslinking and chemical modification strategies for biopolymers will be dealt together with the associated advantages and disadvantages. Focus will be on the crosslinking mechanisms, the crosslinking kinetics and the biocompatibility of the elaborated methodologies. Moreover, their compatibility mainly with 3D printing and electrospinning will be addressed among others. In addition, approaches to tune the biodegradability will be discussed while ample attention will also be paid to biopolymer functionalization as well as characterization prior to and after processing.

Finally, the in vitro biological assessment and in vivo response of processed biopolymers will be discussed.