

Wound Care & Regenerative Medicine 2019: Current trends and challenges in 3D/4D biofabrication using multifunctional smart biomaterials and nanomaterials - Luciano Paulino Silva - Brazil University of Brasília

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Bio fabrication is a multidisciplinary research field combining principles from engineering, biology and material sciences through the application of multiple manufacturing processes to create bio-objects that mimic the architecture of living systems. Indeed, it debuted in scientific and technological scenarios as potential strategies for tissue engineering, regenerative medicine and related areas aiming the production of organoid models for drug screening and cosmetics evaluation, tissues for reconstruction and organs for transplantation. However, now other areas like agriculture and veterinary as well as the food industry can benefit from this exciting field. Probably, hydrogels represent the most essential building blocks for production of scaffolds and cells entrapment aiming bio fabrication. Interestingly, natural polymers derived from agricultural, forestry and livestock products and by-products are the most largely used raw materials for production of hydrogels useful for bio fabrication purposes since they are typically abundant, inexpensive, renewable, biodegradable, and biocompatible and considered appropriate from chemical, structural and mechanical standpoints.

More recently, nanomaterials have also attracted great attention for bio fabrication due to their unique properties which arise from nanoscale and that offers a plethora of new possibilities to meet technical and scientific demands. A recent trend related to this scenario is the termed 4D bio fabrication that goal to construct and fine-tuning 3D bio-structures through dynamic processes of self-assembly that could modulate their morphologies or functionalities over time, particularly when a certain chemical, biological, or physical stimulus is applied to smart materials or cell/tissue/organ post-processing self-organization and shape-morphing occurs. Indeed, it is expected that bio fabrication will continue to break scientific paradigms and revolutionize researchers thinking process next years and the use of multifunctional smart biomaterials and nanomaterials may represent the next revolution in bio fabrication at the cutting edge of technological innovation. In sum, this talk will highlight the current state-of-the-art of bio fabrication field and discuss some recent advances and applications.