Secteur des Sciences
et Technologies

Invitation à la soutenance publique de thèse de

Loïc GERMAIN

Master bioingénieur : chimie et bioindustries

Pour l'obtention du grade de Docteur en sciences agronomiques et ingénierie biologique

« Macroporous scaffolds for tissue engineering :
3D printing and surface mechanical modification »

qui se déroulera
le mercredi 23 octobre 2019 à 16h30
Auditoire A02 SCES
Place des Sciences
1348 Louvain-la-Neuve

Membres du jury :

Prof. Anne des Rieux (UCLouvain), supervisor
Prof. Christine Dupont-Gillain (UCLouvain), supervisor
Prof. Eric Gaigneaux (UCLouvain), chairperson
Prof. Benoît Raucent (UCLouvain), secretary
Prof. Julian Leprince (UCLouvain)
Prof. Elziebta Pamula (University of Science and Technology, Poland)
Prof. Sylvain Gabriele (UMons, Belgium)

Additive manufacturing techniques are promising technologies to produce patient-specific and effective scaffolds for tissue engineering. Chemical and physical surface modifications are often performed on scaffolds to control cell behavior and foster tissue regeneration. On the other hand, surface mechanical properties are known to influence stem cell proliferation and to direct their differentiation.

The aim of this work was to produce poly(lactic acid) (PLA) and poly(ε-caprolactone) scaffolds using a so-called gyroid, which features an isotropic and spring-shaped design. This was achieved by adapting the parameters to get closer to the resolution limits of fused deposition modeling, an easy-to-use and low-cost 3D printing technology. A semi-interpenetrating polymer network made with poly(dimethyl siloxane) crosslinked at different densities was then designed to modify the surface mechanical properties of PLA gyroid scaffolds. Finally, the effect of the coating mechanical properties on the proliferation and osteogenic differentiation of stem cells from the apical papilla was evaluated.

The production of complex scaffolds was successfully achieved using 3D printing. The coating technology that was further developed paves the way towards the modification of the surface mechanical properties of macroporous scaffolds with a complex shape, with a view to control stem cell behavior.