Secteur des Sciences et Technologies

Invitation à la soutenance publique de thèse de

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Master bioingénieur : chimie et bioindustries

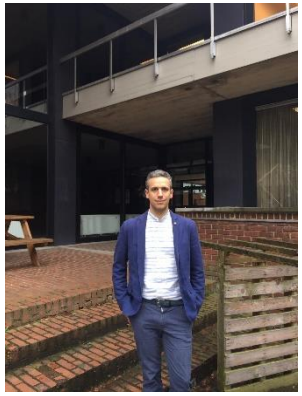
Pour l'obtention du grade de Docteur en sciences de l'ingénieur et technologie

« Nanostructured extracellular matrix-like biointerfaces »

qui se déroulera
le jeudi 05 mars 2020 à 15h30
Auditoire LAVO 51
Place Louis Pasteur, 1
1348 Louvain-la-Neuve

Jury members :

Prof. Sophie Demoustier (UCLouvain), supervisor
Prof. Christine Dupont (UCLouvain), supervisor
Prof. Jean-François Gohy (UCLouvain), chairperson
Dr. Etienne Ferain (UCLouvain), secretary
Prof. Christine Jerome (ULg, Belgium)
Prof. Deepak Kalaskar (University College London, UK)
Prof. Bernard Knoops (UCLouvain)



The scientific community is gathering an ever-growing collection of insights into how cell fate is finely tuned in vivo by a complex interplay of topographical, mechanical and chemical stimuli provided through the extracellular matrix (ECM). This triggers the wish to master and replicate these cell-influencing factors. Indeed, being able to understand and control the complex mechanisms of morphogenesis, cell proliferation and differentiation found in Nature, would greatly advance technologies such as cell therapy, tissue engineering and regenerative medicine. Successful outcomes of these strategies based on the regulation and modification of cell processes are intimately linked to our capacity to develop artificial cell-educative interfaces mimicking the Nature's golden standard which is ECM. As a contribution to this challenge, we have synthesized original interfaces composed of intersected nanotubes whose structure and surface chemistry mimic that of the ECM. These ECM-like biointerfaces were synthesized via hard templating of biopolymers in combination with synthetic polymers or nanocolloids and subsequent dissolution of the supporting template. Whereas some of the produced biointerfaces are still lacking adequate mechanical properties for cell-based biomedical applications, other designs effectively bridge the gap between two often antagonistic factors: bioactivity and mechanical stability. In particular, matrices of intersected polypyrrole (PPy) nanotubes functionalized with a biomimetic (Collagen/Hyaluronic acid) multilayer were seeded with murine pre-osteoblast cells and observed to be cell-adhesive and to positively impact the expression of an early osteogenic marker. In addition to the projected applications as cell-influencing biomaterials, these nanostructured matrices being highly tunable and displaying a high surface area, could be useful for drug-delivery applications, biosensing or nanocatalysis.