materials-driven regeneration

- Wednesday October 12th , 2022 -

- 4:00pm (CET) -

MDR colloquium October 2022

Online – TEAMS meeting

The Research Center for Materials-Driven Regeneration (MDR) is proud to present a series of lectures (monthly). The MDR Gravitation program is a partnership between Eindhoven University of Technology, Maastricht University and Utrecht University, University Medical Center Utrecht and the Hubrecht Institute. MDR brings together materials scientists, cell biologists, tissue engineers and medical scientists to jointly work on the regeneration of tissue and organ function with intelligent, life-like materials.

Spheroid Calcification for Disease Modelling and Regenerative Medicine

Bone fractures or musculoskeletal disorders such as osteoporosis present a significant burden on individuals and the healthcare system. Here, a challenge in regenerative medicine is recapitulating the complex three-dimensional bone microenvironment in vitro to study these disorders and develop regenerative therapies. On the other hand, calcification processes vital for proper bone homeostasis and regeneration also occur unwanted in soft tissues, leading to various disease pathologies. Examples are atherosclerosis and calcific tendinitis, but also rare diseases such as fibrodysplasia ossificans progressive, the “Stoneman Disease”. Similarly, limited knowledge exists concerning disease development and treatment. Therefore, there is an urgent need to develop better in vitro microenvironments to understand the underlying pathophysiological processes.

During the MDR colloquium, I will present our latest work involving a microwell-based platform to create aggregates of human mesenchymal stromal cells (hMSCs) undergoing calcification. We found that combining a spheroid environment supplemented with Ca2+ ions promotes rapid calcification and induces a synergistic effect on osteogenic marker expression. Not only is this concept interesting for tissue regeneration applications, we also demonstrate that this model system is useful for identifying compounds that either promote or inhibit calcification events.

Dr. Steven Vermeulen

MERLN Institute for Technology-Inspired Regenerative Medicine

Hydrogels for high resolution 3D printing: towards narrow tubular scaffolds for kidney engineering

A major challenge in hydrogel 3D-printing is fabricating complex constructs small enough to resemble the dimensions of complex tubular shapes present in human organs, such as the kidney. To enhance the resolution of the final object, we have developed a material-based approach where a 3D-printed construct can be uniformly shrunken on demand by an external trigger. This presentation will show our recent work on ‘shrinking-printing’ triggered by electrostatic and thermosensitive interactions.

Prof. Tina Vermonden

Utrecht University

TU/e Maastricht University UMC Utrecht Hubrecht Institute Utrecht University