



Digitizing the interface between cells and biomaterials

Speaker: Jan de Boer, Laboratory of BioInterface Science, Dept. of Biomedical Engineering, Eindhoven University of Technology, The Netherlands
When: 4pm on Friday 5th of April 2019
Where: Cheyne Lecture Theatre, RCSI, 123 St Stephens Green, Dublin 2

In my seminar I will present our latest work on controlling the interaction of cells with biomaterials through design of surface topography. For instance, we are interested in the bone-inducing properties of a subset of porous calcium phosphate ceramics and show how through reverse engineering, we are uncovering an interesting and complex response of cells to materials. Inspired by this, we have started to design high throughput screening strategies of biomaterials libraries, and in particular libraries of surface topographies. Using a design algorithm, we have generated numerous different patterns, which can first be reproduced on a silicon mold and then imprinted onto polymers using microfabrication. After cell seeding, we use quantitative high content imaging and machine learning algorithms to characterize the response of the cells to the thousands of different surfaces and learn more about the relation between surface topography and cell response. For instance, we have identified surfaces which stimulate osteogenic differentiation of mesenchymal stem cells and we are currently testing whether these surfaces can be applied in orthopedic surgery. The focus of my seminar will be on our effort to digitize life at the interface of biomaterials and cells through parameterization of biomaterial properties, –omics based approaches to analyse cell response and computational science to understand and design bio-active biomaterials.



Jan de Boer studied biology at the University of Utrecht and obtained his PhD in the lab of Jan Hoeijmakers at the Erasmus MC Rotterdam on mouse models for premature ageing in 1999. After a postdoc at the MRC Laboratory of Molecular Biology in Cambridge, UK, he started as a research associate at IsoTis B.V. where his research focused on bone tissue engineering, which was continued as associate professor at the University of Twente. Since 2014 Jan is full professor, and now works at Eindhoven University of Technology.

Jan studies the molecular complexity of cells and how molecular circuits are involved in cell and tissue function. With a background in mouse and *Drosophila* genetics, he entered the field of biomedical engineering in 2002 and has since focused on understanding and implementing molecular biology in the field of tissue engineering, regenerative medicine and medical devices interface biology. His research is characterized by a holistic approach to both discovery and application, aiming at combining high throughput technologies, computational modeling and experimental cell biology to streamline the wealth of biological knowledge to real clinical applications.

He is former chair of the Netherlands Society for Biomaterials and Tissue Engineering, CSO and co-founder of Materiomics b.v., co-founder of the MosaCell scientific platform, co-founder of the MerIn Institute for Technology-inspired Regenerative Medicine in Maastricht and chair of the Biointerface Science lab at the department of Biomedical Engineering at the TU Eindhoven.