Rodriguez I et al, J Biotechnol Biomater 2017, 7:2 (Suppl)
http://dx.doi.org/10.4172/2155-952X.C1.073

Modulation of cell behaviour on artificial materials by functional nano-topographies for applications in regenerative medicine

Rodriguez I and **Viela F**
IMDEA Nanoscience Institute, Spain

Cells can react to synthetic surfaces with a wide way of responses which depend upon many factors, including chemical composition of the surface and the physical properties of the bulk substrate material, including substrate stiffness, topography feature size and geometry. It is now widely accepted that mechanical stimulus exerted onto cells by topographic cues can set off specific physiological processes that ultimately dictate the cell behaviour and fate. Identifying the specific topographical cues that lead to a specific cell behaviour, that is still an endeavour in biomaterial research for application areas impacting regenerative medicine or tissue engineering. In this sense, there have been numerous approaches to develop materials with fine control of the topographical features using micro and nanofabrication techniques. In our laboratory, we use polymer nanoimprinting to produce with nanoscale precision and high reproducibility, cellular instructive micro and nano topographical environments. We specifically investigate the response of progenitor neural stem cells to dense high aspect ratio polymer pillars on the micro and nano scale studies on cell viability, morphology, cell spreading and migration indicating that high aspect ratio topographies impact dramatically the cytoskeleton remodelling and distribution of the cellular tractions which in turn, gave rise to very distinctive cell behaviour. Nanosurface features inspired on the moth eye topography have also been investigated as bactericidal biocompatible surfaces for bionic implants. This surface has been demonstrated to be an effective bactericidal topography against Gram positive and Gram negative bacteria. At the same time, the surface supported cell growth and did not influence the biological cellular responses.

Biography

Isabel Rodriguez is a Research Professor at IMDEA-Nanoscience. Her research interest is on areas related to the application of micro and nano fabrication technologies on polymeric materials to construct functional surfaces. She currently works on the development of antibacterial surfaces and cell culture platforms for cell biomechanical studies. She is also working on the development of multifunctional surfaces, particularly on those with super-hydrophobic, anti-reflective and self-cleaning properties.

i.rodriguez@imdea.org