tide reactivates PCLdiUPy/PEGdiUPy films. These results show that PEGdiUPy can be used to obtain antifouling properties in UPy-materials and that UPy-functionalization of ECM-derived peptides allows the incorporation of functional biological cues in a synthetic scaffold.

31.P08 Novel methodology based on biomimetic superhydrophobic substrates to immobilize cells in hydrogel spheres for tissue engineering applications

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The low retention/integration of injected cells by host structures represents an important challenge in cell based therapies for regenerative medicine purposes. Cell immobilization in hydrogels for target cell delivery has been developed to circumvent this issue. However, the existing immobilization methodologies sometimes have several steps under wet conditions and present some drawbacks, including poor encapsulation efficiency and the use of harmful conditions for cells or other fragile molecules, such as proteins or growth factors. In order to surpass these problems mesenchymal stem cells isolated from rats (rMSCs) bone marrow and fibronectin (FN) were immobilized in alginate beads to mimic extracellular matrix environment using an innovative approach involving the jellification of the liquid precursor droplets onto superhydrophobic surfaces. The alginate drops with cells and FN hardened very fast, at room temperature, into hydrogels spheres in an isolated environment which avoided the loss of FN and any contamination or exchange of molecules with other liquid phase. The process for particle fabrication employed allowed a very high efficiency on FN encapsulation and also the mild conditions prevented the loss of cell viability. Encapsulated rMSCs remained viable and were slowly released from the beads during more than 20 days.

31.P09 Continuous functionally graded materials (cFGMs) for TE

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Biological structures are not uniform but possess spatially distributed functions and properties, or functional gradients. To ensure functional, mechanical and structural integration, a tissue engineered (TE) scaffold has to reproduce these functional gradients. However the fabrication of functionally graded materials is challenging and usually an experimental trial-and-error approach is used. In this work we present a controlled method for the fabrication of cFGMs using the gravitational sedimentation of discrete solid particles within a primary fluid phase. To have an overall control over particle distribution, a time-varying dynamic viscosity solution (i.e. thermo-sensitive) was used as fluid phase. Computational fluid dynamic models were developed to have a fine control over particle distribution. Biomimetic osteochondral cFGMs scaffolds were fabricated using hydroxyapatite (HA) and gelatin. Glutaraldehyde was used to covalently bind gelatin-HA graded scaffolds. Mechanical properties were measured and correlated as a function of HA volume fraction. SEM-EDX analysis was used to further characterise HA content and its distribution within gelatin-HA cFGMs. Finally gelatin-HA cFGMs scaffold were seeded using periosteum derived progenitor cells, to investigate how the HA gradient modulates cell response. This approach represents an innovative yet simple tool for the fabrication of tailored cFGMs with biologically and physiologically relevant gradients for TE applications.

31.P10 Multifunctional peptide nanofiber scaffolds for neural differentiation

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Extracellular matrix (ECM) is composed of various fibrous proteins and proteoglycans providing mechanical support and cues for cell adhesion, migration, proliferation and other cellular functions. ECM show great variation between tissues according to varying needs of cells of different tissues. ECM is also highly modular, decorated by a variety of molecules, even the inorganic ones, to keep functionality of specific tissues. For tissues of high mechanical strength ECM is highly collagenous besides being mineralized while for softer tissues with high water content, it is full of hyaluronic acid which acts as a reservoir of water. Such a high modularity in ECM is highly inspiring for regenerative studies which aim to repair damaged tissues. By considering native tissue structure including the abundance of specific ECM components and their relation to the requirements of resident cells, it is possible to design synthetic materials that mimics the natural environment of cells. We used peptide nanofiber scaffolds with bioactivities incorporated according to requirements of neural cells and stem cells for neural differentiation. By decorating the bioactive part of the peptide molecules with different epitopes derived from neural ECM, we were able to induce differentiation and neurite outgrowth of different cells. Encapsulating conductive molecules in neurite inducer peptide nanofibers allowed electrical stimulation of neural cells on peptide nanofibers yielding longer neurites.

31.P11 Characterization of enzymatic crosslinked hydroxyapatite/collagen nanocomposite for bone tissue engineering

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The regeneration of damaged or diseased skeletal tissues remains a significant clinical challenge. Although small bone fractures are capable of self-repair after trauma, large defects or diseased (i.e., osteoporotic) tissues fail to heal properly. In this study, a novel biomimetic bone matrix with inorganic (hydroxyapatite, HA) and organic (collagen, Col) compositions were developed as major components of nanocomposite. Three-dimensional porous HA/Col scaffold was fabricated by freeze-drying method. The physicochemical and mechanical properties of HA/Col scaffold have been investigated after enzymatic cross-linking with microbial transglutaminase (mTGase). The results showed that the crosslinked HA/Col scaffold could provide human mesenchymal stem cells (hMSCs) well adhesion, proliferation and growth. The nov-

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