Dynamic cell-material interactions

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Supramolecular chemistry provide nowadays an excellent prospect to construct reversible biological interfaces that can be employed for supramolecular cell manipulation experiments.[1] Making use of supramolecular chemistry is rewarding to develop functional materials and devices. Knowing the limitations involved in ordering proteins at different length scales will surely hasten developing future applications, supramolecular bionanotechnology being the most prominent. The construction of synthetic supramolecular assemblies of proteins provides an excellent tool to fabricate organized bioactive components at surfaces. I will present new synthetic procedures for site-specific noncovalent anchoring of proteins to surfaces and polymers.[2-5] Special attention is paid to orientational and conformational aspects at the surface and will be demonstrated. Using concepts of multivalency the interactions between proteins and surfaces can be modulated by design. Many of the protein complexes were patterned on surfaces using microcontact printing or nanolithography and visualized using fluorescence microscopy.[6] Furthermore, supramolecular linkers that are sensitive to remote electrochemical stimuli will be presented, using cucurbituril (CB)[2] and cyclodextrin (CD)-modified surfaces[4]. Electrochemical switching was studied using surface embedded electrodes.[7] Cell release was studied in detail in the case of cell-adhesive peptides and growth factors.[7,8] Lastly, supramolecular linkers were compared to reversible covalent linkers, using imine chemistry, providing insight in the cell receptor signaling pathway.[8] With the development of reversible bioactive platforms on surfaces serving as a reversible dynamic interfaces to cells, improved scaffolds for tissue regeneration will become in hand. First steps into this directions will be introduced as well.

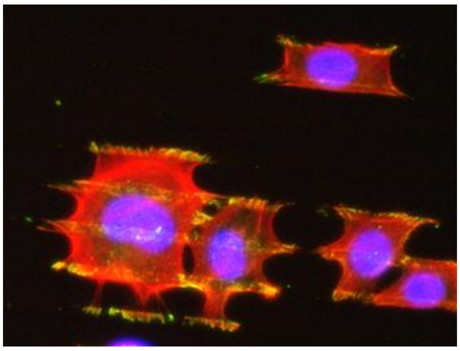

Fig1. Supramolecular platform for cell adhesion employing host-guest chemistry suitable for electro-responsive cell manipulation

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