Assembling biomimetic surfaces with modular amphiphilic proteins

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Amphiphilic secondary structures are ubiquitous in natural proteins, where they serve a wide variety of functions from specific binding ligands to structural elements in supramolecular assemblies. This talk describes the use of amphiphilic motifs in modular protein polymers as a strategy to achieve directed self-assembly of bioactive surfaces. These proteins are designed to include independent elements that direct their assembly onto hydrophobic surfaces, and that display functional peptide sequences to the aqueous solution phase (Figure 1). The associating domains are comprised of amphiphilic helices or beta sheets. These associating elements are linked to water soluble, disordered domains that display sequences with specific cell binding and signaling motifs or sequences that serve as templates for biomineralization. The molecular and interfacial properties of several systems and their potential for supporting attachment, growth and proliferation of a variety of cell types (Figure 2) will be presented, and potential biomedical applications will be discussed.

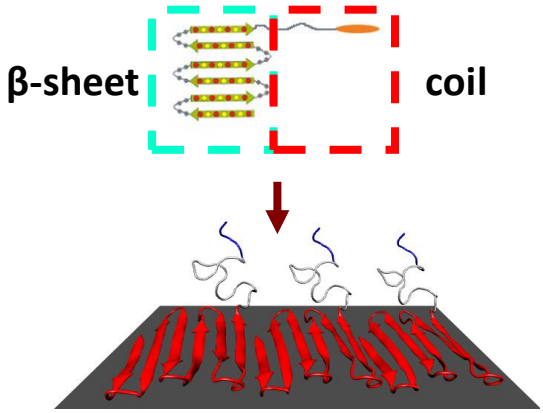

Figure 1: Surface functionalized with amphiphilic diblock protein motif

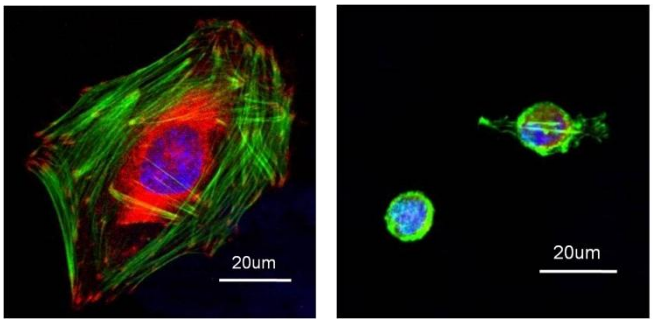

Figure 2: HFF cell response to bioactive (L) & bio-neutral (R) protein surfaces