Extracelluar matrix Proteins on Patterned Gold Substrate

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Abstract

Adsorption process of extracellular matrix (ECM) molecules in biological systems is very important, since the ECM provides many peptide and carbohydrate ligands to most cell membranes, which are recognized by cellular receptor, to regulate normal metabolism process. Indeed, the interactions of the EMC proteins with an external cell membrane are of great interest for biotechnology. For example, fibronectin, one of the most common EMC proteins, is an adhesive protein, acting as the primary intermediate between cells and the collagen matrix for many cell types. They are known to assemble into fibrils 100-1000 nm in diameter, but will not do so spontaneously in solution, generally requiring the presence of cells or cell-surface-like structures. Yet, for most EMC proteins, the mechanism which drives their self-assembly on cell membranes remains poorly understood.

We showed that charged polymers produced by poly(styrene-ran-sulfonic acid) and poly(styrene-ran-acrylic acid) can be used to mimic the cell surface, allowing us to quantitatively study the effect of surface charge density. In addition, The morphology of the ECM proteins was observed to depend on the nature of the substrate onto which the polymers were spun cast. In order to determine the substrate influence, we used a micropatterned gold structure on silicon substrate. The protein lattices on the various substrates will be discussed.

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