BIO-INSPIRED SURFACES FOR FUNCTIONAL AQUEOUS LUBRICATION.

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ABSTRACT
Polymer brushes have been studied through experimental and theoretical means over the past three decades because of the huge potential and possibilities to greatly improve surface properties [1]. Replication takes place by grafting polymers to substrates where one end is tethered to a surface while the other end is free to extend from the surface, constrained only by its elasticity [2]. The chains stretch perpendicular to the substrate due to the steric repulsion between the monomers and the substrate which is highly dependent on the concentration of solution.

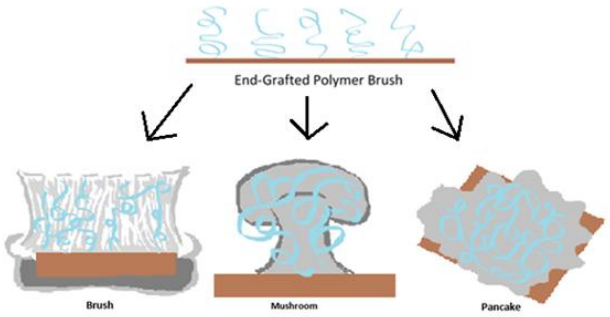

Fig.1 Figure caption

Charged and zwitterionic polymer [2-Methacryloyloxethyl Phosphorylcholine Polymer (MPC)] brushes surfaces can effectively achieve hydrated lubrication. The hydration layer can strongly hold and have the ability to support large pressures without squeezing out, but can also relax very quickly providing fluid response to shear. Such surfaces have been shown to be highly hydrophilic and as a result low friction coefficients (<0.001) have been achieved using nano-tribological methods [3].

The aim of this project was to investigate the feasibility of polymer brush technologies as a method of functionalizing a surface for use in water lubricated environments. This was be achieved through a systematic study in which the surfaces, polymer brush chemistry and tribological environment are varied. Whereby the focus will lie upon the effect of corrosion on zwitterionic polymer brushes under hydrated lubricated environments. Methods of optimizing and managing friction and wear response through functional grading and encapsulation within the films will be investigated. Surface characterisation will be conducted through AFM, ellipsometry and contact angle measurement as well as friction testing.

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