

Surfactant layers and polymer brushes under confinement and shear

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It is very common in technological applications and biological systems that surfaces come to close proximity or intimate contact. These surfaces are often decorated with polymers and surfactants (or lipids), thereby tailoring surface properties and facilitating desired surface interactions. The efficacy of these processes depends intricately on the structural characteristics of the polymer and surfactant molecules present on the surface.

Using a version of the surface force apparatus, we have measured normal and, in particular, shear forces between a pair of surfaces bearing two distinct surface structures in aqueous media: polymer brushes and surfactant bilayers. Their effectiveness in reducing friction will be critically compared in this talk, in particular the unifying feature of fluid hydration layers about charged species in aqueous media. The implications of our results to the lubrication process in biological living systems will also be discussed.