

## **Polymers at surfaces: Adhesion and Friction on the Nanoscale**

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Most proteins readily adsorb on both hydrophobic and hydrophilic surfaces, which is an obstacle when designing protein resistant (so called non-fouling) surface coatings. The mechanism behind this universal attraction involves water. AFM experiments yield high-precision adsorption energies of single protein molecules and point to an extremely high mobility on hydrophobic surfaces. MD simulations suggest that both water structural effects and dispersion interactions between protein and surface contribute to the adsorption energy.

On surfaces, the friction coefficient of bound polymers is very low on hydrophobic substrates, which is traced back to the presence of a vacuum layer between substrate and water, which forms a lubricating cushion on which a polymer can glide. Conversely, friction forces on hydrophilic substrates are large. A modified Amontón's law is introduced, which describes the dynamics of hydrogen-bonded matter on the nano-scale.