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Using Surface Curvature to Control the Dimerization of a Surface-Active Protein MARTIN KURYLOWICZ, MAXIMILIANO GIULIANI, JOHN DUTCHER, University of Guelph — Understanding the influence of surface geometry on adsorbed proteins promises new possibilities in biophysics, such as topographical catalysis, molecular recognition of geometric cues, and modulations of oligomerization or ligand binding. We have created nano-textured hydrophobic surfaces that are stable in buffer by spin coating polystyrene (PS) nanoparticles (NPs) to form patchy NP monolayers on a PS substrate, yielding flat and highly curved areas on the same sample. Moreover, we have separated surface chemistry from texture by floating a 10 nm thick film of monodisperse PS onto the NP-functionalized surface. Using Single Molecule Force Spectroscopy we have compared *in situ* the distribution of detachment lengths for proteins on curved surfaces to that measured on flat surfaces. We have shown that β-Lactoglobulin (β-LG), a surface-active protein which helps to stabilize oil droplets in milk, forms dimers on both flat PS surfaces and surfaces with a radius of curvature of 100 nm, whereas β-LG monomers exist for more highly curved surfaces with radii of curvature of 25 and 40 nm. It is surprising that rather large radii of curvature have such a strong influence on proteins whose radius is only $\sim$2 nm. Furthermore, the transition from dimer to monomer with changes in surface curvature offers promising applications for proteins whose function can be modified by their oligomerization state.

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