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Using Nanoscale Substrate Curvature to Control the Dimerization of Surface-Bound Proteins HILARY PAULIN, MARTIN KURYLOWICZ, JOSH MOGYOROS, MAXIMILIANO GIULIANI, JOHN DUTCHER, University of Guelph — The influence of surface geometry on adsorbed proteins offers new possibilities for controlling quaternary structure by manipulating protein-protein interactions at a surface, with applications that are relevant to protein aggregation, fibrillation, ligand binding and surface catalysis. To understand the effect of surface curvature on the structure of surface-bound proteins, we have used a combination of polystyrene (PS) nanoparticles (NPs) and ultrathin PS films to fabricate chemically pure, hydrophobic surfaces that have nanoscale curvature and are stable in aqueous buffer. We have used Single Molecule Force Spectroscopy (SMFS) to measure the detachment contour lengths (L_c) for beta-lactoglobulin (b-LG) and alpha-lactalbumin (a-LA) adsorbed onto neighbouring regions of highly curved and flat PS surfaces, allowing us to compare these values *in situ* on the same sample. In general, we measure peaks in the L_c distributions corresponding to monomers and dimers. As the curvature of the underlying surface is increased, the population of dimers decreases such that only monomers are observed for b-LG adsorbed onto 25 nm dia NPs. These results indicate that surface curvature provides a new method of manipulating protein-protein interactions and controlling the quaternary structure of adsorbed proteins.

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