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Controlling Protein Oligomerization with Surface Curvature on the Nanoscale MARTY KURYLOWICZ, JOHN DUTCHER, University of Guelph — We investigate the effect of surface curvature on the conformation of beta-lactoglobulin (βLG) using Single Molecule Force Spectroscopy. βLG is a model interfacial protein which stabilizes oil droplets in milk and is known to undergo structural rearrangement when adsorbed onto a surface. We reliably control nanoscale surface curvature by creating close-packed monolayers of monodisperse polystyrene (PS) nanoparticles with diameters of 20, 40, 60, 80 and 140 nm, which are stable in aqueous buffer. By adsorbing βLG onto these hydrophobic surfaces and collecting force-extension curves in the fluid phase we can compare the conformation of βLG on 5 different surface curvatures with that on a flat PS film. We demonstrate a transition from oligomeric to monomeric βLG as the surface curvature is increased. Histograms of contour length from fits to peaks in the force-extension curves show a single maximum near 30 nm for βLG adsorbed onto nanoparticles with diameters less than 80 nm. For the larger nanoparticles, the histogram approaches that observed for βLG adsorbed onto a flat PS film, with maxima indicative of βLG dimers and trimers.

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