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 ($\beta$LG) using Single Molecule Force Spectroscopy. $\beta$LG 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 $\beta$LG onto these hydrophobic surfaces and collecting force-extension curves in the fluid phase we can compare the conformation of $\beta$LG on 5 different surface curvatures with that on a flat PS film. We demonstrate a transition from oligomeric to monomeric $\beta$LG 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 $\beta$LG adsorbed onto nanoparticles with diameters less than 80 nm. For the larger nanoparticles, the histogram approaches that observed for $\beta$LG adsorbed onto a flat PS film, with maxima indicative of $\beta$LG dimers and trimers.

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