**123d Polymer Brushes with High Protein-Binding Capacity Based on Poly(Dimethylamino Ethylmethacrylate)**

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Polymer brushes with high protein-binding affinity can be used as chromatographic media or as protein scavengers for fractionating crude cell lysate samples. Well controlled poly(dimethylamino ethylmethacrylate) (PDMAEMA) brushes are grown on gold surfaces from thiol-linked initiators using atom transfer radical polymerization (ATRP). The polymer grafting density is controlled by varying the ratio of the active and inert thiols that are injected during the preliminary gold surface modification step. PDMAEMA has a lower critical solution temperature (LCST) of approximately 35°C in neutral pH water, making it an attractive candidate for preparing thermally responsive materials and coatings for biomedical applications. Using Surface Plasmon Resonance spectroscopy (SPR), we find that PDMAEMA brushes adsorb the equivalent of 10 to 15 monolayers of bovine serum albumin (BSA) even at temperatures below the LCST. The BSA is imbibed into the brush. The equivalent three-dimensional concentration of bound BSA, calculated from the surface excess concentration and an estimate of the brush thickness, exceeds the aqueous solubility of BSA. BSA is tightly bound in the PDMAEMA brush, desorbing at an immeasurably slow rate upon rinsing with BSA-free solution. Comparing brushes with differing grafting densities, the amount of BSA adsorbed within the PDMAEMA brush appears to occur at a constant ratio of ~146 DMAEMA monomers per bound BSA. After trapping BSA, PDMAEMA brushes lose their thermal responsiveness. This behavior observed for brushes is in agreement with the behavior of PDMAEMA in bulk, where a gel-like structure is formed when solutions of PDMAEMA and BSA are heated above the LCST. These PDMAEMA/BSA gels survive upon cooling to good solvent conditions. In addition to the effects noted here, this presentation will include a systematic exploration of the effects of protein charge and hydrophobicity and of the monomer composition for DMAEMA/methyl methacrylate copolymers that provide a tunable LCST.