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Spot Surface Labeling of Magnetic Microbeads and Application in Biological Force Measurements ASHLEY ESTES, E. TIM O'BRIEN, DAVID HILL, RICHARD SUPERFINE, University of North Carolina-Chapel Hill Department of Physics — Biological force measurements on single molecules and macromolecular structures often use microbeads for the application of force. These techniques are often complicated by multiple attachments and nonspecific binding. In one set of experiments, we are applying a magnetic force microscope that allows us to pull on magnetic beads attached to ciliated human bronchial epithelial cells. These experiments provide a means to measure the stall force of cilia and understand how cilia propel fluids. However, because we are using beads with diameters of one and 2.8 microns, and the diameter of human airway cilia is approximately 200 nm, we cannot be assured that the bead is bound to a single cilium. To address this, we have developed a sputter coating technique to block the biotin binding capability of the streptavidin labeled bead over its entire surface except for a small spot. These beads may also have applications in other biological experiments such as DNA force experiments in which binding of a single target to an individual bead is critical.

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