357f Probing the Adhesion Force between E.Coli and Modified Silicone Rubber Surfaces

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As a highly flexible and fatigue resistance material, silicone is commonly used for such applications as breast implants, heart valves, drug delivery devices, indwelling catheters, and in many other applications. However, the incidence of infection in some of these devices is still a critical issue affecting their application. Bacterial adhesion and the consequent formation of biofilms are key steps of infection in different environments. In this presentation, the interactions between *E.Coli* JM 109 and several modified silicone surfaces formed by chemicals with either hydrophilic or hydrophobic properties, including octadecyltrichlorosilane (OTS)/silicone, fluoroalkylsilane (FAS)/silicone, heparin/silicone and hyaluronan/silicone were investigated.

E.Coli JM 109 were immobilized to a standard Atomic Force Microscopy (AFM) probe. Both approach and retraction force curves were obtained and utilized to describe the extent of bacterial interaction with modified silicone surfaces. Scanning Electron Microscopy (SEM) photomicrography was also preformed. Figures 1 A) and C) show the interaction between bacteria and substrates during their approaching period, whereas, Figure 1 B) and D) exhibit the force needed to detach bacteria from surfaces. Results from both AFM and SEM indicate that FAS coated silicone shows a better bacterial resistant than silicone. Conversely, heparin treated silicone attracted more bacteria than any other surfaces. These techniques for sensing bacterial interactions and adhesion can provide a better understanding of the effects of surface composition on cell-material interaction forces and may be helpful in the future design of novel biomaterial surfaces.

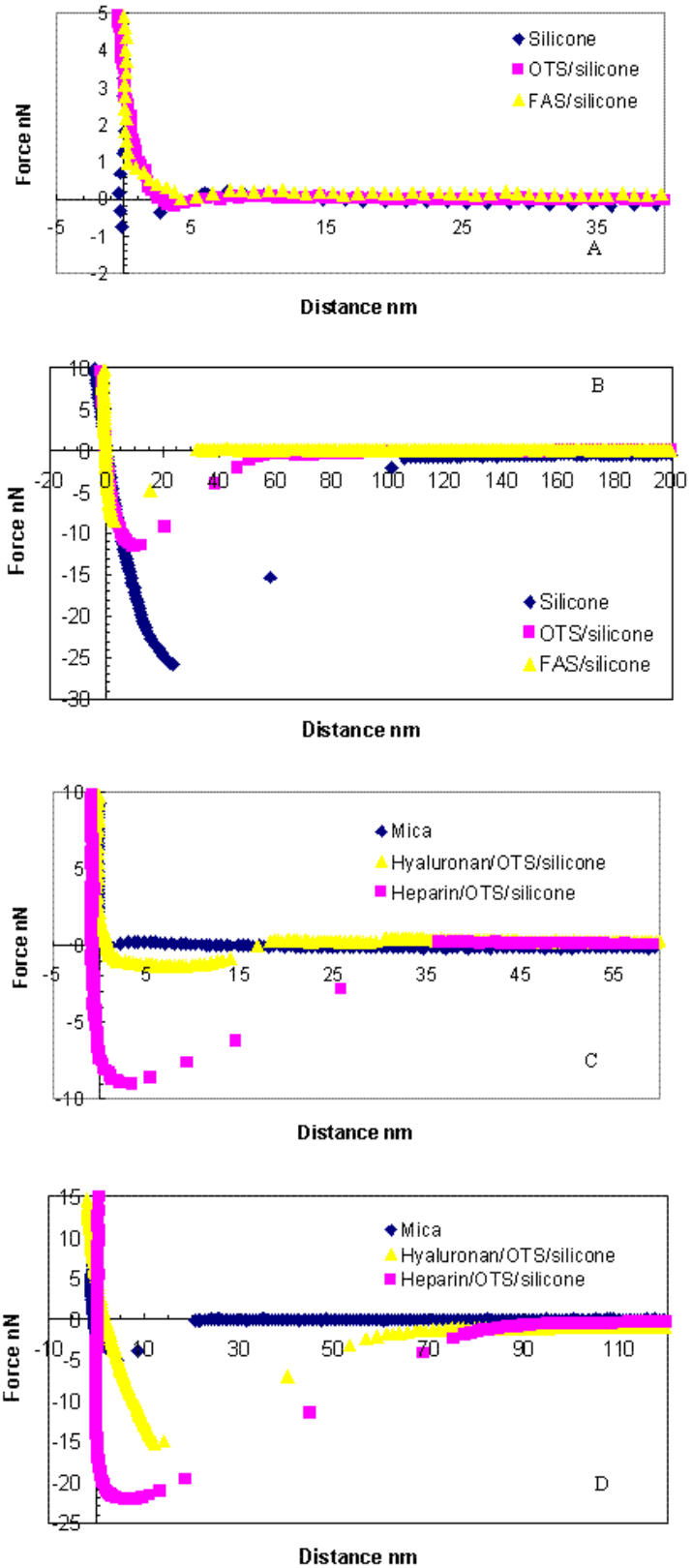

Figure 1 Approaching (A, C) and retraction (B, D) curves of *E.coli* JM 109-coated AFM tip on silicone-modified substrates. X-axis represents separation distance between bacteria coated tip and surface and Y-axis is the force calculated from cantilever deflection. Different modified surfaces have distinct force curve characteristics.