Northeastern University

Chemical Engineering Department

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Preparation of a Nanopatterned Polymer Replica for Reduced Catheter Inflammation and Infection

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Inflammation and infection of catheters are significant problems. It is hypothesized that nanostructured surfaces can be carefully manipulated to inhibit immune cell (*e.g.*, macrophages) and bacteria responses due to their unique surface energy properties which have the ability to control initial protein absorption and subsequent cell behavior. The objective of this in vitro study was to create nanopatterned polydimethylsiloxane (PDMS) molds based on anodized titanium and anodized stainless steel and then to test inflammatory cell and fibroblast responses on such substrates. Results suggested that nanotubular Ti significantly improved the fibroblast adhesion while inhibiting macrophage adhesion. Furthermore, increased fibroblast adhesion also was seen on nanopatterned PDMS template compared with pure PDMS.