Localized gene delivery from polymer /ceramic scaffolds for tissue engineering

Razieh Khalifehzadeh, Buddy D. Ratner

Department of Chemical Engineering, University of Washington,

Seattle, WA 98195

Safe and efficient gene delivery from tissue engineering scaffolds offers potential to promote gene transfer and stimulate new tissue formation. The scaffold provides high concentrations of DNA in the vicinity of target cells and at the same time limits its distribution to distance tissues, thus reducing unfavorable immune response. Inspired by natural biomineralization processes, we described a method to integrate DNA onto the surface of hydrophilic poly(2-hydroxyethyl methacrylate) (polyHEMA) scaffolds. The method involved co-precipitation of DNA with inorganic mineralizing solutions derived from simulated body fluid (SBF). The polymeric scaffolds were incubated within these solutions at 37°C and physiological pH. The morphology and structure of these DNA/mineral composites were characterized by scanning electron microscope and X-ray photoelectron spectroscopy. The extent of *in vitro* gene transfection efficiency will be evaluated using NIH-3T3 fibroblasts cells.