Calcium Phosphate-Chitosan Coatings Deposited on Titanium Surfaces via Pulse Galvanostatic Electrodeposition for Dental Implants

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Calcium phosphate/chitosan coatings were grown with various concentrations of chitosan solution by pulse electrodeposition. The coatings were deposited by 10 cycles of 5% to 20% chitosan by volume in deposition electrolyte. A uniform coating of calcium phosphate was deposited on a titanium surface and the underlying coating mechanism was investigated. The coatings were characterized by X-ray diffraction and scanning electron microscopy. The X-ray diffraction patterns and Fourier-transform infrared spectroscopy spectra confirmed the formation of dicalcium phosphate dihydrate and hydroxyl apatite. During electrodeposition, the reaction between calcium ions and reduced phosphate ions resulted in the formation of dicalcium phosphate dihydrate, which was converted to hydroxyl apatite. Homogenous spindle-like deposits were formed with controlled chitosan contents. The calcium phosphate/chitosan coatings acted as protective layers during electrodeposition. The control of chemical composition in the coatings affected corrosion behavior.

Keywords: Mineralization, Chitosan, Pulse electrodeposition, Calcium phosphate, Corrosion resistance

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