

A Novel Photocrosslinkable and Cytocompatible Chitosan Coating for Ti6Al4V Surfaces

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Abstract : In this work, chitosan (CH) has been used to produce a novel coating for Ti6Al4V, the most widely used alloy in orthopedic implants, so as to improve the biological tissue response at the metallic surface. The Ti6Al4V surface was sandblasted with alumina particles and observed by SEM. Chitosan was chemically modified, via crodiimide chemistry, with lactobionic and 4-azidebenzoic acid to make it soluble at physiological pH and photo-crosslinkable, respectively. The reaction was verified by FTIR, NMR, and UV/vis spectroscopy. Ti6Al4V surfaces were coated with solutions of the modified CH and exposed to UV light, causing the polymer crosslinking, and formation of a hydrogel on the surface. The crosslinking reaction was monitored by FTIR at different exposure times. Coating morphology was observed by SEM. The coating's cytocompatibility was determined in vitro through the culture of rat bone marrow's mesenchymal stem cells, using an MTT assay. The results show that the developed coating is cytocompatible, easy to apply and could be used for further studies in the encapsulation of bioactive molecules to improve osteogenic potential at the tissue-implant interface.

Keywords : chitosan, photo-crosslinking, Ti6Al4V, bioactive coating, hydrogel

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