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IN SITU SYNTHESIS AND CHARACTERIZATION OF HYDROXYAPATITE/TITANIUM OXIDE COATINGS DERIVED BY ANODIZATION AND ANAPHORETIC DEPOSITION

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Titanium substrates were electrochemically treated by novel *in-situ* synthesis method to produce anaphoretic hydroxyapatite/titanium oxide (HAp/TiO_2) coating. This synthesis method was performed *via* anaphoretic deposition of hydroxyapatite and simultaneous anodization of Ti in order to produce highly adherent and strengthened composite coating, where the influence of electric potential, time, electrolyte concentration and pH value of the anodization process on titanium surface roughness and adhesion strength of composite HAp/TiO_2 coatings was examined. *In situ* synthesis was performed in different solutions containing different concentrations of NaOH, HAp and ethanol at different values of time and constant voltage. The effects of anodizing voltage on the morphology and bioactivity of the HAp coating and on the bonding strength between the HAp coating and the anodized substrates were investigated. A modified chemical precipitation method was used to prepare hydroxyapatite powder by the reaction of stoichiometric amount of calcium oxide and phosphoric acid. Prior to novel *in situ* synthesis of HAp/TiO_2 composite coatings, optimization of anodization process of titanium was performed. Anodization was executed under different electric potentials and different distances of counter electrodes from working electrodes, but all experiments had constant quantity of electric charge. Results indicated that highly ordered amorphous TiO_2 surface is formed on the Ti substrate after anodic oxidation. Characterization of titanium samples having rectangular contact surfaces of 10×10×0.89 mm included SEM/EDS analyses, X-ray diffraction analyses, AFM surface topography, morphology and roughness analyses and linear measurements of roughness. The prepared coatings were characterized by FE-SEM, XRD and EDS. Adhesion was investigated by ASTM D 3359–97 Test method B. Uniform and adherent HAp/TiO_2 composite coating on Ti was obtained. The results of simulated body fluid immersing experiments suggest that obtained HAp coating exhibits promising bioactivity. The obtained coating can be good candidate for bone implants due to improved adhesion.