

Synthesis and characterization of nHA-PLA composite coating of stainless steel by dip coating process for biomedical applications

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Abstract

Human bone is a bioceramic composite that is mainly composed of calcium phosphate (69%), collagen (20%), and water (9%). Other organics, such as proteins, polysaccharides, and lipids, only account for a small percentage. The main ingredient in the organic part is collagen fibers, which make the bone flexible and elastic. For this reason, polylactic acid or polylactide (PLA) is biodegradable and bioactive thermoplastic aliphatic polyester that best resemble the features of organic component of bone. In this work, 10g Poly Lactic Acid (PLA) was added to 100 gr chloroform and stirred for 2 h at 60 °C. Then 0.5g hydroxyapatite nanopowder (nHA) was added and continued to stir the mixture for 30 min at 60 °C to form a jelly-like material. Polished 316L specimens were then immersed into the solution and kept there for 5, 10 and 15 minutes. The plates were then withdrawn from the bath at a prescribed withdrawal velocity. The crystal structure was determined by X-ray diffraction (XRD), Functional groups were determined by Fourier transform infrared spectroscopy (FTIR). Morphology and size of the nanocomposites and coating samples were evaluated using scanning electron microscope (SEM).

Keyword: nano hydroxy apatite, poly lactic acid, stainless steel, dip coating.

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