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## Characterization of sol-gel derived silver/fluor-hydroxyapatite composite coatings on titanium substrate

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### Abstract

A composite coating containing silver, fluoride and hydroxyapatite (Ag-FHA) was developed on titanium substrate by sol-gel method. Triethylphosphite, hydrated calcium nitrate, ammonium fluoride and silver nitrate were used respectively, as P, Ca, F and Ag precursors with a Ca:P ratio 1.67 and concentration of silver was 0.3 wt.%. Coatings were characterized by Fourier transform infrared spectroscopy (FTIR), X-ray diffraction (XRD), field-emission scanning electron microscopy (FE-SEM) and atomic absorption spectrometry (AAS). Potentiodynamic polarization measurements in simulated body fluid proved corrosion protection caused by both Ag-FHA coatings. Antibacterial activity of coatings against *Escherichia coli* indicated a significant enhancement in the antibacterial property of Ag-FHA nanocomposite with increasing the amount of fluoride. These coatings can prevent the bacterial infections of implants.

### Keywords

Hydroxyapatite, Coating, Silver, Fluoride, Antibacterial.

### 1. Introduction

Hydroxyapatite (HA,  $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$ ) is a very attractive bioactive material due to its good biocompatibility, bioactivity and excellent osteoconductivity [1-4]. Development of bioactive

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