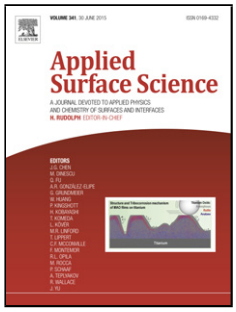

Title: Strontium and magnesium substituted dicalcium phosphate dehydrate coating for carbon/carbon composites prepared by pulsed electrodeposition

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Strontium and magnesium substituted dicalcium phosphate dehydrate coatings for carbon/carbon composites were synthesized by pulsed eletrodeposition.

Strontium and magnesium substituted dicalcium phosphate dehydrate coated carbon/carbon composites exhibited excellent bioactivity in the vivo.

Strontium and magnesium substituted dicalcium phosphate dehydrate coated carbon/carbon composites showed lower corrosion rate with the comparison to pure carbon/carbon composites.

Strontium and magnesium substituted dicalcium phosphate dehydrate coating for carbon/carbon composites prepared by pulsed electrodeposition

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Abstract

Trace elements substituted apatite coatings have received a lot of interest recently as they have many benefits. In this work, strontium and magnesium substituted DCPD (SM-DCPD) coatings were deposited on carbon/carbon (C/C) composites by pulsed electrodeposition method. The morphology, microstructure, corrosion resistance and in-vitro bioactivity of the SM-DCPD coatings are analyzed. The results show that the SM-DCPD coatings exhibit a flake-like morphology with dense and uniform structure. The SM-DCPD coatings could induce the formation of apatite layers on their surface in simulated body fluid. The electrochemical test, indicates that the SM-DCPD coatings can evidently decrease the corrosion rate of the C/C composites in simulated body fluid. The SM-DCPD has potential application as the bioactive coatings.

Key words: Carbon/carbon composites; Dicalcium phosphate dehydrate; Pulsed electrodeposition; Bioactivity; Corrosion

1. Introduction

Carbon/carbon (C/C) composites are primarily preferred for biomaterials applications due to their light weight, high toughness, and high specific strength [1, 2].Moreover, the Young's modulus of C/C composites is closer to that of human bones compared with biomedical metals [3-5]. However, the lack of bioactivity and the failure to form a chemical bond with the host bone have limited their application. Applying bioactive coatings for C/C composites may address the problem. Ideally, the implant materials are replaced by newly growing bone as they are absorbed. Thus the