

Accepted Manuscript

Characterization and one-step synthesis of Hydroxyapatite-Ti(C,N)-TiO₂ composite coating by cathodic plasma electrolytic saturation and accompanying electrochemical deposition on titanium alloy

Jiewen Huang, Xinmin Fan, Dangsheng Xiong, Jianliang Li, Heguo Zhu, Min Huang



PII: S0257-8972(17)30613-8
DOI: doi: [10.1016/j.surfcoat.2017.06.010](https://doi.org/10.1016/j.surfcoat.2017.06.010)
Reference: SCT 22421

To appear in: *Surface & Coatings Technology*

Received date: 6 April 2017

Revised date: 2 June 2017

Accepted date: 4 June 2017

Please cite this article as: Jiewen Huang, Xinmin Fan, Dangsheng Xiong, Jianliang Li, Heguo Zhu, Min Huang, Characterization and one-step synthesis of Hydroxyapatite-Ti(C,N)-TiO₂ composite coating by cathodic plasma electrolytic saturation and accompanying electrochemical deposition on titanium alloy, *Surface & Coatings Technology* (2017), doi: [10.1016/j.surfcoat.2017.06.010](https://doi.org/10.1016/j.surfcoat.2017.06.010)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Characterization and one-step synthesis of Hydroxyapatite-Ti(C,N)-TiO₂ composite coating by cathodic plasma electrolytic saturation and accompanying electrochemical deposition on titanium alloy

Jiewen Huang*, Xinmin Fan, Dangsheng Xiong, Jianliang Li, Heguo Zhu, Min Huang

School of Material Science and Engineering, Nanjing University of Science and Technology, PR. China

Keywords

Plasma electrolytic saturation; electrochemical deposition; Hydroxyapatite; Ti(C,N); TiO₂

Abstract: Besides oxides ceramic coating, cathodic plasma electrolytic saturation (PES) could produce more other types ceramic coatings, including nitrides, carbonitrides, borides, etc., on nearly all kinds of metal substrate. Owing to the accompanying electrochemical deposition(ED) effect of PES, special functional compounds could be deposited in mentioned ceramic coatings by PES simultaneously in special designed electrolyte. In this study, the target Hydroxyapatite (HA)-Ti(C,N)-TiO₂ composite coatings were synthesized in one step by PES and accompanying ED in calcium nitrate and sodium dihydrogen phosphate containing formamide based electrolyte. The phase structures, functional groups of molecules, chemical compositions of the surfaces and binding energies of atoms in coatings were characterized by X-ray diffraction (XRD), attenuated total reflectance-Fourier transform infrared spectroscopy (ATR-FTIR) and X-ray photoelectron spectroscopy (XPS) respectively. The surfaces morphologies, cross sections morphologies, and element maps of the surface were analyzed by Scanning electron microscopy (SEM) and energy dispersive spectrum (EDS). The coatings exhibit porous structure with island like bulges or spheroids around the pores. The phases formed in coatings are verified to be constituted of HA, Ti(C,N) and anatase. The suggested formation mechanism of anatase in coatings differs to that obtained on anodic titanium surface in PEO process. The phase of HA distributes homogenously on surfaces and displays as clusters congressed by nano-scale needles or rods with their transverse length about ~10nm. The size of the pores and bulges, the crystalline amount of HA phase, and the thickness of the coatings all increase with increasing duration time. The thickness reaches about 56±7μm when the duration time grew to 30min, 26% higher than that of the HA-free coating produced in formamide electrolyte with the same process parameters.

Download English Version:

<https://daneshyari.com/en/article/5465105>

Download Persian Version:

<https://daneshyari.com/article/5465105>

[Daneshyari.com](https://daneshyari.com)