

Manufacture of dense apatitic coatings on titanium from solutions with high content of calcium and phosphate ions

Obtención de recubrimientos apatíticos densos sobre titanio en disoluciones con elevado contenido de iones calcio y fosfato

Leonardo M. Pazos¹, Adrian Paz², Clara Bécquer³, M^a. Belén Parodi⁴, Gabriel O. Ybarra⁵ and Jesús E. González⁶

¹ lpazos@inti.gob.ar

National Institute of Industrial Technology, General Paz Avenue 5445, Postal code B1650WAB, San Martín, Buenos Aires. (Argentina)

² adrian.paz@cnic.edu.cu

³ clara.becquer@cnic.edu.cu

National Centre for Scientific Research, 25th Avenue and 158st, Playa, Havana City. Postal code 6414 (Cuba)

⁴ belen@inti.gob.ar

⁵ gabriel@inti.gob.ar

National Institute of Industrial Technology, General Paz Avenue 5445, Postal code B1650WAB, San Martín, Buenos Aires. (Argentina)

⁶ jesus.gonzalez@cnic.edu.cu

National Centre for Scientific Research, 25th Avenue and 158st, Playa, Havana City. Postal code 6414 (Cuba)

Abstract

Introduction: The biomimetic method is used for deposit apatitic coatings on titanium and its alloys. However, it requires considerable treatment time to obtain a suitable layer thickness and in addition, their deposits are usually nanoporous and some variants of treatment generate deposit with low crystallinity. **Materials and methods:** Twelve commercially pure Ti plates (10 mm x 5 mm x 2 mm) were successively polished with 120, 220, 400 and 600 grit silicon carbide emery paper, they were divided into four groups with different treatment of activation: a- acid etching, b- acid etching + treatment in hydrogen peroxide solution, c- acid etching + treatment in hydrogen peroxide solution + heat treatment d- acid etching + treatment in NaOH solution. The activated samples were immersed in a solution with high content of calcium and phosphate ions at 37 °C for 24 h. The coatings were characterized by Fourier transform infrared spectroscopy, X-ray diffraction, scanning electron microscopy and X-ray energy dispersive spectroscopy. **Results and discussion:** As a result of treatment homogeneous deposits in the four substrates studied were formed. In the coatings prevails hydroxyapatite in crystalline form, with a high density and nano and submicrometer-sized particles oriented oriented in the direction of the treated surfaces. **Conclusions:** The proposed treatment option allows obtain dense apatitic coatings and reduce treatment time compared with the method developed by Kokubo et al.

Keywords: Coating; Hydroxyapatite; Biomimetic method; Titanium.