

3rd International Conference and Exhibition on Materials Science & Engineering

October 06-08, 2014 Hilton San Antonio Airport, USA

Electrodeposition, characterization and corrosion stability of nanostructured anodic oxides on new Ti-15Zr-5Nb alloy surface

S I Drob¹, M Popa¹, C Vasilescu¹, M F Popa², J M Calderon Moreno¹ and E Vasilescu¹

¹Institute of Physical Chemistry "Ilie Murgulescu", Romania

²SC Dentestetics SRL, Romania

In this paper, a new Ti-15Zr-5Nb alloy was elaborated to satisfy the most important requirements of an implant material; this alloy (containing only non-toxic and non-allergic elements) has an $\alpha + \beta$ microstructure, type Widmanstätten, a low Young's modulus (82.69 GPa), a good correlation between its mechanical properties and corrosion resistance. Its surface was nanostructured by galvanostatic anodization in 0.3M H₃PO₄ solution. The obtained layer has a nanotube-like porosity, revealed by scanning electron microscopy (SEM), and it is formed of anatase-like small crystallites, with added phosphorus as phospho-titanate, determined by Raman spectroscopy, Fourier transform infrared (FT-IR) and energy dispersive X-ray (EDX) analysis; this composition can stimulate the formation of the bone and the porosity can offer a good scaffold for the bone cell attachment. The electrochemical behavior of the bare and anodized alloy in Ringer solutions of 3.21, 7.58, 8.91 pH values was determined from cyclic potentiodynamic and linear polarization and electrochemical impedance spectroscopy measurements. The experimental results made evident a nobler behavior of the anodized alloy than that of the bare one, as result of the existence of the nanostructured layer that improves the protective properties of the native passive film by its thickening. Corrosion and ion release rates had lower values showing a better resistance to corrosion and implicitly a more reduced quantity of ions released in biofluid, namely, a lower toxicity of the anodized alloy. Therefore, by galvanostatic anodization, the alloy enhanced its corrosion stability and implicitly its biocompatibility.

Biography

S I Drob is a Doctoral degree student in the domain of electrochemistry and corrosion of the metallic materials and non-polluted anticorrosive protections from Institute of Physical Chemistry "Ilie Murgulescu" of Romanian Academy. He is Junior Researcher at Institute of Physical Chemistry "Ilie Murgulescu", Bucharest, Romania. He has scientific research activity in the field of the stability modeling of nano and micro-structured bioalloys in physiological media and the protective capacity of biocompatible mono and multi-layers on various alloys surfaces. He has published more than 30 papers in reputed journals.

sidrob@chimfiz.icf.ro

Cost effective, green reduction of graphene oxide to pure graphene for polymer nanocomposites

Santosh Kumar Tiwari, R Oraon, A Adhikari and G C Nayak

Indian School of Mines, India

Graphene has emerged as a new hope for the entire scientific fraternity because of its unique characteristics. Oxidation of graphite into graphene oxide (GO) and consequently reduction of GO into graphene (GR) is still an important route for scalable graphene synthesis. And the quality of graphene depends on pathway of reduction. This paper reports an effective reduction of GO to pure graphene using very small amount of Se powder at 280°C without any solvent in the inert atmosphere. The prepared sample purified by 1-2 times washing with distilled water. A particular application of our prepared sample for highly thermo-mechanical reinforced polymer blend has also been tested. The characterization and results were established using Transmission electron microscopy (TEM), scanning electron microscopy (SEM), Field Emission Scanning Electron Microscopy (FESEM) Fourier transform infrared spectrometry (FTIR), X-ray diffraction (XRD), Raman spectrometry, Ultraviolet, absorption (UV), selected area electron diffraction (SAED), Thermo-gravimetric analysis (TGA), Differential scanning calorimetry (DSC), Dynamic mechanical analysis (DMA), Reometer etc.

ismgraphene@gmail.com