J Material Sci Eng 2014, 3:3
http://dx.doi.org/10.4172/2169-0022.S1.017

OMICS Group Conferences
Accelerating Scientific Discovery

3rd International Conference and Exhibition on
Materials Science & Engineering
October 06-08, 2014 Hilton San Antonio Airport, USA

Characterization and surface properties of a new titanium bio alloy

C Vasilescu, S I Drob, P Osiceanu, J M Calderon Moreno and **P Drob**
Institute of Physical Chemistry, Romania

A novel Ti-15Ta-5Zr alloy was synthesized; this possesses an α+β stable, homogeneous, biphasic microstructure (determined by optical microscopy, X-ray diffraction - XRD and scanning electron microscopy - SEM) The alloy presents a fine lamellar structure with typical lamella thicknesses in the submicron range. Its passive film contains the protective oxides of all constituent elements (TiO_2, $Ti2O_3$, Ta_2O_5 and ZrO_2 determined by X-ray photoelectron spectroscopy - XPS) and is more compact and thicker (8.5±1 nm) than that of Ti (1.5-3 nm). The corrosion behaviour (by cyclic and linear polarization and electrochemical impedance spectroscopy - EIS) in Ringer solution was studied. Main electrochemical parameters presented more favorable values for alloy in comparison with Ti, denoting an easier, more rapid, stronger passivation of the Ti-15Ta-5Zr alloy. The alloy polarization resistance reached higher value (about 180 kΩ cm^2) than that of Ti (about 18 kΩ cm^2) that represents a very corrosion resistant material. Main corrosion parameters attested a nobler behaviour, lower corrosion rates (of about 70 times smaller than those of Ti) proving a more capacitive, resistant passive film on the Ti-15Ta-5Zr alloy surface. EIS spectra described a passive film formed by two layers: an inner, barrier, compact layer and an outer, porous layer; in the pores of this layer can be incorporated species from the human biofluid (bioactivity). An electric equivalent circuit with two time constants was fitted: the first time constant is represented by resistance and capacitance of the barrier layer and the second one is illustrated by porous layer resistance and capacitance.

Biography

C Vasilescu has completed his PhD at the age of 29 years from Institute of Physical Chemistry "Ilie Murgulescu" of Romanian Academy and postdoctoral studies from Paul Sabatier University, Toulouse, France. She is Senior Researcher at Institute of Physical Chemistry "Ilie Murgulescu", Bucharest, Romania. She has as research fields Physical Chemistry and Electrochemistry and obtained original results with significant impact in the domain of the corrosion of different materials and coatings for industrial and biomedical applications. She has published more than 85 papers in reputed journals.

cora_vasilescu@yahoo.com

Self-assembled complex oxide heterostructures

Ying-Hao Chu
National Chiao Tung University, Taiwan

In the past decades, self-assembled nanocomposites have become a glamour research topic because various kinds of fascinating and novel properties and multifunctionalities can be discovered and designed via the intercoupling among freedom of degrees such as spin, orbital, charge, and lattice within the materials. In this talk, we will stress on development of 1-3 type nanocomposite thin films, or the so-called "self-assembled vertical heteroepitaxial nanostructure (VHN) thin films", specifically on the systems composed of perovskites and spinels. We will first introduce the fabrication of the self-assembled VHN films by PLD process and the corresponding growth mechanisms, which are the most popular and extensive approach recently. Growth parameters such as temperature, substrate orientation, and strain are very crucial to determine the morphologies and crystal anisotropies of nanocomposites. In addition, the key value to build up VHN is its high degree of freedom to priceless multi-functionalities. Then, we will introduce the approaches to functionality design by three dominant interactions - mechanical, physical, and chemical interaction- case by case along with several decent and published works, such as magnetoelectric effect, photomagnetic effect, large magnetoresistance etc. In final part, conclusive concepts will be delineated again and future directions will be suggested. By comprehensive review from growth to design system, we genuinely hope this report will provide readers an opportunity to fully understand the magnificence of VHN growth and design; most importantly, to further create innovative designs for practical applications in next era.

Biography

Ying-Hao Chu has completed his PhD at the age of 27 years from National Tsing Hua University and postdoctoral studies from UC Berkeley. He has published more than 160 papers in reputed journals and serving as a volume organizer of MRS Bulliten.

yinghaochu@gmail.com