Journal of Biotechnology & Biomaterials
ISSN: 2155-952X
2020
Vol.10 No.5

Efficacy of laser shock processing of biodegradable Mg and Mg-1Zn alloy on their in vitro bacterial response

Miguel Angel Pacha Olivenza

Networking Research Center on Bioengineering, Biomaterials and Nanomedicine (CIBER-BBN), Spain

Abstract

The development of biomaterials for biodegradable and bioabsorbable implants in bone repair continues to gain popularity. Magnesium and its alloys have emerged as firm candidates because they combine a suitable Young's modulus, close to that of the bone, low density, good biocompatibility andbioactivity. Despite these interesting properties,magnesium alloys also have some draw backs. For example, their relatively fast degradation rates which, depending on the nature and amount of alloying elements, can induce some toxicity. An important factor in the use for these applications is that degradation products could be at bacterial adhesion, and so contribute avoiding infection and the consequent implant failure. The antibacterial capacity of Mg–base alloys has been evaluated in previous studies but there is still a lack of consensus.

Different approaches have been implemented to partly overcome disadvantages associated with the fast corrosion rate. In this work, the application of laser shock processing (LSP) technology to bioabsorbable magnesium is presented for the specificcase of a commercially pure Mg and a Mg-1Zn alloy. Zinc as an alloying element has the capability of enhancing the corrosion resistance and the mechanical properties of magnesium. Our aim is to relate the possible generated subsurface residual stresses, together with the modification of the surface microstructure, the modification of corrosion behaviour, the adhesion and viability of a strain of Staphylococcus epidermidis, which is one of the main bacteria present in nosocomial implant related infections and the specific effects of the inclusion of 1 wt% Zn in solid solution on LSP Mg.

ciber-bbn
Biomedical Research Networking Center
Bioengineering, Biomaterials, Nanomedicine

Biography:

Pacha-Olivenza M.A., has completed his PhD at the age of 28 years from Extremadura University School of Medicine. He is a Professor at the Department of Biomedical Sciences at the University of Extremadura. His research interest is focused on the physical-chemical characteristics of surfaces that are relevant for the biocompatibility of medical devices and in the interactions between bacteria and surfaces. He belongs to the research Group of Microbial Adhesion of the Networking Research Center on Bioengineering, Biomaterials and Nanomedicine, Instituto de Salud Carlos III. He has about 35 scientific articles and more than 80 contributions to congresses.

Speaker Publications:

1. Efficacy of the surface electrodeposition treatment of the biodegradable AZ31 alloy on their in vitro bacterial response
2. Efficacy of laser shock processing of biodegradable Mg and Mg-1Zn alloy on their in vitro bacterial response

5th Annual Conference and Expo on Biomaterials; Webinar - August 31- September 01, 2020

Abstract Citation:

Miguel Angel Pacha Olivenza, Efficacy of laser shock processing of biodegradable Mg and Mg-1Zn alloy on their in vitro bacterial response, Biomaterials 2020, 5th Annual Conference and Expo on Biomaterials; August 31-September 01, 2020

(https://biomaterials.insightconferences.com/abstract/2020/efficacy-of-laser-shock-processing-of-biodegradable-mg-and-mg-1zn-alloy-on-their-in-vitro-bacterial-response)