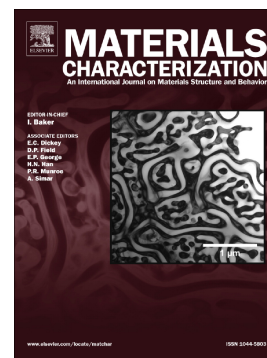


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Influence of surface pattern on the biological properties of Ti Grade 2*Donata Kuczyńska^{1*}, Piotr Kwaśniak¹, Marcin Pisarek², Paweł Borowicz², Halina Garbacz¹*¹ Faculty of Materials Science and Engineering, Warsaw University of Technology, Warsaw, Poland²Institute of Physical Chemistry, Polish Academy of Sciences, Warsaw, Poland

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Abstract

This paper presents a detailed characterisation of Ti surface geometries as produced by non-contact laser functionalization and its impact on the process of protein adsorption. The proposed surface modification is designed for the local treatment of implantable devices with original roughness. In this work, titanium plates were initially modified by the two most common mechano-chemical treatments, shot peening and acid etching. The material under study was next functionalized DLIL (Direct Laser Interference Lithography) in order to obtain two different surface patterns: grooves and islands. The modified surfaces were characterized in terms of their shape, roughness, wettability, surface energy and chemical composition. For this purpose, the following methods were used: scanning electron microscopy, optical profilometry, atomic force microscopy, contact angle measurements, and X-ray photoelectron spectroscopy. Protein adsorption tests were conducted to consider the potential of the proposed methodology in biomedical applications and to compare the influence of the two different surface patterns on the initial state of osseointegration. To this end, XPS and FTIR studies were conducted. The systematic analysis presented will be useful when selecting an appropriate surface geometry for the local surface functionalization of implantable devices.

Keywords

Titanium, Surface Characterization, Multimodal topography, Protein adsorption

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