TITANIUM NANOROUGHNESS FOR BONE CELLS ADESION

T.S. Goia[1#], K.B. Violin [2], A.H.A Bressiani [2], S.F. Santos [3]

[1] Universidade Federal do ABC, Avenida dos Estados 5001, Santo André 09210-580, Brazil.
[2] Centro de Ciências e Tecnologia de Materiais, Instituto de Pesquisas Energéticas e Nucleares, São Paulo 05508-000, Brazil.

[#]Corresponding author: t.goia@ufabc.edu.br

Titanium is the main metal studied for application as bone implants, obtained as porous structure can provide good mechanical properties and enhanced biological interactions [1]. Production methods of porous metallic materials are based on powder metallurgy (PM), because it allows the manufacturing of parts with complex shapes and dimensions close to the final (near-net shape), with pores. The pore production by space-holder technique constitutes of mixing organic compounds with metallic powder, that when removed by heat treatment, prior structures are kept in place [2]. The main target of this study was to analyse the surface features of commercially pure titanium (cpTi) porous implants. The processing route was PM with space-holder technique, using TiH_2 as raw material and albumin (30 wt%) as an additive. The TiH_2 and albumin mixture was cold isostatically pressed at 140 MPa and heat treated by 1h at 350^{o}C in an oxidizing atmosphere to decompose the organic material. Samples were subsequently sintered at 1300°C (1h) under high vacuum (~10^{-5} mBar). Sintered bodies were characterized by Scanning Electron Microscope (FEG-SEM) and their interaction with bone tissue were characterized by Confocal Laser Microscopy. The investigated samples showed interconnected pores with high surface roughness in nanoscale. The morphology of pore edges showed polygonal - like morphology which is attributed to the crystallographic planes which had growth during the sintering, by the anisotropy of the titanium surface energy [3]. The obtaining of porous materials with addition of albumin in powder metallurgy process, results in an outstanding structure for osseointegration, in macroscale the bone ingrowth is increased by the high porosity, and in the nanoscale, the nanoroughness propitiated a friendlier surface for cell attachment, improving the bone implant contact area.

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