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Assessment of biomimetic modification on a novel low elastic modulus Ti–Nb–Hf alloy for dental implants

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Currently, the material most commonly used as implants to bone regeneration, have elastic modulus between 220 GPa (CoCr) and 110 GPa (Ti), however the cortical bone has a elastic bone of 7-25 GPa, then, there is a tendency to show a stress shielding effect. Therefore, low modulus alloy are nowadays desired, because the modulus required for implant must be more similar to that of bone, which will inhibit bone atrophy and induce good bone remodeling as stated above. Different authors say that Ti alloy containing elements no toxic as Nb, Zr, Ta, Mo, Hf, Fe, Sn, Zr improve mechanical properties, low elastic modulus, biocorrosion resistance, also they have biocompatible and have not allergic problems. For this study a Ti alloy (TiHfNb) was used. Unlike other Ti alloys employed as implant materials it is Ni free, and therefore able to show good resistance and presents an elastic modulus of 74 GPa. Although the excellent qualities this material lacks bioactivity, in order to overcome this drawback were incorporated on the surfaces biological molecules (RGD, FHRRKA, PHSRN and mixtures). These peptide sequences have previously shown to improve cell adhesion interactions. Finally, cells adhesion studies on modified surfaces were made for to evaluate the biomimetic modification.

Biography

Virginia Paredes began studying Mechanical Engineering in Venezuela (1998). She was Project Manager (1998-2008). In 2008, she was awarded the "FUNDAYACUCHO" fellowship by Fundación Gran Mariscal de Ayacucho of Venezuela, and she completed her PhD in Biomedical Engineering (Biomaterials) from Technical University of Catalonia (UPC), Barcelona, Spain in 2012. ("Biofunctionalized metal surfaces for bone tissue regeneration"). In 2012, she joined the "Department of Materials Science and Metallurgical Engineering" (UPC) as researcher. In 2013, she has been working in Colombia development project related to biomimetic modified metal surface. She has participated in international congress and published several peer review journals index.

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