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Synthesis of Calcium-Phosphorous doped TiO₂ nanotubes by anodization and reverse polarization: a promising strategy for an efficient biofunctional implant surface

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Abstract

The modification of surface features such as nano-morphology/topography and chemistry have been employed in the attempt to design titanium oxide surfaces able to overcome the current dental implants failures. The main goal of this study is the synthesis of bone-like structured titanium dioxide (TiO₂) nanotubes enriched with Calcium and Phosphorous able to enhance osteoblastic cell functions and, simultaneously, display an improved corrosion behavior. To achieve the main goal, TiO₂ nanotubes were synthesized and doped with Calcium and Phosphorous by means of a novel methodology which relied, firstly, on the synthesis of TiO₂ nanotubes by anodization of titanium in an organic electrolyte followed by reverse polarization and/or anodization, in an aqueous electrolyte. Results show that hydrophilic bone-like structured TiO₂ nanotubes were successfully synthesized presenting a highly ordered nano-

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