SILVER-DOPED CALCIUM TITANATE LAYER WITH *IN VIVO* BONE-BONDING ABILITY TO FIGHT BONE BACTERIAL INFECTION IN TITANIUM IMPLANTS

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ABSTRACT

The rapid integration in the bone tissue and the prevention of bacterial infection are key to the success of titanium implants for orthopedic applications [1]. In this work, a silver (Ag)-doped thermochemical treatment that generates a Ag-doped calcium titanate layer on titanium implants was developed in order to improve the bone-bonding ability and provide antibacterial activity [2]. The formation of the Ag-doped coating was confirmed by Raman spectroscopy, X-Ray diffraction and scanning electron microscopy. Moreover, transmission electron microscopy and electron diffraction showed the presence of metallic silver particles. The coating showed apatite forming ability in simulated body fluid (SBF), which enhanced Osteoblast-like (SaOS-2) cell adhesion, proliferation and differentiation even in the presence of the potentially cytotoxic Ag. The antibacterial effect of the coating was tested against *Staphylococcus aureus* and *Staphylococcus epidermidis*, with a reduction in the biofilm formation of 90%. The results suggest that the incorporation of Ag does not interfere in apatite forming ability of the calcium titanate layer. Moreover, the release of Ag from the sample is able to inhibit bacterial biofilm formation with no toxic effects in Osteoblast-like cells. Therefore, the Ag-doping surface is capable of preventing and protecting bone bacterial infection while promoting osteointegration.

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[2] Rodríguez-Contreras, A. *et al*, Surf Coatings Technol. 421 (2021) 127476