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Apatite-forming ability of doped-ceria coatings for orthopedic implants

There is an increasing demand for orthopedic implants owing to the increasing numbers of aging population. Titanium alloy (Ti6Al4V) is a common material used for orthopedic implants owing to its advantageous properties in terms of good corrosion resistance, minimal elastic modulus mismatch with bone, bio-inertness and high mechanical strength. However, it is important to improve the bioactivity and osseointegration of the titanium alloy and this can be achieved by coating the implant surface with suitable ceramic materials. In the present work, pure and doped-ceria (CeO2) coatings were deposited by spin coating on the titanium alloy surface in order to enhance the biological interactions between the surface of the implant and the surrounding tissue. In order to examine the bone-binding ability of an implant, Simulated Body Fluid (SBF) tests were conducted in order to assess the capability of apatite layer formation on the surface and thus predict in vivo bone bioactivity. Characterization was done using Scanning Electron Microscopy (SEM) and X-Ray Diffraction (XRD) analyses to determine the extent of apatite formation. Preliminary tests showed that the CeO2 coatings were biocompatible and that the extent of apatite formation and its characteristics can be enhanced by doping with suitable metal ions.

Biography

Ayda Khosravanihaghighi is currently a PhD student at the School of Materials Science and Engineering, University of New South Wales Sydney (UNSW Sydney), Australia. She has completed her MSc in Materials Science and Engineering from Shiraz University, Iran and BE in Chemical Engineering from Azad University, Iran. She has three years of experience working as a Process Engineer in Pishro-Sazandedan Persia Co., Iran.

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