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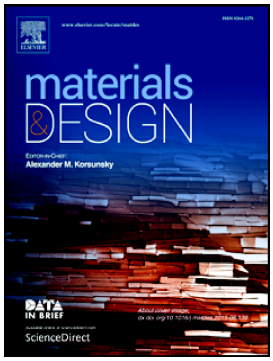

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Deposition of nanodiopside coatings on metallic biomaterials to stimulate apatite-forming ability

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Abstract

One of the drawbacks of metals and alloys in biomedical applications is their inefficient fixation to adjacent tissues which can be fairly addressed by applying bioactive ceramic coatings. In this work, colloidal suspensions based on coprecipitation-derived nanoparticulate diopside ($CaMgSi_2O_6$) were deposited on stainless steel 316L by dip-coating and subsequent low-temperature sintering. Afterwards, the structure, bioactivity and biodegradation of the samples were *in vitro* evaluated by spectroscopic and microscopic techniques. The apatite-forming ability of the surface was found to be improved by using the nanodiopside coating, while controlled by a typical ion-exchange reaction mechanism originating from the film's degradability. In this regard, after soaking the coated samples in a simulated body fluid, an integrated leaf-like precipitation of apatite at early stages and a following non-uniform rose-like growth of apatite with an increased level of the carbonate substitution for hydroxyl were detected. It is eventually concluded that nanodiopside coatings deserve further consideration and development in the biomedical field, where a bioactive fixation is needed along the implant/tissue interface.

Keywords: Diopside; Coating; Bioactivity; Biodegradation

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