عنوان مقاله:

Improving the mechanical and bioactivity of hydroxyapatite porous scaffold ceramic with diopside/forstrite ceramic coating

محل انتشار:

مجله علوم نانو, دوره 6, شماره 1 (سال: 1398)

تعداد صفحات اصل مقاله: 5

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خلاصه مقاله:

Objective(s): Scaffolds are considered as biological substitutes in bone defects which improve and accelerate the healing process of surrounding tissue. In recent years a major challenge in biomaterials is to produce porous materials with properties similar to bone tissue. In this study, the natural bioactive hydroxyapatite scaffolds with nano Diopside /Forstrite coating was successfully synthesized to be used in tissue engineering applications. Materials and Methods: The spongy part of bovine bone was cut and the subsequent sintering temperature was applied for fabrication of natural hydroxyapatite. Then the scaffolds were coated with 30 wt% nano-Diopside/Forstrite composite slurry. The scaffolds were characterized by X-ray diffraction (XRD), transmission electron microscopy (TEM), scanning electron microscopy (SEM), and energy-dispersive spectroscope (EDS).Results: In the present study, the mechanical properties of natural HA scaffold were improved when coated with a composite nmaed Diopside/Forstrite ceramic. The optimum properties were evaluated for the scaffolds containing 30 wt% composite ceramic coating. The pore size of the obtained scaffold was measured to be in the range of 300-400 nm. Compressive strength and porosity of the composite scaffold were approximately 1.5±0.2 MPa and 93±1.1 MPa, respectively.Conclusions: Based on the mechanical and bioactivity result, the natural bioactive hydroxyapatite scaffolds with nano Diopside /Forstrite coating showed improved mechanical properties, pore size, porosity content and apatite formation ability whcih can be a promising candidate for bone tissue engineering applications.

کلمات کلیدی:

Porous materials, Hydroxyapatite, Coating, Forstrite, Diopside