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Economic route to sodium-containing silicate bioactive glass scaffold

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ABSTRACT

Tetraethyl orthosilicate (TEOS) and trimethyl orthosilicate (TMOS) alkoxysilanes are expensive common precursors for silicate based solgel derived bioactive glasses. Facile approa- ches involving low cost substitutes are a necessity for bioactive glass implants in bone regeneration therapy. Quaternary $SiO_2 - Na_2O - CaO - P_2O_5$ bioactive glass was prepared by the solgel method from locally sourced sand as precursor. The monolith glass material obtained was subjected to immersion studies in simulated body fluid (SBF) for 21 days. The surface morphology and composition of the glass before and after immersion in SBF was studied using SEM-EDX, while pH analysis was used to monitor changes on the glass surface in SBF solution. FTIR was used to confirm apatite formation on the material. Results showed that the concentration of Ca, P and C increased on the surface of the glass sample as immersion time increased, which was attributed to the formation of carbonated hydroxyapatite (HCA). The material shows ability to bond to bone making it a promising scaffold material for bone repair.

KEYWORDS

Sand; Alkoxysilanes; Carbonated Hydroxyapatite; Simulated Body Fluid; Bone Regeneration

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