OMICS Group Conferences
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International Conference on
Tissue Science & Engineering

October 1-3, 2012 DoubleTree by Hilton Chicago-North Shore, USA

Synthesis, characterization and evaluation of bioactivity and antibacterial activity of SiO_2-CaO-P_2O_5-MgO-ZnO glass system intended for bone tissue engineering

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Bioactive glasses in the system of SiO_2-CaO-P_2O_5-MgO (BGZn0) and SiO_2-CaO-P_2O_5-MgO-ZnO (BGZn5) were prepared by sol-gel method and characterized. The biocompatibility and surface reactivity evaluation of the glass samples was assessed through in vitro cell culture [alkaline phosphatase (AP) activity of osteoblasts] experiments and immersion studies in simulated body fluid (SBF) for different time intervals while monitoring the pH changes and the concentration of calcium, phosphorus and zinc in the SBF medium. The effect of Zn addition to the glass matrix on the formation of apatite layer on the glass surface was investigated through x-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR) and scanning electron microscopy (SEM). The antibacterial activity of Zn containing glass against Pseudomonas aeruginosa was measured by the halo zone test. The presence of Zn in glass composition improved the chemical durability, slowed down the formation rate of Ca-P layer and decreased the apatite particle size. Zn containing glass exhibited the ability to support the growth of human fetal osteoblastic cells (hFOB 1.19) and an excellent antibacterial activity against P. aeruginosa.

Biography

Fatemeh Baghbani has completed her MSc at the age of 24 years from AmirKabir University of technology School of Biomedical engineering.

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