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ORIGINAL PROCESS OF BIOACTIVE GLASS NANOPARTICLES ELABORATION: APPLICATIONS IN BONE BIOMATERIALS RECONSTRUCTION

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Recently, nanotechnology offers a new strategy to develop novel bioactive materials. Nanoscience are attractive in relation to regenerative medicine and tissue engineering approaches. Nanoparticles with size of 100 to 120 nm enhanced the interactions between cells and biomaterial surfaces. The higher specific surface area of nanoscale bioactive glasses allows faster release of ions and accelerates the deposition process of hydroxyapatite. Ternary bioactive glass nanoparticles (BGN) composed by SiO_2 – CaO – P_2O_5 were prepared by a novel method based on a quick alkali-mediated sol-gel method, in which the size of the bioactive glasses could be controlled. Particles size distribution of BGN has been determined by using dynamic light scattering (DLS). Obtained results show the size between 20 and 40 nm with an average of 36 nm. These sizes have been increased to 120 nm for biomedical applications according to the experimental method. Physicochemical characterization has been conducted by using several complementary techniques. The bioactive character of these BGN biomaterials was confirmed by using *in vitro* assays. Nanoparticles have been immersed in simulated body fluid (SBF) for different periods. The formation of hydroxyapatite layer was rapidly observed on the surface of BGN. Based on these results, this bioactive glass nanoparticle with excellent bioactivity would be a promising biomaterial for bone tissues engineering. After preparation and characterization, these BGN will be coated on metallic prosthesis using the electrophoresis method and associated with therapeutic molecules.

Note:

ADVANCED NANO MATERIALS FOR RENEWABLE ENERGIES

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The energy conversion from most of the present-day process is 15% to 30%. And remaining energy is lost. Traditional energy regenerators for renewables are bulky and needs higher capital investment. By incorporating advanced nano materials into the energy process efficiency of energy conversion can be increased by another 15%. Figure of merit provides rough estimate of efficiency of energy conversion. Devices manufactured using conventional materials have figure of merit of 0.7 to 0.9. Recently theoretically and practically it has shown that by incorporating nano materials in renewable devices, figure of merit can enhance by two to three folds. In this talk we will show various strategies for producing nano materials and show that how figure of merit is increased using such nano materials.