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Evaluation of delivery route efficiency of microwave synthesized nanostructures of hap: An artificial bone material

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Skeleton gives basic infrastructural platform for the development of soft tissues in mammals. Bones play key role in any type of motion and make body enable for load bearing. Scientists are attracted towards some synthetic bone materials due to lack of bone fractures in road accidents, need of total hip replacement, total knee replacement and several other bone diseases like osteoporosis in old ages or in pregnancy, osteomalacia, osteogenesis imperfecta, osteochondroma. Hydroxyapatite $Ca_{10}(PO_4)_6(OH)_2$: (HAp) is found to be most useful ceramic material for artificial bone and teeth due to excellent bioactivity, biocompatibility and stability. It is also reported that nano-HAp is able to enhance osteoblast activities, such as cell adhesion, proliferation, differentiation, and mineralization as compared with micro-sized HAp. The natural bone exhibits the natural nanoparticles of HAp crystals with rod-like or needle-like shapes, forming the composite with polymeric matrix of collagen type I. The range of the particle size of natural HAp nanostructures formed in physiological conditions in human is 10-80 nm. Therefore we have developed several nanostructures such as nanorods, nanostrips, nanocapsules of HAp. Evaluation of different nanostructured HAp delivery at target specific oesteogenic sites may be possible through most abundant circulatory medium blood. This study is necessary to elucidate the most efficient delivery route of HAp to the target site through blood as well as to check the toxicity of the delivered material HAp. To evaluate the most efficient delivery route for HAp nanorods, the vibrational spectroscopy is employed and fruitful results have been found.

Biography

Vijay Kumar Mishra is a research scholar in Department of Physics, Banaras Hindu University and Department of Ceramic Engineering, Indian Institute of Technology-Banaras Hindu University, India. He is currently working on synthesis of different nanaostructures of hydroxyapatite and its fictionalizations. Along with hydroxyapatite he is also working on borosilicate glasses with an expert group in University of Lucknow, Lucknow. He has published three papers in reputed international journals such as *Journal of the American Ceramic Society, Phase Transitions: A multinational Journal etc.* One paper is communicated in *Materials Science and Engineering C*.

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Investigation of evolution of nano rods in bismuth thin films by closed space sublimation method and its effects on thermoelectric efficiency

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The present research reflects the investigation of variation in morphology of bismuth thin films from granules to nano needles which are deposited by closed space sublimation method (CSS). The major interest to investigate morphology is based on the fact that bismuth shows a variation from semi metal to semiconductor as it grows from bulk bismuth to thin films and is attractive for electronic industry. Size and thickness of Bi films affect the electron transport makes it ideal for quantum size confinement effects. The novelty in this work is to fabricate nano needles at a low temperature of 550 K.Later the effects of nano needle morphology on the See back Coefficient will be studied as lower dimensionality (2D or 1D) could enhance the thermoelectric efficiency (See back coefficient) as compare to bulk material. Characterization technique of scanning electron microscopy (SEM) predicted the average size of nano needles with a diameter range 80-400 nm and length of 3-5 μm. XRD results confirmed the crystal system to be rhombohedral, space group [R-3m], space group no [160] with dominant peak indexing at [012], [104], [110] confirmed the existence of bismuth rhombohedral crystal system. EDX analysis is done for elemental analysis which confirmed the presence of bismuth mass percentage 73.03% and elemental percentage is 95.05%. AFM and Raman spectroscopic analysis is done to study the morphology of the nano needles. See back coefficient value measured to be -1.21mV/K and the thermal conductivity value is 236W/K.m enhancing thermoelectric efficiency 40 %.

Biography

Wajeeha Usman is pursuing her Master's degree in Materials and Surface Engineering from National University of Sciences and Technology, Islamabad - Pakistan. She is working on multifunctional nanomaterials.

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