J Material Sci Eng 2014, 3:3
http://dx.doi.org/10.4172/2169-0022.S1.017

OMICS Group Conferences
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3rd International Conference and Exhibition on
Materials Science & Engineering
October 06-08, 2014 Hilton San Antonio Airport, USA

Synthesis and characterization of sol-gel derived SiO_2-Na_2O-CaO-P_2O_5-MgO bioactive glass as biomaterial

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Bioactive glass samples containing SiO_2-- Na_2O- CaO - P_2O_5- MgO were prepared by sol-gel route. These glasses were characterized to determine their use as biomaterials. The nucleation and crystallization regimes were determined by differential thermal analysis (DTA) and the controlled crystallization of glass samples were carried out by heattreatment. The crystalline phase formed after heat treatment was identified using X-ray powder diffraction technique. Bioactivity of these glasses was measured before and after immersion of glass samples in simulated body fluid (SBF) for different time periods. The formation of hydroxyl carbonate apatite (HCA) layer was identified by FTIR spectrometry, scanning electron microscope (SEM) and XRD which showed the presence of HCA as the main phase in all tested bioglass samples. The pH measurement of the SBF solution after immersion of the samples for different time periods also showed the formation of HCA through different stages of chemical reactions on the surface of the bioglass samples. In-vitro studies of glass samples in SBF had shown that the pH of the solution increased with increasing time period after immersion during initial stages of reaction and after attaining maxima it further decreased with increasing time period. This indicated that the bioactivity of the samples had increased with increasing duration of time and on later stages the decrease in pH of the solution with time had shown that the bioactivity of the samples had decreased.

Biography

Himanshu Tripathi has completed his MTech in Ceramic Engineering at the age of 21 from Indian Institute of Technology (Banaras Hindu University), India and pursuing his PhD from same institute. His area of research is bioactive glasses. He is working for his research work as a teaching assistant in the department of Ceramic Engg of the institute. He has taught several theories and practical classes at BTech and MTech levels in Ceramic Engineering. He has published two papers in reputed international journals. He has orally presented several research papers in various national and international seminars, symposia and conferences.

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Synthesis and characterization of Li-modified $AgTaO_3$

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$(Li_xAg_{1-x})TaO_3$ (LAT), $0 \le x \le 0.15$, ceramics have been fabricated by the mixed oxide route. Compositions with $x \le 0.1$ were single phase and could be indexed according to the Rhombohedral, R3c or R3c, structure. XRD traces of ceramics with $x > 0.1$ showed second phase peaks associated to $LiTaO_3$ and $Ag_2Ta_8O_{21}$. It was noticed that the ranges of metastable and stable phase solubility limits of Li in $AgTaO_3$ are $x < 0.05$ and $0.10 < x < 0.15$ respectively. Raman and dielectric measurements confirmed the existence of ferroelectric state in ceramics with $x \ge 0.05$. This triggering of ferroelectricity supports the premise that substitution of smaller ion increases the displacement of the A-site cation. The transition temperature was found to increase as a function of increasing Li-concentration. Raman spectra and electron diffraction patterns at temperatures <100 K showed that Li-doped $AgTaO_3$ ceramics seem to adopt new octahedral tilt systems, inconsistent with $AgTaO_3$ phase diagram.

Biography

Hidayat Ullah Khan did his PhD in August 2011 at the age of 37 years from the Universityof Sheffield, UK. He is Assistant Professor at the Institute of Physics & Electronics, University of Peshawar, Pakistan. He has published two papers in the Journal of Applied Physics and one paper in Journal of the Pakistan Materials Society. His research includes fabrication of electroceramics and study of their phase transitions, electrical properties and crystal structures, and their relationship.

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