OMICS Group Conferences
Accelerating Scientific Discovery

International Conference on
Tissue Science & Engineering

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

Synthesis of Sr incorporated hydroxyapatite by ion implantation

Tapash R. Rautray[1], Suman S. Nayak[2], Satya R. Das[3] and Kyo-Han Kim[4]

[1]Centre of Excellence in Theoretical and Math Sciences, SOA University, India
[2]University of Illinois at Urbana Champaign, USA
[3]Department of Computer Science, Institute of Technical education and Research, SOA University, India
[4]Institute for Biomaterials Research and Development, Republic of Korea

Hydroxyapatite (HA) was synthesized by ion implantation of Ca^{2+} and P^{2+} beams by using an electrostatic medium energy accelerator. Oxygen injection had a major role in the formation of HA. Sr^{2+} ions were implanted into HA formed on Ti. In vitro studies of the Sr^{2+} ion implanted HA coating layer showed better cell response as compared to the pure HA layer formed on titanium. Ti substrates were implanted with ^{31}P, ^{40}Ca and ^{88}Sr beams using a 3 MV electrostatic accelerator. XRD, SEM and PIXE confirmed the phase, morphology and elemental concentration respectively of the samples, whereas adhesion strength, hardness, contact angle and in vitro tests were carried out to know the properties of the samples. Higher ratio of Ca/P in both the coatings means more bone conductivity leading to higher biological activity. The tensile pull-off strength of HA was 41.5 MPa and that of Sr^{2+} ion implanted HA was 40.2 MPa. Sr^{2+} ion implanted HA coating was found to be more hydrophilic than pure HA coating surface. The osteoblast cells spread and formed lamellae on the coating surfaces. But Sr^{2+} ion implanted HA had shown higher osteoblast cell count and higher protein activity. Presence of strontium in the coating had better osteoblast activity and differentiation. The synthesized specimens had excellent adhesion (increased penetration depth) strength with the substrate. Implantation of Ca and P ions into Ti substrate to successfully form HA and subsequently Sr ion implantation in this layer was carried out.

Biography

Tapash R. Rautray obtained his PhD from National Institute of Technology, Rourkela, India, continued his postdoctoral studies at Kyungpook National University, South Korea and served as a Research Professor there. He has published more than 47 journal papers, 2 books and 4 book chapters and continues his works in the field of tissue engineering.

tapash.rautray@gmail.com