

Preparation of Polycaprolactone, Hydroxyapatite with Alendronate Hybrid Nanocomposite for their Potential use in Bone Tissue Engineering Application

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Biomimetic polymeric scaffolds using polycaprolactone (PCL) as a matrix with hydroxyapatite (HAP) and alendronate (ALD) composite were fabricated using porogen leaching technique. The scaffolds were designed in two steps. Initially, HAP was functionalized with ALD using co-precipitation method to enhance the bioavailability of the drug in composite and in the second step, modified HAP (MHAP) nanoparticles were loaded into the PCL which leads to the formation of scaffolds. Physicochemical characterizations manifested the attachment of HAP with ALD and it was confirmed using ¹H NMR study along with XRD and FTIR, which also evidently validated for the functionalization of the ALD in the composite. The wt% of ALD and MHAP in the composites, as well as in scaffolds respectively was determined using TGA studies. Scaffolds exhibited remarkably improved mechanical strength and exhibited tuneable enzymatic degradation behaviour in lipase. *In Vitro* cytotoxicity and proliferation showed the scaffolds promote the adhesion and growth of bone marrow cells onto its surface. Scaffolds with appropriate mechanical strength and tunable degradation rate with enhancing cell growth hold the potential as used in bone tissue engineering.

Keywords: Scaffold, hydroxyapatite, alendronate, tissue engineering, drug delivery, hybrid composite.

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Biography

Mr. Deepak Poddar is working as a teaching research fellow (TRF) pursuing his Ph.D. from Department of Chemistry, Netaji Subhas University of Technology (N.S.U.T) (erstwhile Netaji Subhash Institute of Technology, University of Delhi), Delhi, India in the area of biomedical applications of polymers and specifically on the development of sustainable structure and material for bone and tissue engineering applications. Currently he is working in diverse field of exploration such as corrosion inhibition of Schiff base complexes, solar cell and polymer synthesis, as well as in area of polymer composite for several applications. Before joining N.S.U.T Delhi, he was working as a research fellow (RF) at the C.S.I.R-IITR (Indian Institute of Toxicology Research) Lucknow. He also has an M.Sc. and B.Sc. degree in Polymer Science and Technology from C.I.P.E.T Ahmedabad and University of Delhi respectively.