

Polymer Nanocomposite Scaffolds for Tissue Engineering

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Abstract

Biodegradable polymer scaffolds are useful materials to integrate the femoral part of the implant with the bone, and provide a matrix for cellular growth. Synthetic biodegradable polymers can provide temporary scaffold for cell adhesion and expansion both in vitro and in vivo and guide tissue regeneration with defined sizes and shapes. The fibrillar structure is important for cell attachment, proliferation and differentiated function in tissue engineering. The structure allows for growth and is convenient for transport of nutrients. The synthetic polymers such as Polycaprolactone (PCL), Poly L-lactic acid (PLLA), and their copolymers have attracted wide attention for their biodegradation in the human body and are used for tissue engineering. Several methods have been practiced to create highly porous scaffolds including fiber bonding, solvent casting/ salt leaching, gas foaming, phase separation and electrospinning. Out of which electrospinning is the simple and cost-effective technique for producing nanofibers from polymer solution. Introduction of organically modified clay in polymers leads to different types of structures which include intercalated or exfoliated morphology. The nano reinforcement increases the mechanical rigidity, mobility, stiffness and biodegradability in biodegradable polymers. Moreover, it also increases the porosity of the polymer nanocomposite. Nanoparticle reinforced scaffolds are yet to achieve importance. In fact they have a wide range of interests in tissue engineering. Literature reports regarding nanoparticle reinforced scaffolds are very scant. Hence the present investigation will be interesting and will find application in tissue engineering in the foreseeable future. In the present talk the state of the art on the synthesis, morphology, structure, properties and applications of dual porous nanocomposite scaffolds will be presented.

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Biography

Sabu Thomas is working at Mahatma Gandhi University, India.