**Development of Functional PLA-based Porous Bone Scaffolds**

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**Abstract**

Osteoblasts play a crucial role in bone development, growth, function, healing, and maintenance. Despite the rapid advancement in implant technology and bone grafting-techniques, there is a high demand for new bone replacement strategies. There are various methods used to produce porous biodegradable polymer scaffolds. However, most of the previous work showed that further post-foaming solvent treatment is needed to increase cell adhesion and proliferation, leading to denature proteins, and thus be harmful to cells and biological tissues. The main objective of this work is to avoid this solvent treatment by designing via the chemical foaming technique a solvent-free PLA open-cell porous scaffold that mimics at best the structure and the function of the extracellular matrix of the natural bone tissue. The originality of this investigation is the use of a specially prepared chemical foaming composite, that we called CFCO, in which a CS-g-PLA copolymer composed of chitosan (CS) grafted with poly-lactic acid (PLA) was integrated at various concentrations. So, during the decomposition of the CFCO to generate scaffolds’ porosity, the CS-g-PLA copolymer is pushed toward the surface of the pores with its PLA component localized inside the PLA matrix and the CS side immobilized on the surface of the pores during their expansion.

Different foaming parameters, such as the foaming time, temperature, and the foaming agent concentration were characterized to show their effect on the scaffold’s morphology, particularly its average cell size. Finally, the biological characterization of the so-developed porous scaffolds was done and interesting results were observed for both cell adhesion and proliferation.