XXXII Panhellenic Conference on Solid State Physics and Materials Science
Conference Center "Carolos Papoulias", 18-21 September 2016, Ioannina, Greece

Engineering biomaterials for tissue engineering with controlled immunomodulation

M. Chatzinikolaidou[1,2], M. Kaliva[1,2], L. Papadimitriou[1,2],A. Georgopoulou[1,2], E. Mygdali[2], M. Vamvakaki[1,2]

[1]*IESL-FORTH, Heraklio, Greece*
[2]*Dept. of Materials Science and Technology, University of Crete, P.O. Box 2208, 71003 Heraklio, Greece*

Biodegradablebiomaterial scaffolds are useful tools to conduct tissue development. At the same time biomaterials have an impact on the host immune response. The induced immune response is essential since it can facilitate the healing process. It is therefore important to predict and promote the proper immune response after implantation. The aim of the present study is to synthesize and characterize chitosan-*grafted*-poly(ε-caprolactone) copolymers (CS-*g*-PCL) with PCL contents of 20 wt% and 50 wt% and evaluate (i) their immunomodulatory potential by analyzing the differentiation of primary bone marrow derived macrophages (BMDMs) cultured on copolymeric films, (ii) the osteogenic differentiation potential of pre-osteoblastic cells on copolymericfilms, and (iii) the angiogenic potential of the copolymeric materials.
We have successfully synthesized novel CS-*g*-PCL copolymers and prepared thin films on glass substrates. *In vitro* experiments of BMDMs onto CS-*g*-PCL films have shown a strong cell attachment and good cell proliferation after 7 days in cell culture. The CS-*g*-PCL copolymer with the higher PCL content exhibited anti-inflammatory action on macrophages, which was attributed to their higher CS content.We demonstrate an enhanced osteogenic response of pre-osteoblastic cells on CS-*g*-PCL copolymers and a pronounced angiogenic differentiation potential of human umbilical vein endothelial cells, supporting their potential use as scaffolds in vascularized bone tissue engineering.