Effects of lactic acid on degradation of electrospun poly(ε-caprolactone) fibers

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ABSTRACT

Electrospinning of poly(ε-caprolactone)/lactic acid (PCL/LA) blend was investigated to fabricate electrospun PCL fibers with improved biodegradability and biocompatibility for biomedical applications. Simple blending of PCL solution with different amounts of LA was used for electrospinning and physicochemical properties of as-fabricated mat was evaluated using different techniques. Scanning electron microscopy showed that fiber diameter decreased with increasing amount of LA. FT-IR and TGA also revealed that LA was successfully incorporated through PCL fibers. Presence of LA could accelerate the biodegradation of PCL fibers and enhance the hydrophilicity of the membrane. The adhesion, viability, and proliferation properties of osteoblast cells on the PCL/LA composite fibers were analyzed by in vitro cell compatibility test which showed that LA can increase the cell compatibility of PCL fibers. Additionally, subsequent conversion of LA into calcium lactate (CL) by neutralization with calcium base could provide Ca++ ions on fiber surface to promote the nucleation of CaPO4 particles.

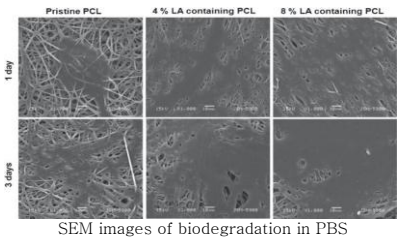
Keywords: PCL; Lactic acid; Nanofibers; Biomaterials; Electrospinning

References

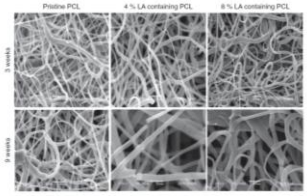
[1] D. W. Hutmacher, *Biomaterials* **21:**2529-2543 (2000).

[2] Q. Z. Chen, S. L. Liang and G. A. Thouas, *Prog Polym Sci* **38:**584-671 (2013).

[3] H. Y. Tian, Z. H. Tang, X. L. Zhuang, X. S. Chen and X. B. Jing, *Prog Polym Sci* **37:**237-280 (2012)



SEM images of biodegradation in PBS



Morphology of osteoblast cells on various mats after 1 and 3 days of cell culture