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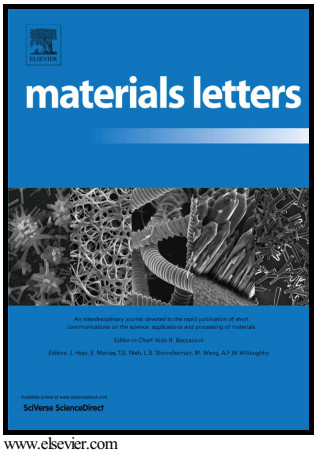

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Fabrication of nanofibrous tubular scaffolds for bone tissue engineering

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Abstract

Nanofibrous tubular poly(L-lactic acid) (PLLA) scaffolds were fabricated by centrifugation combined with thermally induced phase separation technique using PLLA/1,4-dioxane/water ternary system, at input voltage of 4.00 V and phase separation temperature of −15 °C. Addition of sucrose led to the generation of porous scaffolds with interconnected pores. Input voltage was the crucial factor to generate nanofibrous tubular scaffold that mimicked the structural features of the biological systems. The surface of nanofibrous tubular scaffold provided a good environment for attachment and proliferation of MC3T3-E1 subclone 14 cells, exhibiting significant potential for bone tissue regeneration.

Keywords: biomaterials; polymer; centrifugation; nanofibrous tubular scaffolds; bone tissue engineering; thermally induced phase separation

1. Introduction

Tissue engineering aims to exploit and develop biologically functional living succedaneums for diseased tissues [1]. Researchers have fabricated scaffolds for tissue engineering, possessing structure and properties similar to the autologous tissue, for promoting cell differentiation and tissue regeneration [2–4]. Recently, nanofibrous scaffolds have attracted significant interest in tissue