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Keywords	Electrospinning, Nanofiber, Post-Spin Treatment, Silk Fibroin
Abstract	In this study, regenerated silk fibroin (RSF, from Bombyx mori) nanofibers with smooth surface had been successfully prepared via electrospinning, as shown by SEM and then as-spun fibers were induced under 75% ethanol vapor. We aimed to investigate the morphology and structure change of 75% ethanol vapor-induced silk fibroin nanofibers. To determine any difference in surface topographies, the nanofibers were inspected using atomic force microscope (AFM) and the results showed that after inducement of 75% ethanol vapor for 24 h, the surface of fibers became rough. Differential Scanning Calorimetry (DSC) analysis indicated that electrospun SF nanofibrous membranes typically took silk I form and 75% ethanol vapor-induced SF nanofibrous membranes took silk II structure. These results suggested that 75% ethanol vapor inducement could be an attractive alternative to expand the application of RSF.
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Ethanol vapor-induced morphology and structure change of silk fibroin nanofibers

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Keyword: silk fibroin, electrospinning, nanofibers, post-spin treatment

Abstract. In this study, regenerated silk fibroin (RSF, from *Bombyx mori*) nanofibers with smooth surface had been successfully prepared via electrospinning, as shown by SEM and then as-spun fibers were induced under 75% ethanol vapor. We aimed to investigate the morphology and structure change of 75% ethanol vapor-induced silk fibroin nanofibers. To determine any difference in surface topographies, the nanofibers were inspected using atomic force microscope (AFM) and the results showed that after inducement of 75% ethanol vapor for 24 h, the surface of fibers became rough. Differential Scanning Calorimetry (DSC) analysis indicated that electrospun SF nanofibrous membranes typically took silk I form and 75% ethanol vapor-induced SF nanofibrous membranes took silk II structure. These results suggested that 75% ethanol vapor inducement could be an attractive alternative to expand the application of RSF.

Introduction

As a main component of silkworm silk, silk fibroin (SF) is a naturally occurring protein polymer. Recently, SF has captured much more attention, due to its distinguishing properties including remarkable biocompatibility and biodegradability, good oxygen and water vapor permeability, low inflammatory response, unique mechanical properties and so on [1-8].

Electrospinning is a simple, effective and flexible approach to fabricate nanofibers of different materials in diverse fibrous assemblies [9]. In resent years, growing attention was paid to electrospinning of SF for mimicking the extracellular matrix (ECM) [1,10-13]. It had been demonstrated that SF nanofibrous membranes can promote cell attachment and proliferation significantly compared with cast films [14].

It is widely accepted that tissue engineering is a methodology that reconstructs a tissue or organ *in vitro* and *in vivo*. Therefore, various properties of the biomaterial scaffold regulate the process of tissue regeneration including the morphology and structure of nanofibers, thermal behavior, good biocompatibility and so on. In this study, we aimed to investigate 75% ethanol vapor-induced morphology and structure change of SF nanofibers.