

FABRICATION OF UNSMOOTH BAMBOO-LIKE NANOFIBERS

by

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Short paper

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Effect of post drawing on morphology of bubbfil-spun polyvinyl alcohol nanofibers was firstly investigated. Bamboo-like nanofibers were observed after drawing. The increase of surface area of the unsmooth fibers has many potential applications in various fields.

Key words: bubble electrospinning, bubbfil spinning, polyvinyl alcohol, post-drawn, bamboo-like

Introduction

Unsmooth fibers have large surface area compared with its smooth partner with same diameter. The classical spinning process, however, always produces smooth fibers, though beaded fibers and other unsmooth fibers were reported [1]. This paper is to convert the smooth fibers into unsmooth ones by post drawing, the sample polyvinyl alcohol (PVA) nanofibers are obtained by the bubbfil spinning [2-4].

Experimental

Bubbfil spinning, which is a development of bubble electrospinning, is used to fabricate PVA nanofibers from PVA solution with concentration of 8 wt.%. A high electric potential of 20 kV is applied, and the receptor distance is 25 cm from the solution. The morphology of nanofibers was observed using a scanning electron microscope (SEM) (Hitachi S-4800, Japan) at 20 °C, 60 RH.

Results and discussion

Figure 1 is SEM illustrations for as-spun and post-drawn PVA nanofibers. It is obvious that the diameter of the fibers reduces greatly, see fig. 1(b), and its surface morphology changes from smooth one to bamboo-like surface, see fig. 1(e). The surface area has been remarkably increased due to the reduced fiber and unsmooth surface, and the treated fibers have many potential applications in catalyst, energy storage, and stealth materials.

Conclusions

The paper concludes that the post-drawing is an effective approach to surface modification of nanofibers. Some mechanical properties and thermal properties can be remarkably

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enhanced after treatment, and the treated fibers have many potentials applications in filtration and other fields.

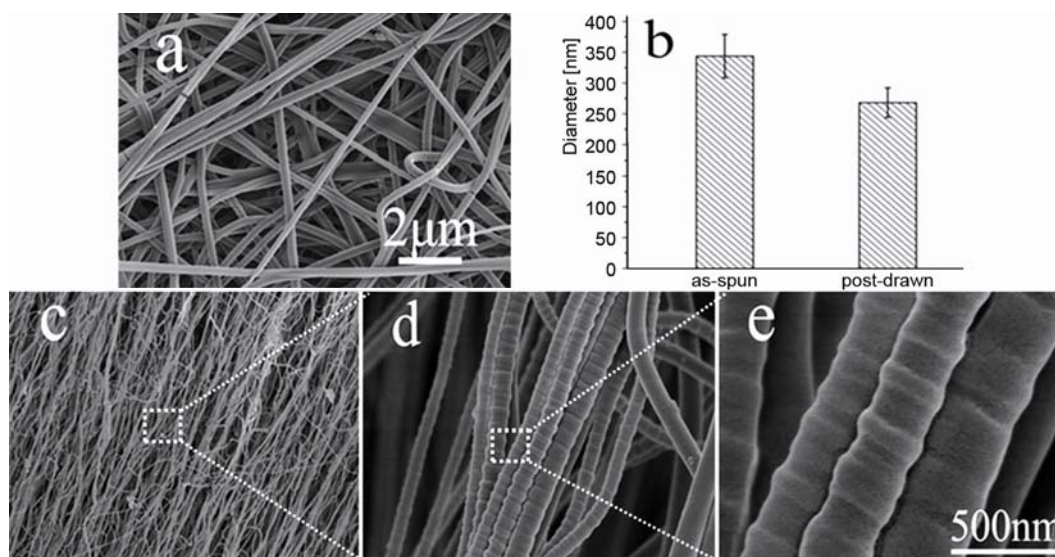


Figure 1. The SEM illustrations for as-spun and post-draw PVA nanofibers; (a) as-spun PVA nanofibers, (b) diameter comparison between as-spun and post-drawn nanofibers, (c)-(e) post-drawn nanofibers

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