

NEW TRENDS AND ACHIEVEMENTS IN PRODUCTION OF NANOFIBERS-BASED FILTER MEDIA

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Abstract:

The use of fine fiber has become an important design tool for filter media. Nanofibers based filter media have some advantages as lower energy consumption, longer filter life, high filtration capacity, easier maintenance, low weight rather than other filter medias [1-3]. The nanofibers based filter media made up of fibers of diameter ranging from 100 to 1000 nm can be conveniently produce by electrospinning technique (Figure 1)[4,5]. Common filter media have been prepared with a layer of fine fiber on typically formed the upstream or intake side of the media structure. The fine fiber increases the efficiency of filtration by trapping small particles which increases the overall particulate filtration efficiency of the structure. Improved fine fiber structures have been developed in this study in which a controlled amount of fine fiber is placed on both sides of the media to result in an improvement in filter efficiency and a substantial improvement in lifetime.

In this research, regenerated silk fibroin obtained from industrial silk wastes were used to produce filter media. Figure 2 shows a typical cross section of SEM for nanomatt based silk fibroin nanofiber produced.

Characteristics such as fibers diameter and its distribution, representative pore size, porosity and matt thickness of nanofiber filters which obtained in lab was examined by scanning electron microscopy (SEM). The air permeability of this new nanofilter was investigated using air flow meter instruments.

References:

- [1] R. Gopal, S. Kaur, Z. Ma, C. Chan, S. Ramakrishna, T. Matsuura, *Journal of Membrane Science*, **281** (2006) 581–586.
- [2] Y.C. Ahn, S.K. Park, G.T. Kim, Y.J. Hwang, C.G. Lee, H.S. Shin, J.K. Lee, *Current Applied Physics*, **6** (2006) 1030–1035.
- [3] R.S. Barhate, C. K. Loong, S. Ramakrishna, *Journal of Membrane Science*, **283** (2006) 209–218.
- [4] A.K.Haghi and M. Akbari, *Physica Status Solidi*, DOI , 2007.
- [5] A.K.Haghi , M. Akbari and V. Mottaghitalab, "*Electrospinning of natural fibers*" , Book Chapter: in "Natural Fiber Reinforced Polymer Composites" Edited by S. Thomas and L.A. Pothan, Old City Publishing, USA,(2007).

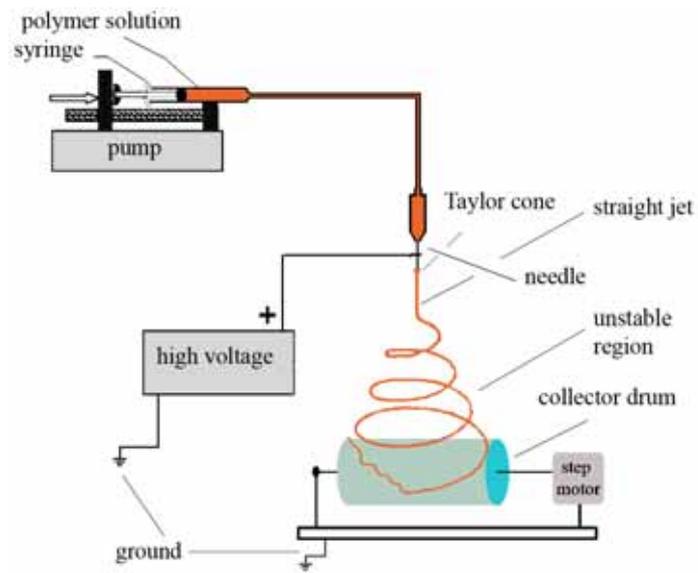


Figure1. Schematic of electrospinning set up for producing nanofilter.

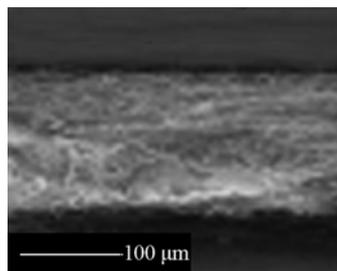


Figure2. Scanning electron microscopy of cross sectional silk fibroin nanofiber matt.